Thesaurus on Image Analysis

Abbreviations and Relationship Indicators

Term record is organized as follows:

Descriptor	
RUS	Russian Term
UF	Used For
SEC	Thematic Section
DEF	Definition
BT	Broader Term
BTG	Broader Term (Generic)
BTP	Broader Term (Partitive)
NT	Narrower Tem
NTG	Narrower Term (Generic)
NTP	Narrower Term (Partitive)
RT	Related Term

0 … 9

16-bit image
RUS 16-битовое изображение
UF 16-bit picture
SEC IMAGE
DEF 16-bit image. An image where 16 bits are allocated for each pixel giving a possible range of 65 536 tones or colours [Davies, 2005]
BTG image
RT 1-bit image
24-bit image
4-bit image
8-bit image

1-bit image
RUS 1-битовое изображение
UF 1-bit picture
SEC IMAGE
DEF 1-bit image. An image comprising pixels that contain only a single bit of information – each pixel is either on or off. Usually, “on” refers to white, while “off” is black [Relf, 2003]
BTG image
RT 16-bit image
24-bit image
4-bit image
8-bit image

2.5D image
RUS 2.5-мерное изображение
UF 2.5D picture
SEC IMAGE
DEF 2.5D image. A range image obtained by scanning from a single viewpoint. This allows the data to be represented in a single image array, where each pixel value encodes the distance to the observed scene. The reason this is not called a 3D image is to make explicit the fact that the back sides of the scene objects are not represented [Fisher, 2005]
BTG image
RT 2D image
3D image

24-bit image
RUS 24-битовое изображение
UF 24-bit picture
SEC IMAGE
DEF 24-bit image. A 24-bit image contains pixels made up of RGB byte triplets [Relf, 2003]

24-bit image. An image where 24 bits are allocated for each pixel giving a possible range of 16.7 million colours. Such images would normally consist of three 8 bit channels (usually red, green and blue) [Davies, 2005]
BTG image
RT 16-bit image
1-bit image
4-bit image
8-bit image

2D image
RUS двухмерное изображение
UF 2D picture
two-dimensional image
two-dimensional picture
SEC IMAGE
DEF 2D image: A matrix of data representing samples taken at discrete intervals. The data may be from a variety of sources and sampled in a variety of ways. In computer vision applications the image values are often encoded color or monochrome intensity samples taken by digital cameras but may also be range data [Fisher, 2005]
BTG image
RT 2.5D image
3D image

3D image
RUS трехмерное изображение
UF 3D picture
three-dimensional image
three-dimensional picture
SEC IMAGE
BTG image
RT 2.5D image
2D image

4-bit image
RUS 4-битовое изображение
UF 4-bit picture
SEC IMAGE
DEF 4-bit image. An image file format that allows for 4-bits of image-based data per pixel. Such an image can contain up to 16 different colors or levels of gray [Relf, 2003]
BTG image
RT 16-bit image
1-bit image
24-bit image
8-bit image

4-connected region
RUS 4-х связная область
SEC IMAGE
DEF A region R is connected if there is a path between any two resolution cells contained in R. More precisely, R is 4-connected if for each pair of resolution cells (r,c) and (u,v) belonging to R, there exists some sequence $<(a_1,b_1),(a_2,b_2),...,(a_m,b_m)>$ of resolution cells belonging to R such that $(r,c)=(a_1,b_1)$, $(u,v)=(a_m,b_m)$, and (a_i,b_i), is 4-connected to (a_{i+1},b_{i+1}), $i=1,...,m-1$.
[Haralick, 1991]
BTG connected region
RT 8-connected region

8-bit image
RUS 8-битовое изображение
UF 8-bit picture
SEC IMAGE
DEF 8-bit image. An image where each pixel contains 8 bits of information. An 8-bit pixel can take on one of 256 possible values. There are two common types of 8-bit images: grayscale and indexed color. In grayscale images, each pixel is represented as one of 256 shades linearly distributed of gray from 0 (usually black) to 256 (usually white), and therefore does not require a palette (but often contains one anyway). Indexed color images always contain a palette, and each pixel is an index to a color in the palette of 256 colors [Relf, 2003]

8-bit image. An image where 8 bits are allocated for each pixel giving a possible range of 256 tones or colours [Davies, 2005]
BTG image
RT 16-bit image
1-bit image
24-bit image
4-bit image

8-connected region
RUS 8-ми связная область
SEC IMAGE
DEF A region R is connected if there is a path between any two resolution cells contained in R. More precisely, R is 8-connected if for each pair of resolution cells (r,c) and (u,v) belonging to R, there exists some sequence $<(a_1,b_1),(a_2,b_2),...,(a_m,b_m)>$ of resolution cells belonging to R such that $(r,c)=(a_1,b_1)$, $(u,v)=(a_m,b_m)$, and (a_i,b_i) is 8-connected to (a_{i+1},b_{i+1}), $i=1,...,m-1$.
[Haralick, 1991]
BTG connected region
RT 4-connected region

A

adaptive edge detection
RUS адаптивное выделение яркостных переходов
UF adaptive edge extraction
SEC IMAGE ANALYSIS
DEF Adaptive edge detection: Edge detection with adaptive thresholding of the gradient magnitude image [Fisher, 2005]
BTG edge detection method

adaptive filter
RUS адаптивный фильтр
SEC IMAGE PROCESSING
DEF Adaptive filters — filters that change their characteristics as they are applied to an image [Myler, 1993]
BTG image filter
RT adaptive filtering

adaptive filtering
RUS адаптивная фильтрация
SEC IMAGE PROCESSING
DEF Adaptive filtering: In signal processing, any filtering process in which the parameters of the filter change over time, or where the parameters are different at different parts of the signal or image [Fisher, 2005]
BTG image filtering method
RT adaptive filter

adaptive histogram equalization
RUS адаптивное выравнивание гистограммы
SEC IMAGE PROCESSING
DEF Adaptive histogram equalization: A localized method of improving image contrast. A histogram is constructed of the gray levels present. These gray levels are re-mapped so that the histogram is

approximately flat. It can be made perfectly flat by dithering [Fisher, 2005]
BTG histogram equalization

adaptive smoothing
RUS адаптивное сглаживание (изображений)
SEC IMAGE PROCESSING
DEF Adaptive smoothing: An iterative smoothing algorithm that avoids smoothing over edges. Given an image $I(x,y)$, one iteration of adaptive smoothing proceeds as follows: 1. Compute gradient magnitude image $G(x,y)=|\nabla I(x,y)|$. 2. Make weights image $W(x,y)=e^{-\lambda G(x,y)}$. 3. Smooth the image $S(x,y)=\frac{\sum_{i=-1}^{1}\sum_{j=-1}^{1}A_{xyij}}{\sum_{i=-1}^{1}\sum_{j=-1}^{1}B_{xyij}}$, where $A_{xyij}=I(x+i,y+j)W(x+i,y+j)$, $B_{xyij}=W(x+i,y+j)$ [Fisher, 2005]
BTG image smoothing method

adaptive thresholding
RUS пороговая обработка (изображений) с адаптивным порогом
SEC IMAGE ANALYSIS
DEF Adaptive thresholding: An improved image thresholding technique where the threshold value is varied at each pixel. A common technique is to use the average intensity in a neighbourhood to set the threshold [Fisher, 2005]
BTG image thresholding

additive noise
RUS аддитивный шум
SEC IMAGE
DEF Additive noise: Generally image independent noise that is added to it by some external process. The recorded image I at pixel (i,j) is then the sum of the true signal S and the noise N. $I_{i,j}=S_{i,j}+N_{i,j}$. The noise added at each pixel (i,j) could be different [Fisher, 2005]
BTG image noise

additive primary colors
RUS аддитивные основные цвета
UF additive primaries
additive primary colours
SEC IMAGE
DEF Additive primary colors. Red, green and blue; the colors used to create all other colors when direct or transmitted light is used. They are called “additive primaries” because they produce white when superimposed [Relf, 2003]
RT color

adjacency graph
RUS граф смежности
SEC MATHEMATICS
DEF A graph that shows the adjacency between structures, such as segmented image regions. The nodes of the graph are the structures and an arc implies adjacency of the two structures connected by the arc [Fisher, 2005]
RT region adjacency graph

affine image transformation
RUS аффинное преобразование изображений
SEC IMAGE PROCESSING
DEF Image transformation, affine: mapping of pictorial data based on a linear coordinate transformation [Klette, 1996]
BTG geometric transformation method
RT affine transformation

affine transformation
RUS аффинное преобразование
SEC MATHEMATICS
DEF Affine transformation: A special set of transformations in Euclidean geometry that preserve some properties of the construct being transformed. Affine transformations preserve: 1) Collinearity of points: if three points belong to the same straight line, their images under affine transformations also belong to the same line and the middle point remains between the other two points. 2) Parallel lines remain parallel, concurrent lines remain concurrent (images of intersecting lines intersect). 3) The ratio of length of line segments of a given line remains constant. 4) The ratio of areas of two triangles remains constant. 5) Ellipses remain ellipses and the same is true for parabolas and hyperbolas. 6) Barycenters of triangles (and other shapes) map into the corresponding barycenters. Analytically, affine transformations are represented in the matrix form f(x)=Ax+b where the determinant det(A) of the square matrix A is not 0. In 2D the matrix is 2 x 2; in 3D it is 3 x 3 [Fisher, 2005]
RT affine image transformation

algebraic distance
RUS алгебраическое расстояние
SEC MATHEMATICS
DEF Algebraic distance: A linear distance

metric commonly used in computer vision applications because of its simple form and standard matrix based least mean square estimation operations. If a curve or surface is defined implicitly by $f(\vec{x},\vec{a})=0$ (e.g., $\vec{x}\cdot\vec{a}=0$ for a hyper-plane) the algebraic distance of a point $\vec{x}_i$ to the surface is simply $f(\vec{x}_i,\vec{a})$ [Fisher, 2005]

BTG distance function

analog image

RUS аналоговое изображение
UF analog picture
continuous image
continuous picture
SEC IMAGE
DEF An analog image is a 2D image F(*x*,*y*) which has infinite precision in spatial parameters *x* and *y* and infinite precision in intensity at each spatial point (*x*,y) [Shapiro, 2001]
BTG image
RT digital image

AND operator

RUS оператор логического умножения (изображений)
SEC IMAGE PROCESSING
DEF AND operator: A Boolean logic operator that combines two input binary images, applying the AND logic at each pair of corresponding pixels. This approach is used to select image regions [Fisher, 2005]
BTG logical operator
RT NAND operator
NOT operator
OR operator
XOR operator

anisotropic filtering

RUS анизотропная фильтрация
SEC IMAGE PROCESSING
DEF Image filtering that produces different amounts of filtering (e.g., smoothing filtering in different directions at each pixel in an image). Two uses of anisotropic filtering in graphics are to: (1) produce textures with different spatial frequency distributions in different directions, and (2) to reduce aliasing effects along edge without blurring the edges as much. Anisotropic filtering can be done in either image or the frequency domains [Laplante, 2000]

Anisotropic filtering: Any filtering technique where the filter parameters vary over the image or signal being filtered [Fisher, 2005]
BTG image filtering method
RT bilateral filtering

area of a region

RUS площадь области
SEC IMAGE ANALYSIS
DEF Area: In image processing, the number of pixels in a region [IEEE, 1990]

The area *A* of a region *R* is defined by $A=[\#R]\cdot s$ where *s* is the scale factor which specifies the area of a pixel [Haralick, 1991]

Area: The measure of a region or surface's extension in some given units. The units could be image units such as square pixels, or in scene units, such as square centimeters [Fisher, 2005]
BTG region descriptor
RT region

area-based image operation

RUS операция на локальных окрестностях изображения
UF area-based operation
SEC IMAGE PROCESSING
DEF Area based: Image operation that is applied to a region of an image, as opposed to pixel based [Fisher, 2005]
BTG image processing operation

arithmetic coding

RUS арифметическое кодирование
SEC IMAGE PROCESSING
DEF Arithmetic coding: a method (due to Elias, Pasco, Rissanen, and others) for lossless data compression. This incremental coding algorithm works efficiently for long block lengths and achieves an average length within one bit of the entropy for the block. The name comes from the fact that the method utilizes the structures of binary expansions of the real numbers in the unit interval [Laplante, 2001]

In arithmetic coding, a one-to-one correspondence between source symbols and code words does not exist. Instead, an entire sequence of source symbols (or message) is assigned a single arithmetic code word. The code word itself defines an interval of real numbers between 0 and 1. As the number of symbols in the message increases, the interval used to represent it becomes smaller and the number of information units (say, bits) required to represent the interval becomes larger. Each symbol of the message reduces the size of the interval in

accordance with its probability of occurrence [Gonzalez, 2002]
BTG variable length coding

arithmetic operator
RUS арифметический оператор (изображений)
SEC IMAGE
BTG image processing operator
RT arithmetic-based transformation method
image arithmetic

arithmetic-based transformation method
RUS метод преобразования изображений, основанный на применении арифметических операций
SEC IMAGE PROCESSING
BTG image processing method
NTG image blending
image subtraction
RT arithmetic operator
image arithmetic

arithmetical feature
RUS арифметический признак
SEC IMAGE
DEF By an arithmetical feature, we mean the result of calculation of the number of pixels with certain properties. In particular, measurable features are arithmetical, because they are obtained by applying arithmetical operations to an image obtained from the original one by the binarization algorithm. As examples, we may mention the sum of the intensities of pixels of an object, the perimeter and volume of the object, features obtained by partitioning into zones, etc. [Gurevich, 2006]
BTG image feature
RT combinatorial feature
logical feature
matrix feature
topological feature

aspect ratio
RUS формат изображения
SEC IMAGE
DEF The ratio of an image's width to its height. Standard television has an aspect ratio of 4:3, while motion pictures have an aspect ratio of 16:9 [Smith, 1999]

Aspect ratio: (1) the size invariant ratio of length to width for a rectangular box enclosing a shape, the orientation of the box being chosen to maximize the ratio. This measure is used to characterize object shapes as a preliminary to, or as a quick procedure for, object recognition. (2) In a computer display, the ratio of the length of the x-coordinate range to the y-coordinate range [Laplante, 2001]

Aspect ratio: In an image, it is the ratio of the image width to height. For example, an image of 640 by 480 pixels has an aspect ratio of 4:3 [Fisher, 2005]

The relationship between the width and height of a recorded or displayed image. For television it is 4:3 [Davies, 2005]
RT image

average filter
RUS усредняющий фильтр
SEC IMAGE PROCESSING
DEF Average filters perform a low-pass filtering of the image and are applied for noise reduction and blurring. Small objects and structures consisting of high frequency components are erased [Sachse, 2004]
BTG image filter
RT image denoising method

B

background
RUS фон
SEC IMAGE
DEF Background: A connected component of a region's complement such that the connected component completely surrounds the region [IEEE, 1990]

Background: union of all image segments which do not belong to picture objects. This assumes a binary image model such that segments can be classified either as background or as object segments [Klette, 1996]

Background: In computer vision, generally used in the context of object recognition. The background is either (1) the area of the scene behind an object or objects of interest or (2) the part of the image whose pixels sample from the background in the scene. As opposed to foreground [Fisher, 2005]
BTP image
RT foreground

band-pass filter
RUS полосовой фильтр
UF band pass filter
bandpass filter
SEC IMAGE PROCESSING
DEF A band pass filter is a linear spatial filter which attenuates those spatial frequencies outside the band and accentuates those spatial frequencies within the band. It is typically used to enhance details of the

image whose spatial size characteristics are related to the spatial frequencies within the band [Haralick, 1991]

Bandpass filter: a filter which allows only signals between given set points to propagate, preventing propagation of signals below the lower bound and above the upper bound [Laplante, 2001]

Bandpass filter: A signal processing filtering technique that allows signals between two specified frequencies to pass but cuts out signals at all other frequencies [Fisher, 2005]

BTG image filter
RT linear filter

Beltrami flow
RUS течение Бельтрами
SEC IMAGE PROCESSING
DEF Beltrami flow: A noise suppression technique where images are treated as surfaces and the surface area is minimized in such a way as to preserve edges [Fisher, 2005]
BTG image denoising method

bilateral filtering
RUS двусторонняя фильтрация
SEC IMAGE PROCESSING
DEF Bilateral filtering: A non-iterative alternative to anisotropic filtering where images can be smoothed but edges present in them are preserved [Fisher, 2005]
BTG image filtering method
RT anisotropic filtering

bilevel image
RUS двухуровневое изображение
UF bilevel picture
bi-level image
bi-level picture
two-level image
two-level picture
SEC IMAGE
DEF Bilevel image: image f with only two possible image values f(x,y), e.g., 0 and G-1. Special variants are binary images and halftone images [Klette, 1996]
BTG image
NTG binary image
halftone image
RT binarization
binarization method

binarization
RUS бинаризация (тоновых изображений)
SEC IMAGE PROCESSING
DEF Binarization: transformation of a gray level image into a binary or a half-tone image [Klette, 1996]
BTG image processing task
RT bilevel image
binarization method
gray scale image

binarization method
RUS метод бинаризации (тоновых изображений)
UF binarization algorithm
binarization technique
SEC IMAGE PROCESSING
DEF Binarization: transformation of a gray level image into a binary or a half-tone image. It maps specified gray levels onto value 0, and the other gray levels onto the value 1 (in the binary case), or onto G-1 (normally, if half-tone images are generated). A binarization threshold is the criterion used in the simplest gray level binarization approach [Klette, 1996]
BTG image processing method
RT bilevel image
binarization
binarization threshold
gray scale image

binarization threshold
RUS порог бинаризации
SEC IMAGE PROCESSING
DEF Binarization threshold: value S, $0 \le S < G-1$, that defines a binarization of gray level images f into binary or half-tone images b, according the general rule

$$b(x,y) = \begin{cases} 0, f(x,y) \le S \\ G-1, f(x,y) > S \end{cases}$$

[Klette, 1996]
RT binarization method

binary feature
RUS бинарный признак
SEC IMAGE
DEF Binary features are widely used in image analysis. Any feature calculated by a function on a binary image is a binary feature. Many features calculated in several steps (high level features) are binary; in particular, arithmetical features are calculated in two steps: (1) binarization of a greyscale image by extracting the contours of objects and (2) application of arithmetical operations to the binary image obtained. Binary features are used for recognition of characters, hieroglyphs, faces, fingerprints, humans, motions, etc. The main advantage of binary features is a relatively low computational complexity. This is connected with specificity of representation of binary features [Gurevich, 2006]
BTG image feature

RT binary image
color feature
gray scale feature

binary image
RUS бинарное изображение
UF binary picture
black-and-white image
black-and-white picture
Boolean image
Boolean picture
SEC IMAGE
DEF A binary image is an image in which each pixel takes either the value zero or the value one [Haralick, 1991]

Binary image: an image whose pixels can have only two values, 0 or 1 (i.e., "off" or "on"). The set of pixels having value 1 ("on") is called the figure or foreground, while the set of pixels having value 0 ("off") is called the background. Examples include black/white photographs and facsimile images [Laplante, 2001]

Binary image: An image whose pixels can either be in an 'on' or 'off' state, represented by the integers 1 and 0 respectively [Fisher, 2005]
BTG bilevel image
RT binary feature
binary noise reduction

binary image operation
RUS бинарная операция обработки изображений
UF binary operation
SEC IMAGE PROCESSING
DEF Binary operation: An operation that takes two images as inputs, such as image subtraction [Fisher, 2005]
BTG image processing operation

binary noise reduction
RUS подавление шума на бинарном изображении
SEC IMAGE PROCESSING
DEF Binary noise reduction: A method of removing salt-and-pepper noise from binary images. For example, a point could have its value set to the median value of its eight neighbours [Fisher, 2005]
BTG image denoising method
RT binary image
salt-and-pepper noise

binomial filter
RUS биномиальный фильтр
SEC IMAGE PROCESSING
DEF Binomial filter: linear filter whose discrete impulse answer (*n x n* convolution kernel) is a product of a 1 x *n* column vector and a *n* x 1 row vector. Binomial coefficients $C(n-1,i) = \binom{n-1}{i}$ with i=0,…,n-1 are the components of both vectors [Klette, 1996]
BTG image filter
RT linear filter

biometrics
RUS биометрия
SEC APPLIED PROBLEMS
DEF The science of discriminating individuals from accurate measurement of their physical features. Example biometric measurements are retinal lines, finger lengths, fingerprints, voice characteristics and facial features [Fisher, 2005]
NTG signature identification

bit plane
RUS битовая плоскость
SEC IMAGE
DEF Bit plane: the binary *N* x *N* image formed by selecting the same bit position of the pixels when the pixels of an *N* x *N* image are represented using *k* bits [Laplante, 2001]
RT bit plane coding

bit plane coding
RUS кодирование битовых плоскостей
UF bit plane encoding
bit-plane coding
bit-plane encoding
SEC IMAGE PROCESSING
DEF Lossless binary encoding of the bit planes is termed bit plane encoding. The image is decomposed into a set of *k*, *N* x *N* bit planes from the least significant bit to *k*-1 most significant bits and then encoded for image compression [Laplante, 2001]

The technique, called bit-plane coding, is based on the concept of decomposing a multilevel (monochrome or color) image into a series of binary images and compressing each binary image via one of several well-known binary compression methods [Gonzalez, 2002]

Bit-plane encoding: An image compression technique where the image is broken into bit planes and run length coding is applied to each plane. To get the bit planes of an 8-bit gray scale image, the picture has a Boolean AND operator applied with the binary value corresponding to the desired plane. For example, ANDing the image with

00010000 gives the fifth bit plane [Fisher, 2005]
BTG lossless image compression
NTG constant area coding
run length coding
RT bit plane

BMP
RUS формат BMP
UF bit mapped format
BMP file
BMP file format
SEC IMAGE
BTG image file format

boundary descriptor
RUS дескриптор границы
UF border descriptor
border property
boundary property
SEC IMAGE ANALYSIS
DEF Boundary property: Characteristics of a boundary, such as arc length, curvature, etc. [Fisher, 2005]
BTG region description method
NTG boundary diameter
boundary length
Fourier descriptors
RT boundary of a region

boundary detection
RUS выделение границ (области)
UF border detection
boundary delineation
SEC IMAGE ANALYSIS
DEF Boundary detection or boundary delineation refers to any process which determines a chain of pixels separating one image region from a neighboring image region [Haralick, 1991]
BTG image analysis task
RT boundary of a region
boundary detection method

boundary detection method
RUS метод выделения границ (области)
UF border detection algorithm
border detection method
border detection technique
boundary detection algorithm
boundary detection technique
SEC IMAGE ANALYSIS
DEF Border detection: Any image segmentation technique that identifies borders within a digital image [IEEE, 1990]

Boundary detection: An image processing algorithm that finds and labels the edge pixels between two neighboring image segments after segmentation. The boundary represents physical discontinuities in the scene, for example changes in color, depth, shape or texture [Fisher, 2005]
RT boundary of a region
boundary detection

boundary diameter
RUS диаметр границы
UF border diameter
diameter of a border
diameter of a boundary
SEC IMAGE ANALYSIS
DEF The diameter of a boundary B is defined as $Diam(B) = \max_{i,j}[D(p_i, p_j)]$, where D is a distance measure and p_i and p_j are points on the boundary. The value of the diameter and the orientation of a line segment connecting the two extreme points that comprise the diameter (this line is called the major axis of the boundary) are useful descriptors of a boundary [Gonzalez, 2002]
BTG boundary descriptor
RT boundary of a region

boundary following
RUS прослеживание границ (области)
UF border following
SEC IMAGE ANALYSIS
BTG image analysis task
RT boundary following method
boundary of a region

boundary following method
RUS метод прослеживания границ (области)
UF border following algorithm
border following method
border following technique
boundary following algorithm
boundary following technique
SEC IMAGE ANALYSIS
DEF Boundary following refers to the sequential procedure by which the chain of the boundary pixels of a region can be determined [Haralick, 1991]
BTG image analysis method
RT boundary following
boundary of a region

boundary grouping
RUS группировка границ (области)
UF border grouping
SEC IMAGE ANALYSIS
BTG image analysis task
RT boundary grouping method
boundary of a region

boundary grouping method
RUS метод группировки границ (области)
UF border grouping algorithm

border grouping method
border grouping technique
boundary grouping algorithm
boundary grouping technique
SEC IMAGE ANALYSIS
DEF Boundary grouping: An image processing algorithm that attempts to complete a fully connected image-segment boundary from many broken pieces. A boundary might be broken because it is common-place for sharp transitions in property values to appear in the image as slow transitions, or sometimes disappear due to noise, blurring, digitization artifacts, poor lighting or surface irregularities, etc. [Fisher, 2005]
BTG image analysis method
RT boundary grouping
boundary of a region

boundary length
RUS длина границы
UF border length
length of a border
length of a boundary
SEC IMAGE ANALYSIS
DEF The length of a boundary is one of its simplest descriptors. The number of pixels along a boundary gives a rough approximation of its length. For a chain-coded curve with unit spacing in both directions, the number of vertical and horizontal components plus $\sqrt{2}$ times the number of diagonal components gives its exact length [Gonzalez, 2002]
BTG boundary descriptor
RT boundary of a region

boundary of a region
RUS граница области (на изображении)
UF border
border of a region
contour
region border
region boundary
SEC IMAGE
DEF Border: The set of pixels in a region of a digital image that are adjacent to pixels in the region's complement [IEEE, 1990]

Contour: simple closed curve which bounds a region. A contour is a path of image points. It can be obtained by boundary thinning [Klette, 1996]

Let *R* be a subset of pixels in an image. We call *R* a *region* of the image if *R* is a connected set. The *boundary* (also called *border* or *contour*) of a region *R* is the set of pixels in the region that have one or more neighbors that are not in *R*. If *R* happens to be an entire image (which we recall is a rectangular set of pixels), then its boundary is defined as the set of pixels in the first and last rows and columns of the image. This extra definition is required because an image has no neighbors beyond its border. Normally, when we refer to a region, we are referring to a subset of an image, and any pixels in the boundary of the region that happen to coincide with the border of the image are included implicitly as part of the region boundary. [Gonzalez, 2002]
BTP region
RT boundary description
boundary description method
boundary descriptor
boundary detection
boundary detection method
boundary diameter
boundary following
boundary following method
boundary grouping
boundary grouping method
boundary length
boundary-region fusion
boundary representation
boundary representation method

boundary representation
RUS представление границ (областей)
SEC IMAGE ANALYSIS
BTG image analysis task
RT boundary of a region
boundary representation method

boundary representation method
RUS метод представления границ (областей)
SEC IMAGE ANALYSIS
BTG region representation method
NTG chain code
polygonal approximation
signature
RT boundary of a region
boundary representation

boundary-region fusion
RUS слияние областей
SEC IMAGE ANALYSIS
DEF Boundary-region fusion: Region growing segmentation approach where two adjacent regions are merged when their characteristics are close enough to pass some similarity test. The candidate neighborhood for testing similarity can be the pixels lying near the shared region boundary [Fisher, 2005]
BTG region growing
RT boundary of a region

bounding contour of a region
RUS ограничивающий контур области
SEC IMAGE

DEF The bounding contour of a region R consists of the simple boundary which surrounds the pixels of R [Haralick, 1991]
RT region

bounding rectangle of a region
RUS прямоугольник, ограничивающий область
SEC IMAGE
DEF The bounding rectangle of a region R is a rectangle which circumscribes R. It has its sides aligned with the row and column directions, its leftmost side aligning with the lowest numbered column of R, its rightmost side aligning with the highest numbered column of R, its topmost side aligning with the lowest numbered row of R, and its bottommost side aligning with the highest numbered row of R [Haralick, 1991]
RT region

box filter
RUS фильтр с прямоугольным окном
SEC IMAGE PROCESSING
DEF A box filter is a linear spatial smoothing filter in which each pixel in the filtered image is the equally weighted average of the pixels in a rectangular window centered at its spatial position in the input image [Haralick, 1991]

Box filter: linear low-pass filter in which all coefficients of the convolution kernel are equal [Klette, 1996]
BTG image filter
RT linear filter

brightness
RUS яркость
UF intensity
SEC IMAGE
DEF Brightness: In image processing, a value associated with a point of an image, representing the amount of light projected from a scene in a given direction [IEEE, 1990]

Brightness is a number or value assigned to a position on an image. For optic or photographic sensors, the image intensity at (r,c) is proportional to the integrated output, reflectance, or transmittance of a small area, usually called a resolution cell or pixel, centered on the position (r,c). Its value can be related to transmittance, reflectance, a coordinate of the tristimulus, ICI, YIQ, or RGB color coordinate system, brightness, radiance, luminance, density, voltage, or current [Haralick, 1991]

Brightness — the gray level value of a pixel within an image that corresponds to energy intensity. The larger the gray level value the greater the brightness [Myler, 1993].

Brightness: The quantity of radiation reaching a detector after incidence on a surface. Often measured in lux or ANSI lumens. When translated into an image, the values are scaled to fit the bit patterns available. For example, if an 8-bit byte is used, the maximum value is 255 [Fisher, 2005]
RT brightness adjustment
brightness adjustment method

brightness adjustment
RUS коррекция яркости
SEC IMAGE PROCESSING
DEF Brightness adjustment: Increase or decrease on the luminance of an image [Fisher, 2005]
BTG image processing task
RT brightness
brightness adjustment method
image enhancement

brightness adjustment method
RUS метод коррекции яркости
UF brightness adjustment algorithm
brightness adjustment technique
SEC IMAGE PROCESSING
DEF Increase or decrease on the luminance of an image. To decrease, one can linearly interpolate between the image and a pure black image. To increase, one can linearly extrapolate from a black image and the target. The extrapolation function is $\nu=(1-\alpha)*i_0+\alpha*i_1$ where α is the blending factor (often between 0 and 1), ν is the output pixel value and i_0 and i_1 are the corresponding image and black pixels [Fisher, 2005]
BTG image processing method
RT brightness
brightness adjustment
image enhancement method

butterfly filter
RUS фильтр «бабочка»
SEC IMAGE PROCESSING
DEF Butterfly filter: A linear filter designed to respond to “butterfly” patterns in images. A small butterfly filter convolution kernel is $\begin{matrix} 0 & -2 & 0 \\ 1 & 2 & 1 \\ 0 & -2 & 0 \end{matrix}$. It is often used in conjunction with the Hough transform for finding peaks in the Hough feature space, particularly when searching for lines. The

line parameter values of (p, θ) will generally dive a butterfly shape with a peak at the approximate correct values [Fisher, 2005]
BTG image filter
RT linear filter

C

Canny edge detector
RUS оператор выделения яркостных переходов Кэнни
UF Canny edge detection operator
Canny edge operator
SEC IMAGE ANALYSIS
DEF Canny edge detector: The first of the modern edge detector. It took account of the trade-off between sensitivity of edge detection versus the accuracy of edge localization. The edge detector consists of four stages: 1) Gaussian smoothing to reduce noise and remove small details; 2) gradient magnitude and direction calculation; 3) non-maximal suppression of smaller gradients by larger ones to focus edge localization and 4) gradient magnitude thresholding and linking that uses hysteresis so as to start linking at strong edge positions, but then also track weaker edges [Fisher, 2005]
BTG edge detection method

cardiac image analysis
RUS анализ изображений сердца
SEC APPLIED PROBLEMS
DEF Techniques involving the development of 3D vision algorithms for tracking the motion of the heart from NMR and echocardiographic images [Fisher, 2005]

cascaded Hough transform
RUS каскадное преобразование Хафа
SEC IMAGE PROCESSING
DEF Cascaded Hough transform: An application of several successive Hough transforms, with the output of one transform used as input to the next [Fisher, 2005]
BTG Hough transform

centroid of a region
RUS центроид области
SEC IMAGE
DEF The centroid (r, c) of a region R is the center of mass of the region. It is the mean (row, column) position for all pixels in the region and is given by

$$\bar{r} = \frac{1}{\#R} \sum_{(r,c) \in R} r, \bar{c} = \frac{1}{\#R} \sum_{(r,c) \in R} c .$$

[Haralick, 1991]

BTG region descriptor
RT region

chain code
RUS цепной код
SEC IMAGE ANALYSIS
DEF Chain code: A representation of a curve using line segments that must lie on a fixed grid with a fixed set of orientations. A curve can be compactly expressed as the sequence of integers representing the orientation of each line segment [Fischler, 1987]

The chain code representation of a digital arc or blob boundary is a sequence in which each element is a symbol representing the vector joining two neighboring pixels of the digital arc or blob boundary. The most common chain code uses the symbols 0 to 7 to represent the vectors (0, 1), (-1, 1), (-1, 0), (-1, -1), (0, -1), (1, -1), (-1, -1), and (-1,0) of row column coordinates, which can join two neighboring pixels. More complex chain codes have more symbols and can represent the vector joining two more distant pixels which define the beginning and ending of a digital straight line segment which is part of a digital arc or blob boundary [Haralick, 1991]

An efficient method for contour coding where an arbitrary curve is represented by a sequence of small vectors of unit length in a limited set of possible directions. Depending on whether the 4 connected or 8 connected grid is employed, the chain code is defined as the digits from 0 to 3 or 0 to 7, assigned to the 4 or 8 neighboring grid points in a counter-clockwise sense [Fisher, 2005]
BTG boundary representation method

city-block distance
RUS расстояние городских кварталов
UF Manhattan distance
Manhattan metric
SEC MATHEMATICS
DEF The block or city distance between two points $p = (p_1, ..., p_N)$ and $q = (q_1, ..., q_N)$ is defined by

$$d(p,q) = \sum_{n=1}^{N} | p_n - q_n | .$$

[Haralick, 1991]

Manhattan distance: Also called the Manhattan metric. Motivated by the

problem of only being able to walk along city blocks in dense urban environments, the distance between points (x_1, y_1) and (x_2, y_2) is $|x_1-x_2| + |y_1-y_2|$ [Fisher, 2005]
BTG distance function

class region
RUS область класса
SEC PATTERN RECOGNITION
DEF The region of space occupied by pattern measurements coming from the same class or category is called a class region [Haralick, 1991]
RT pattern class

classifier
RUS классификатор
SEC PATTERN RECOGNITION
DEF A classifier is a device or process that sorts patterns into categories or classes [Haralick, 1991]

Classifier: An algorithm assigning a class among several possible to an input pattern or data [Fisher, 2005]
RT pattern class
pattern classification

cluster
RUS кластер
SEC PATTERN RECOGNITION
DEF Cluster: (1) In image processing, a set of pixels in a digital image that are close to one another and similar in some way. (2) In pattern recognition, a set of points in a feature space that are similar in some way [IEEE, 1990]

A cluster is a homogeneous group of units which are very "like" one another. "Likeness" between units is usually determined by the association, similarity, or distance between the measurement patterns associated with the units [Haralick, 1991]

Cluster: a set of points in a feature space that are close to each other and well separated from other sets of points. A cluster is a natural candidate for a class of objects [Jahne, 2004]
RT cluster analysis
cluster assignment function

cluster analysis
RUS кластерный анализ
SEC IMAGE RECOGNITION
DEF Cluster analysis: (1) The detection and description of clusters in a digital image. (2) The detection and description of clusters in a feature space [IEEE, 1990]

Cluster analysis: the detection and description of clusters in a feature space [Jahne, 2004]
BTG image recognition task
RT cluster

cluster assignment function
RUS функция кластеризации
SEC PATTERN RECOGNITION
DEF A cluster assignment function is a function which assigns each observed unit to a cluster on the basis of the measurement pattern(s) in the data sequence or on the basis of their corresponding features. Sometimes the units are treated independently. In this case the cluster assignment function can be considered as a transformation from measurement space to the set of clusters [Haralick, 1991]
RT cluster

CMYK color model
RUS цветовая модель CMYK
UF CMYK colour model
cyan-magenta-yellow-black color model
cyan-magenta-yellow-black colour model
SEC IMAGE
DEF CMYK: Cyan, magenta, yellow and black color model. It is a subtractive model where colors are absorbed by a medium, for example pigments in paints. Where the RGB color model adds hues to black to generate a particular color, the CMYK model subtracts from white. Red, green and blue are secondary colors in this model [Fisher, 2005]
BTG color model

color
RUS цвет
UF colour
SEC IMAGE
DEF Color: Color is both a physical and psychological phenomenon. Physically, color refers to the nature of an object texture that allows it to reflect or absorb particular parts of the light incident on it. The psychological aspect is characterized by the visual sensation experienced when light of a particular frequency or wavelength is incident on the retina. the key paradox here concerns why light of slightly different wavelengths should be so perceptually different (e.g., red versus blue) [Fisher, 2005]
RT additive primary colors
color co-occurrence matrix
color correction
color correction method
color image
color model

color normalization
hue
saturation

color co-occurrence matrix
RUS матрица взаимосвязи цветов
UF colour co-occurrence matrix
SEC IMAGE
DEF Color co-occurrence matrix: A matrix (actually a histogram) whose elements represent the sum of color values existing, in a given image in a sequence, at a certain pixel position relative to another color existing at a different position an the image [Fisher, 2005]
RT color

color correction
RUS цветовая коррекция
UF colour correction
SEC IMAGE PROCESSING
BTG image processing task
RT color
color correction method
color image
image enhancement

color correction method
RUS метод цветовой коррекции
UF colour correction method
SEC IMAGE PROCESSING
BTG image processing method
NTG color normalization
RT color
color correction
color image
image enhancement method

color feature
RUS яркостный признак (изображения)
UF colour feature
SEC IMAGE RECOGNITION
DEF By color features, we mean features calculated by a function on a color image. The color features are widely used in works connected with color investigation and reconstruction, as well as for identification of faces and natural images; otherwise, authors prefer greyscale features, because they keep all the necessary information with significantly lower computational expenses. To reduce the computational resources required, the authors empirically choose a rule for transformation of the original color images into greyscale ones that conserves the maximum possible amount of information. Color features are also used in recognition of natural images. For example, to characterize uniform regions corresponding to an image of sand, the following features are used: the level of spatial covering, relative location of the characterized region, dominant color and its dispersion, texture features, and wavelet features. These features characterize the main visual properties not only of the uniform region corresponding to the sand image, but also of other regions. Owing to these features, the region can be successfully classified [Gurevich, 2006]
BTG image feature
RT binary feature
color image
gray scale feature

color image
RUS цветное изображение
UF color picture
colour image
colour picture
SEC IMAGE
DEF Color image: An image where each element (pixel) is a tuple of values from a set of color bases [Fisher, 2005]
BTG image
RT color
color correction
color correction method
color feature
color model
color normalization

color model
RUS цветовая модель
UF color representation system
color space
color system
colour model
colour representation system
colour space
colour system
SEC IMAGE
DEF The purpose of a color model (also called color space or color system) is to facilitate the specification of colors in some standard, generally accepted way. In essence, a color model is a specification of a coordinate system and a subspace within that system where each color is represented by a single point.
Most color models in use today are oriented toward hardware (such as for color monitors and printers) or toward applications where color manipulation is a goal (such as in the creation of color graphics for animation). In terms of digital image processing, the hardware-oriented models most commonly used in practice are the RGB (red, green, blue) model for color monitors and a broad class of color video cameras; the CMY (cyan, magenta, yellow) and CMYK

(cyan, magenta, yellow, black) models for color printing; and the HSI (hue, saturation, intensity) model, which corresponds closely with the way humans describe and interpret color. The HSI model also has the advantage that it decouples the color and gray-scale information in an image, making it suitable for many of gray-scale techniques. There are numerous color models in use today due to the fact that color science is a broad field that encompasses many areas of application [Gonzalez, 2002]

Color space: color can be represented in a computer by a triple of values in a number of ways: (1) the intensity of the red, green, and blue components (RGB); (2) the values of the hue, saturation, and intensity (HIS); and (3) intensity and a set of color differences (red-green), (blue-yellow) (YUV). Each of these representational systems defines a color space with different distance relationships existing between a given pair of color vectors [Jahne, 2004]

Color representation system: A 2D or 3D space used to represent a set of absolute color coordinates. RGB and CIE are examples of such spaces [Fisher, 2005]

NTG CMYK color model
RGB color model
RT color
color image

color normalization

RUS нормализации цветов
UF colour normalization
SEC IMAGE PROCESSING
DEF Color normalization: Techniques for normalizing the distribution of color values in a color image, so that the image description is invariant to illumination. One simple method for producing invariance to lightness is to use vectors of unit length for color entries, rather than coordinates in the color representation system [Fisher, 2005]
BTG color correction method
RT color
color image

color quantization method

RUS метод квантования цветов
UF color quantization algorithm
color quantization technique
colour quantization algorithm
colour quantization method
colour quantization technique
SEC IMAGE PROCESSING
DEF Color quantization: The process of reducing the number of colors in an image by selecting a subset of colors, then representing the original image using only them. This has the side-effect of allowing image compression with fewer bits [Fisher, 2005]
BTG image processing method

combinatorial feature

RUS комбинаторный признак (изображения)
SEC IMAGE
DEF As combinatorial features, we consider the results of calculation of combinatorial formulas on images, as well as more complicated mathematical objects determined on the image, namely, tests used in pattern recognition [Gurevich, 2006]
BTG image feature
RT arithmetical feature
logical feature
matrix feature
topological feature

compactness hypothesis

RUS гипотеза компактности
SEC PATTERN RECOGNITION
DEF The compactness hypothesis states that the pattern measurements of a given class are nearer to other pattern measurements in the class than they are to pattern measurements from other classes [Haralick, 1991]
RT pattern class

compactness of a region

RUS компактность области
SEC IMAGE ANALYSIS
DEF Compactness: A scale, translation and rotation invariant descriptor based on the ratio $\frac{perimeter^2}{area}$ [Fisher, 2005]
BTG region descriptor
RT region

compound decision rule

RUS составное решающее правило
SEC PATTERN RECOGNITION
DEF A compound decision rule is a decision rule which assigns a unit to a category on the basis of some non-trivial subsequence of measurement patterns in the data sequence or in the corresponding sequence of feature patterns [Haralick, 1991]
BTG decision rule

computable feature

RUS вычисляемый признак (изображения)

SEC IMAGE
DEF Computable features are features obtained by application of an analytic function to the image. Computable features include a large number of features, in particular, statistical features, including those based on the histogram and the co-occurrence matrix, spectral features, Fourier coefficients and other functions of the Fourier transforms, functions of the Gabor transforms and of two-dimensional cosine transforms, functions of fractal transforms and wavelet transforms, logic operations and other mathematical functions whose argument is the original image [Gurevich, 2006]
BTG image feature
RT derivable feature
extractable feature
measurable feature

connected component
RUS компонента связности
SEC IMAGE
DEF Let *S* represent a subset of pixels in an image. Two pixels *p* and *q* are said to be connected in *S* if there exists a path between them consisting entirely of pixels in *S*. For any pixel *p* in *S*, the set of pixels that are connected to it in *S* is called a connected component of *S*. If it only has one connected component, then set *S* is called a connected set [Gonzalez, 2002]
RT Euler number of a region

connected region
RUS связная область
SEC IMAGE
DEF A region R is connected if there is a path between any two resolution cells contained in R [Haralick, 1991]
BTG region
NTG 4-connected region
8-connected region

conservative smoothing
RUS консервативное сглаживание
SEC IMAGE PROCESSING
DEF Conservative smoothing: A noise filtering technique whose name derives from the fact that it employs a fast filtering algorithm that sacrifices noise suppression power to preserve the image detail. A simple form of conservative smoothing replaces a pixel that is larger (smaller) than its 8 connected neighbors by the largest (smallest) value amongst those neighbors. This process works well with impulse nose but is as effective with Gaussian noise [Fisher, 2005.]
BTG image denoising method

constant area coding
RUS кодирование областей постоянства
UF CAC
SEC IMAGE PROCESSING
DEF A simple but effective method of compressing a binary image or bit plane is to use special code words to identify large areas of contiguous 1's or 0's. In one such approach, called constant area coding (CAC), the image is divided into blocks of size *p x q* pixels, which are classified as all white, all black, or mixed intensity. The most probable or frequently occurring category is then assigned the 1-bit code word 0, and the other two categories are assigned the 2-bit codes 10 and 11. Compression is achieved because the *pq* bits that normally would be used to represent each constant area are replaced by a 1-bit or 2-bit code word. Of course, the code assigned to the mixed intensity category is used as a prefix, which is followed by the *pq*-bit pattern of the block [Gonzalez, 2002]
BTG bit plane coding

content-based image retrieval
RUS поиск изображений по содержимому
UF CBIR
SEC APPLIED PROBLEMS
DEF Image database searching methods that produce matches based on the contents of the images in the databases, as contrasted with using text descriptors to do the indexing. For examples, one can use descriptors based on color moments to select images with similar invariants [Fisher, 2005]
BTG image retrieval

contour-based feature
RUS контурный признак (изображения)
SEC IMAGE
DEF Contour-based features are features calculated on a contour (closed or open). It should be noted that the contour-based features are calculated in two stages: (1) pixels belonging to the contour of an object in the image are extracted; and (2) the feature itself is calculated by using the selected pixels of the contour. As a rule, the extracted contour is a binary image. This significantly diminishes the running time of algorithms. Contour-based features are widely used in problems of recognition of typewritten and handwritten texts. Contour-based features are also widely used in fingerprint analysis and classification. In connection with the specificity of these images, the contours of edges characterizing the fingerprint itself are extracted in these

images and, then, the features of the obtained contour images are determined [Gurevich, 2006]
BTG image feature
RT point-based feature
skeleton-based feature
segment-based feature

contrast
RUS контраст
SEC IMAGE
DEF Contrast: The intensity difference between an object and its background [Fischler, 1987]

Contrast: In image processing, the difference between the average brightness of two subsets of an image [IEEE, 1990]

The contrast of an object against its background can be measured by: (1) its contrast ratio, which is the ratio between the higher of object transmittance or background transmittance to the lower of object transmittance or background transmittance; (2) its contrast difference, which is the difference between the higher density of object or background to the lower density of object or background; (3) its contrast modulation, which is the difference between the darker of object or background image intensity and the lighter of the two divided by the sum of object image intensity and background image intensity [Haralick, 1991]

Contrast - the amount of gray level variation within an image [Myler, 1993].

Contrast: difference between the maximum and the minimum gray level of an image (global contrast), or of an image segment (local contrast) [Klette, 1996]

The difference between the brightness of an object and the brightness of the background [Smith, 1999]

Contrast: 1) The difference in brightness values between two structures, such as regions or pixels. 2) A texture measure. In a gray scale image, contrast, C, is defined as $C = \sum_i \sum_j (i-j)^2 P[i,j]$ where P is the gray-level co-occurrence matrix [Fisher, 2005]
RT contrast enhancement
contrast enhancement method
local contrast adjustment

contrast enhancement
RUS улучшение контраста
UF contrast stretching
SEC IMAGE PROCESSING
DEF Contrast enhancement: image processing task aiming at generating image with higher contrast. Increasing the image value difference between "dark and bright pixels" is possible, e.g., by enhancing object image values (higher values), or by reducing background image values. The enhancement factor can be constant in the entire image, or locally adaptive [Klette, 1996]
BTG image processing task
RT contrast
contrast enhancement method
image enhancement

contrast enhancement method
RUS метод улучшения контраста
UF contrast enhancement algorithm
contrast enhancement technique
contrast stretching algorithm
contrast stretching method
contrast stretching technique
SEC IMAGE PROCESSING
DEF Contrast stretching: An image enhancement technique in which the contrast between image subsets and their complements is increased [IEEE, 1990]

Contrast stretching refers to any monotonically increasing point operator whose effect is to increase or enhance the visibility of an image's detail [Haralick, 1991]

Contrast enhancement: Contrast enhancement (also known as contrast stretching) expands the distribution of intensity values in an image so that a larger range of sensitivity in the output device can be used. This can make subtle changes in an image more obvious by increasing the displayed contrast between image brightness levels. Histogram equalization is one method of contrast enhancement [Fisher, 2005]
BTG image processing method
NTG local contrast adjustment
RT contrast
contrast enhancement
histogram equalization
homomorphic filtering
image enhancement method

convolution mask
RUS маска свертки
UF convolution kernel
SEC IMAGE PROCESSING
DEF Convolution mask -- small subimage,

typically 3x3 to 7x7 in size, used as a filter in a discrete convolution operation [Myler, 1993].
BTG mask

corner detection
RUS выделение углов
UF corner finding
SEC IMAGE ANALYSIS
BTG image analysis task
RT corner detection method

corner detection method
RUS метод выделения углов
UF corner detection algorithm
corner detection operator
corner detection technique
corner detector
corner finder
SEC IMAGE ANALYSIS
BTG image analysis method
NTG Plessey corner finder
SUSAN corner finder
Zuniga-Haralick operator
RT corner detection

correlation operator
RUS оператор корреляции (изображений)
SEC IMAGE PROCESSING
DEF Correlating an image I with a kernel k having support or domain K produces a correlated image J defined by
$$J(r,c) = \sum_{(i,j)\in K} I(r+i, c+j)k(i,j)$$
.
Correlation is a linear operator.

[Haralick, 1991]
BTG image processing operator

Crimmins smoothing operator
RUS сглаживающий оператор Кримминса
SEC IMAGE PROCESSING
DEF Crimmins smoothing operator: An iterative algorithm for speckle (salt-and-pepper noise) reduction. It uses a nonlinear noise reduction technique that compares the intensity of each image pixel with its eight neighbors and either increments or decrements the value to try and make it more representative of its surroundings. The algorithm raises the intensity of pixels that are darker relative to their neighbors and lowers pixels that are relatively brighter. More iterations produce more reduction in noise but at the cost of increased blurring of detail [Fisher, 2005]
BTG image denoising method

cursive script recognition
RUS распознавание курсивных символов
SEC APPLIED PROBLEMS
DEF Methods of optical character recognition whereby hand-written cursive (also called joined-up) characters are automatically classified [Fisher, 2005]
BTG optical character recognition

curve
RUS кривая
SEC MATHEMATICS
DEF Curve: A set of connected points in 2D or 3D, where each point has at most two neighbors. The curve could be defined by a set of connected points, by an implicit function (e.g., $y+x^2=0$), by an explicit form (e.g., $(t,-t^2)$ for all t), or by the intersection of two surfaces (e.g., by intersecting the planes X=0 and Y=0), etc. [Fisher, 2005]

D

decision rule
RUS решающее правило
SEC PATTERN RECOGNITION
DEF Decision rule: a rule or algorithm used in pattern classification to assign an image pixel or an object to a pattern class based on features extracted from the image [Jahne, 2004]
NTG compound decision rule
hierarchical decision rule
maximum likelihood decision rule
non-parametric decision rule
simple decision rule
RT pattern classification

Deriche edge detector
RUS оператор выделения яркостных переходов Дерише
UF Deriche edge detection operator
Deriche edge operator
SEC IMAGE ANALYSIS
DEF Deriche edge detector: Convolution filter for edge finding similar to the Canny edge detector. Deriche uses a different optimal operator where the filter is assumed to have infinite extent. The resulting convolution filter is sharper than the derivative of the Gaussian that Canny uses
$f(x) = Axe^{-\frac{|x|}{\sigma}}$ [Fisher, 2005]
BTG edge detection method

derivable feature
RUS извлекаемый признак (изображения)
SEC IMAGE
DEF Derivable features are those for determination of which some additional

information is used about the subject domain to which the image belongs. These features may be treated as high-level features, because they are often calculated not on the original image but on a preprocessed image (for instance, in recognition of straight lines in an image). These features are widely used in face recognition, because facial images have a certain strongly marked structure [Gurevich, 2006]
BTG image feature
RT computable feature
extractable feature
measurable feature

deterministic image representation
RUS детерминированное представление изображений
SEC IMAGE
DEF In deterministic image representation, a mathematical image function is defined and point properties of the image are considered [Pratt, 2001]
BTG image representation
RT statistical image representation

difference image
RUS разностное изображение
UF difference picture
SEC IMAGE
DEF Difference image: An image computed as pixel wise difference of two other images, that is, each pixel in the difference image is the difference between the pixels at the same location in the two input images [Fisher, 2005]
BTG image

digital image
RUS цифровое изображение
UF digital picture
digitized image
digitized picture
discrete image
discrete picture
SEC IMAGE
DEF Digital image: An image that has been converted into an array of pixels, each of which has an associated value called its gray level [IEEE, 1990]

A digital image, digitized image, or digital picture function is an image in digital format and is obtained by partitioning the area of the image into a finite two-dimensional array of small uniformly shaped mutually exclusive regions called resolution cells and assigning a representative image value to each such spatial region. A digital image may be abstractly thought of as a function whose domain is the finite two-dimensional set of resolution cells and whose range is the set of possible image intensities [Haralick, 1991]

A digital image is a 2D image I[r,c] represented by a discrete 2D array of intensity samples, each of which is represented using a limited precision [Shapiro, 2001]

Digital image: an image in digital format consisting of an array of pixels. It is obtained by partitioning the area of the image into a finite two-dimensional array of small uniformly shaped mutually exclusive regions called pixels or resolution cells and assigning a representative image value to each such spatial region [Jahne, 2004]

Digital image: Any sampled and quantized image [Fisher, 2005]
BTG Image
RT analog image

directional filter
RUS направленный фильтр
SEC IMAGE PROCESSING
DEF Directional filter: a spatial frequency filter which enhances features in an image in selected directions [Jahne, 2004]
BTG image filter

discrete cosine transform
RUS дискретное косинусное преобразование
UF DCT
SEC IMAGE PROCESSING
DEF Discrete cosine transform - mathematical transformation performed on discrete data that resolves additive real sinusoidal components of the data that correspond to the spatial frequency content of the data [Myler, 1993].

Discrete cosine transform (DCT): A transformation that converts digital images into the frequency domain in terms of the coefficients of discrete cosine functions. Used, for example, within JPEG image compression [Fisher, 2005]

Discrete cosine transform (DCT) is a technique applied to image pixels in spatial domain in order to transform them into a frequency domain in which redundancy can be identified [Furht, 2006]
BTG image processing operator
RT global operator

discrete Fourier transform
RUS дискретное преобразование Фурье
UF DFT
SEC IMAGE PROCESSING
DEF The discrete Fourier transform $\hat{I}$ of a digital image I represents the image in terms of a linear combination of complex exponentials. The Fourier transform $\hat{I}$ is defined by

$$\hat{I}(w_r, w_c) = \frac{1}{RC}\sum_{r=0}^{R-1}\sum_{c=0}^{C-1} I(r,c)e^{-2j\pi\left(\frac{rw_r}{R}+\frac{cw_c}{C}\right)}.$$

$\hat{I}(w_r, w_c)$ is the coefficient of the complex exponential $e^{2j\pi\left(\frac{rw_r}{R}+\frac{cw_c}{C}\right)}$ in the linear combination representing I as can immediately be seen from the corresponding relation

$$I(r,c) = \sum_{w_r=0}^{R}\sum_{w_c=0}^{C} \hat{I}(w_r, w_c)e^{2j\pi\left(\frac{rw_r}{R}+\frac{cw_c}{C}\right)}$$

which is called the inverse discrete Fourier transform. The variables w_r and w_c have the interpretation of being row and column spatial frequencies [Haralick, 1991]

Discrete Fourier transform - mathematical transformation performed on discrete data that resolves additive complex sinusoidal components of the data that correspond to the spatial frequency content of the data [Myler, 1993].

Discrete Fourier transform [DFT]: the discrete Fourier transform of a digital image represents the image in terms of a linear combination of periodic functions (complex exponentials) [Jahne, 2004]

Discrete Fourier transform (DFT): A version of the Fourier transform for sampled data [Fisher, 2005]
BTG image processing operator
RT fast Fourier transform
Fourier image processing
global operator

discrete Radon transform
RUS дискретное преобразование Радона
SEC IMAGE PROCESSING
DEF The discrete Radon transform $R: Q \to [0,\infty)$ of a function $I: X \to [0,\infty)$ relative to a functional form $F: X \to [0,\infty)$ is defined by

$$R(q) = \sum_{\{x \in X \mid F(x,q)=0\}} I(x).$$

[Haralick, 1991]

Radon transform: A transformation mapping an image into a parameter space highlighting the presence of lines. It can be regarded as an extension of the Hough transform. One definition is

$$g(\rho,\theta) = \iint I(x,y)\times\delta(\rho - x\cos\theta - y\sin\theta$$

where $I(x,y)$ is the image (gray values) and $\rho = x\cos\theta + y\sin\theta$ is a parametric line in the image. Lines are identified by peaks in the ρ, θ space [Fisher, 2005]
BTG image processing operator

discrete wavelet transform
RUS дискретное вейвлет-преобразование
UF DWT
SEC IMAGE PROCESSING
DEF Wavelet transform: Representation of a signal in terms of a basis of wavelets. Similar to the Fourier transform, but as the wavelet basis is a two-parameter family of functions ψ_{jk}, the wavelet transform of a d-D signal is an $(d+1)$-D function. However, the number of distinct values needed to represent the transform of a discrete signal of length n is just $O(n)$. The wavelet transform has similar applications to the Fourier transform, but the wavelet basis offers advantages when representing natural signals such as images [Fisher, 2005]

Discrete wavelet transform (DWT) is a technique to transform image pixels into wavelets, which are then used for wavelet-based compression and coding [Furht, 2006]
BTG image processing operator
RT wavelet coding

distance function
RUS метрика
UF distance metric
metric
SEC MATHEMATICS
DEF Distance metric: A measure of how far apart two things are in terms of physical distance or similarity. A metric can be other functions besides the standard Euclidean distance, such as the algebraic or Mahalanobis distances. A true metric must satisfy: 1) $d(x,y)+d(y,z) \geq d(x,z)$, 2) $d(x,y)=d(y,x)$, 3) $d(x,x)=0$ and 4) $d(x,y)=0$ implies x=y, but computer vision processes often uses functions that do not satisfy all of these criteria [Fisher, 2005]
NTG algebraic distance
city-block distance
Euclidean distance
Hausdorff distance
Mahalanobis distance

dynamic range
RUS динамический диапазон
SEC IMAGE
DEF The ratio of the brightest and darkest values in an image. Most digital images have a dynamic range of around 100:1 but humans can perceive detail in dark regions when the range is even 10 000:1. To allow for this we can create high dynamic range images [Fisher, 2005]
RT image

E

edge
RUS яркостный переход
UF image edge
SEC IMAGE
DEF Edge: In image processing, a set of pixels belonging to an arc and having the property that pixels on opposite sides of the arc have differing gray levels [IEEE, 1990]

Edge: boundary characterized by strong gray value changes between two neighboring image segments [Klette, 1996]

Edge. A region of contrast or color change. Edges are often useful in machine vision because optical edges often mark the boundary of physical objects [Relf, 2003]

Edge: A sharp variation of the intensity function. Represented by its position, the magnitude of the intensity gradient, and the direction of the maximum intensity variation [Fisher, 2005]
BTP image
NTG fold edge
occluding edge
roof edge
step edge
NTP edge pixel
RT edge-based image segmentation
edge detection
edge detection method
edge direction
edge enhancement
edge enhancement method
edge image
edge magnitude
edge sharpness

edge detection
RUS выделение яркостных переходов
UF edge extraction
edge finding
SEC IMAGE ANALSIS
DEF Edge detection: The location of boundaries across which one or more image attributes – such as intensity, texture, or color – are discontinuous [Fischler, 1987]

Edge extraction: task in image processing directed on computing edge positions in digital images. The result can be visualized by an edge image [Klette, 1996]
BTG image analysis task
RT edge
edge-based image segmentation
edge detection method
edge detection operator
edge image

edge detection method
RUS метод выделения яркостных переходов
UF edge detection algorithm
edge detection operator
edge detection technique
edge detector
edge extraction algorithm
edge extraction method
edge extraction technique
edge finder
edge finding algorithm
edge finding method
edge finding technique
edge operator
SEC IMAGE ANALYSIS
DEF Edge detection: An image segmentation technique in which edge pixels are identified by examining their neighborhoods [IEEE, 1990]

An edge operator or step edge operator is a neighborhood operation which determines the extent to which each pixel's neighborhood can be partitioned by a simple arc passing through the pixel where pixels in the neighborhood on one side of the arc have one predominant value and pixels in the neighborhood on the other side of the arc have a different predominant value. Some edge operators can also produce a direction which is the predominant tangent direction of the arc as it passes through the pixel. There are four classes of edge operators: gradient operators, Laplacian operators, zero-crossing operators, and morphologic edge operators. The gradient operators compute some quantity related to the magnitude of the slope of the underlying image gray tone intensity surface of which the observed image pixel values are noisy discretized sample. The Laplacian operators compute some quantity related to the Laplacian of the underlying image

gray tone intensity surface. The zero-crossing operators determine whether or not the digital Laplacian or the estimated second direction derivative has a zero-crossing within the pixel. The morphologic edge operators compute a quantity related to the residues of an erosion and/or dilation operation [Haralick, 1991]

Edges are usually detected by a two-stage process. First, a small spatial filter – a mask or edge detector – is cross-correlated with the image to detect pixels in the image which according to the nature of the mask nay from part of an image. This process is an approximation to some kind of spatial differentiation of the image intensity and such masks are sometimes called difference operators as they produce a digital estimate of derivatives at a point on the image surface. Such operations are essentially local and, depending on the size of the mask, are sensitive to noise so a second operation is often performed to aggregate the points into connected edges [Watt, 1998]

Edge detection: An image processing operation that computes edge vectors (gradient and orientation) for every point in an image. The first stage of edge based segmentation [Fisher, 2005]

Edge detection is a process of transforming an input digital image into an edge map which can be viewed as a line drawing image [Furht, 2006]

BTG image analysis method
NTG adaptive edge detection
Canny edge detector
Deriche edge detector
gradient-based edge detector
parametric edge detector
morphological edge detector
RT edge
edge-based image segmentation
edge detection
edge image

edge direction
RUS ориентация яркостного перехода
UF edge orientation
SEC IMAGE
DEF Edge direction: The direction perpendicular to the normal to an edge, that is, the direction along the edge, parallel to the lines of constant intensity. Alternatively, the normal direction to the edge, i.e., the direction of maximum intensity change (gradient) [Fisher, 2005]
RT edge

edge enhancement
RUS усиление яркостных переходов
SEC IMAGE PROCESSING
BTG image enhancement
RT edge
edge enhancement method
image enhancement

edge enhancement method
RUS метод усиления яркостных переходов
UF edge enhancement algorithm
edge enhancement technique
SEC IMAGE PROCESSING
DEF Edge enhancement: An image enhancement technique in which edges are sharpened by increasing the contrast between the gray levels of the pixels on opposite sides of the edge [IEEE, 1990]

Any image processing algorithm that makes the edges more obvious [Smith, 1999]

Edge enhancement: An image enhancement operation that makes the gradient of edges steeper. This can be achieved, for example, by adding some multiple of a Laplacian convolved version of the image L(i,j) to the image g(i,j). f(i,j)=g(i,j)+kL(i,j) where f(i,j) is the enhanced image and k is some constant [Fisher, 2005]

BTG image processing method
RT edge
edge enhancement
image enhancement method

edge image
RUS изображение с нанесенными яркостными переходами
UF edge picture
SEC IMAGE
DEF Edge image: An image in which each pixel is labeled as either an edge pixel or a non-edge pixel [IEEE, 1990]

An edge image is an image in which each pixel is labelled as "edge" or "non-edge". In addition to this basic labeling, pixels in an edge image may carry additional information such as edge direction, edge contrast, or edge strength [Haralick, 1991]

Edge image: image visualizing the result of an edge operator. All edge pixels are labeled by certain image values. The edge slope and the edge amplitude can contribute to these image values [Klette, 1996]

Edge image: An image where every pixel represents an edge or the edge magnitude [Fisher, 2005]
BTG image
RT edge
edge detection
edge detection method

edge linking
RUS связывание яркостных переходов
UF edge following
edge grouping
edge tracking
SEC IMAGE ANALYSIS
DEF Edge tracking. 1) The grouping of edges into chains of significant edges. The second stage of edge based segmentation. Also known as edge following, edge grouping and edge linking. 2) Tracking how the edge moves in a video sequence [Fisher, 2005]
BTG image analysis task
RT edge-based image segmentation
edge linking method

edge linking method
RUS метод связывания яркостных переходов
UF edge following algorithm
edge following method
edge following technique
edge grouping algorithm
edge grouping method
edge grouping technique
edge linking algorithm
edge linking technique
edge tracking algorithm
edge tracking method
edge tracking technique
SEC IMAGE ANALYSIS
DEF Edge linking: An image processing technique in which neighboring pixels labeled as edge pixels are connected to form an edge [IEEE, 1990]
BTG image analysis method
RT edge-based image segmentation
edge linking

edge magnitude
RUS значение яркости яркостного перехода
SEC IMAGE
DEF Edge magnitude: A measure of the contrast at an edge, typically the magnitude of the intensity gradient at the edge point [Fisher, 2005]
RT edge

edge pixel
RUS пиксел яркостного перехода
UF edge element
edgel
edge point
SEC IMAGE
DEF An edgel, short for edge element, is a triplet, whose first component is the (row, column) location of a pixel, whose second component is the position and orientation of an edge running through the pixel, and whose third component is the strength of the edge [Haralick, 1991]

Edge point: 1) A location in an image where some quantity (e.g., intensity) changes rapidly. 2) A location where the gradient is greater that some threshold [Fisher, 2005]
BTP edge
RT pixel

edge preserving smoothing
RUS сглаживание изображений, сохраняющее яркостные переходы
SEC IMAGE PROCESSING
DEF Edge preserving smoothing: A smoothing filter that is designed to preserve the edges in the image while reducing image noise [Fisher, 2005]
BTG image denoising method

edge sharpness
RUS резкость яркостных переходов
UF acutance
SEC IMAGE
DEF Acutance: A measure of the sharpness of the edges in an image [IEEE, 1990]

Acutance is a measure of the sharpness of edges in a photograph or image. It is defined for any edge by the average squared rate of change of the image intensity across the edge divided by the total image intensity difference from one side of the edge to the other side of the edge [Haralick, 1991]

A measure of the transition between edges in an image. Filters such as the unsharp mask increase acutance or edge sharpness [Davies, 2005]
RT edge

edge-based image segmentation
RUS сегментация изображений посредством выделения яркостных переходов
UF edge-based segmentation
SEC IMAGE ANALYSIS
DEF Edge-based segmentation is a technique that in its simplest application means utilizing edge detection processes to find a closed boundary such that an inside and an outside can be defined [Watt, 1998]

Edge based segmentation: Segmentation of an image based on the edges detected

[Fisher, 2005]
BTG image segmentation method
NTG watershed segmentation
RT edge
edge detection
edge detection method
edge linking
edge linking method

entropy-based feature
RUS энтропийный признак (изображения)
SEC IMAGE
DEF A large group in the class of statistical features consists of features based on the concept of entropy. Let $V_{\max}$ be the maximal value of intensity in the image. Then, entropy E is determined by the formula $E = -\sum_{i=1}^{V_{\max}} h_i \log h_i$, where h_i is an elementary event on which the entropy is determined. Elementary events on which the entropy is determined may be quite various, e.g., values of elements of the spectrum, normalized values of the histogram, entropy of sum f_8, entropy f_9 and difference entropy f_{11}, and the number of points in the cube centered at a random point with an edge of length L [Gurevich, 2006]
BTG statistical feature

Erlang noise
RUS шум Эрланга
UF gamma noise
SEC IMAGE
DEF The probability density function of Erlang noise is given by

$$p(z) = \begin{cases} \frac{a^b z^{b-1}}{(b-1)!} e^{-az} & for \quad z \geq 0 \\ 0 & for \quad z < 0 \end{cases},$$

where the parameters are such that $a>0$, b is a positive integer, and "!" indicates factorial. The mean and variance of this density are given by $\mu = \frac{b}{a}$ and $\sigma^2 = \frac{b}{a^2}$ [Gonzalez, 2002]
BTG image noise

Euclidean distance
RUS евклидово расстояние
SEC MATHEMATICS
DEF Euclidean distance: The geometric distance between two points (x_1, y_1) and (x_2, y_2), i.e., $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. For n-dimensional vectors $\vec{x}_1$ and $\vec{x}_2$, the distance is $(\sum_{i=1}^{n} (x_{1,i} - x_{2,i})^2)^{\frac{1}{2}}$ [Fisher, 2005]

Euclidian distance: distance between two points given by the magnitude of the vector connecting the two points [Jahne, 2004]
BTG distance function

Euler number of a region
RUS число Эйлера области
SEC IMAGE ANALYSIS
DEF The Euler number of a region is the number of its connected components minus the number of its holes [Haralick, 1991]
BTG region descriptor
RT connected component
hole of a region
region

exponential noise
RUS экспоненциальный шум
SEC IMAGE
DEF The probability density function of exponential noise is given by

$$p(z) = \begin{cases} ae^{-az} & for \quad z \geq 0 \\ 0 & for \quad z < 0 \end{cases},$$

where $a>0$. The mean and variance of this density are given by $\mu = \frac{1}{a}$ and $\sigma^2 = \frac{1}{a^2}$ [Gonzalez, 2002]
BTG image noise

exterior border pixel of a region
RUS внешний смежный пиксел области
SEC IMAGE
DEF A pixel is an exterior border pixel of a region R if the pixel does not belong to R and neighbors a pixel belonging to R [Haralick, 1991]
RT pixel
region

extractable feature
RUS выделяемый признак (изображения)
SEC IMAGE
DEF Extractable features are characterized by the property that they are not numerical characteristics of the image but indicate the presence or absence of an element in

the image. There are two methods for feature extraction: first, by searching in the image for certain prespecified reference objects; second, by extracting primitive elements in the image and constructing a representation of the image, for instance, similar to the 2.5-dimensional sketch of Marr. To create a "primal sketch" of the image, primitive elements of the following types are used: intersection of the zero level, spots, breaks, discontinuities of edges, boundaries, and lines. In the 2.5-dimensional sketch representation, to specify information characterizing the geometrical properties of visible surfaces (orientation, depth, discontinuity contours), primitives of the following types are used: local orientation, distance from the observer, and discontinuities. Extractable features are widely used in the recognition of faces and fingerprints [Gurevich, 2006]
BTG image feature
RT computable feature
derivable feature
measurable feature

extremal pixel of a region
RUS экстремальная точка границы области
SEC IMAGE
DEF An extremal pixel of R is a pixel of R having from among all pixels in R either
(a) an extremal row coordinate value r and an extremal column coordinate value taken from among all the column positions c such that $(r,c)\in R$.
(b) an extremal column coordinate value c and an extremal row coordinate value taken from among all the row positions r such that $(r,c)\in R$.
A region may have as many as eight distinct extremal points, each of which must be lying on the bounding rectangle of the region. Extremal pixels can be used to represent the areal extent of a region and to infer the dominant axis length and orientation of the region [Haralick, 1991]
RT pixel
region

F

face analysis
RUS анализ лиц
SEC APPLIED PROBLEMS
DEF A general term covering the analysis of face images and models. Often used to refer to facial expression analysis [Fisher, 2005]
NTG face expression analysis

face authentication
RUS аутентификация лиц
UF face verification
SEC APPLIED PROBLEMS
DEF Verification that (the image of) a face corresponds to a particular individual. This differs from the face recognition in that here only the model of a single person is considered [Fisher, 2005]
RT face modeling

face detection
RUS выделение лиц
SEC APPLIED PROBLEMS
DEF Identification of faces within an image or series of images. This often involved a combination of human motion analysis and skin color analysis [Fisher, 2005]
NTG feature invariant face detection
knowledge-based face detection
RT face feature detection

face expression analysis
RUS анализ выражения лица
SEC APPLIED PROBLEMS
DEF Study or identification of the facial expression(s) of a person from an image or sequence of images [Fisher, 2005]
BTG face analysis

face feature detection
RUS выделение признаков лица
SEC APPLIED PROBLEMS
DEF The location of features (such as eyes, nose, mouth) from a human face. Normally performed after face detection although it can be used as a part of face detection [Fisher, 2005]
RT face detection

face indexing
RUS классификация лиц
SEC APPLIED PROBLEMS
DEF Indexing from a database of known faces as a precursor to face recognition [Fisher, 2005]

face modeling
RUS моделирование лиц
SEC APPLIED PROBLEMS
DEF Representing a face using some type of model typically derived from an image (or images). These models are used in face authentication, face recognition, etc. [Fisher, 2005]
RT face authentication

face recognition
RUS распознавание лиц
UF face identification

SEC APPLIED PROBLEMS
DEF The task of recognizing a face from an image as an instance of a person recorded in a database of faces [Fisher, 2005]
RT face recognition method
face recognition system

face recognition method
RUS метод распознавания лиц
UF face recognition algorithm
face recognition technique
SEC APPLIED PROBLEMS
DEF Face recognition techniques can be roughly divided into two main categories: global approaches and feature-based techniques. In global approaches the whole image serves as a feature vector, while in local feature approaches a number of fiducial or control points are extracted and used for classification [Furht, 2006]
RT face recognition

face recognition system
RUS система распознавания лиц
SEC APPLIED PROBLEMS
DEF A face recognition system recognizes an individual by matching the input image against images of all users in a database and finding the best match [Furht, 2006]
RT face recognition

face tracking
RUS отслеживание лиц
SEC APPLIED PROBLEMS
DEF Tracking of a face in a sequence of images. Often used as part of a human-computer interface [Fisher, 2005]

false identification
RUS неверная (ложная) идентификация
SEC PATTERN RECOGNITION
DEF False identification: in pattern classification, the assignment of a pattern to a pattern class other than its true pattern class. Contrast with: misidentification [Jahne, 2004]
RT misidentification

fast Fourier transform
RUS быстрое преобразование Фурье
UF FFT
SEC IMAGE PROCESSING
DEF Fast Fourier transform (FFT) - a special formulation of the Fourier Transform that takes advantage of repetitive forms to increase the speed of computer calculations [Myler, 1993]

Fourier transformation, fast (FFT): special algorithmic realization of the Fourier transformation. Instead of $O(n^2)$ arithmetic operations required with the formula of the Fourier transformation, this algorithm performs only $O(n \log n)$ arithmetic operations if n complex numbers have to be transformed [Klette, 1996]

FFT; fast Fourier transform: an algorithm to perform the discrete Fourier transform (DFT) with maximal speed, i.e., a minimum number of computations [Jahne, 2004]

Fast Fourier transform (FFT): A version of the Fourier transform for discrete samples that is significantly more efficient (order $N\log_2 N$) than the standard discrete Fourier transform (which is order N^2) on data sets with N points [Fisher, 2005]
RT discrete Fourier transform

feature
RUS признак
UF pattern feature
SEC PATTERN RECOGNITION
DEF Feature: In pattern recognition, an attribute of a pattern that may contribute to pattern classification; for example, size, texture, or shape [IEEE, 1990]

A feature, or feature pattern, or feature n-tuple, or feature vector or pattern feature is a n-tuple or vector whose components are functions of the initial measurement pattern variables or some subset of the initial measurement pattern variables. Feature n-tuples or vectors are designed to contain a high amount of information relative to the discrimination between units of the types of categories in the given category set. Sometimes the features are predetermined and other times they are determined at the time the pattern discrimination problem is being solved. In image pattern recognition, features often contain information relative to gray tone intensity, texture, or region shape [Haralick, 1991]

Feature: A numerical property (possibly combined with others to form a feature vector) and generally used in a classifier [Fisher, 2005]
RT feature extraction
feature selection
feature space

feature extraction
RUS извлечение признаков
UF property extraction
SEC PATTERN RECOGNITION

DEF Feature extraction: A step in pattern recognition, in which measurements or observations are processed to find attributes that can be used to assign patterns to pattern classes [IEEE, 1990]

Feature extraction is the process by which an initial measurement pattern or some subset of measurement patterns is transformed to a new pattern feature. Sometimes feature extraction is called property extraction [Haralick, 1991]

BTG pattern recognition task

RT feature

feature image

RUS изображение, содержащее отличительный признак

UF feature picture

SEC IMAGE

DEF Feature image: an image containing a feature computed by low-level image processing operators and used to recognize and classify objects in images [Jahne, 2004]

BTG image

RT image feature

feature invariant face detection

RUS выделение лиц с помощью инвариантных признаков

SEC APPLIED PROBLEMS

DEF Feature invariant approaches aim to find structural features that exist even when the viewpoint or lighting conditions vary and then use these to locate faces. Different structural features are being used: facial local features, texture, and shape and skin color. Local features such as eyes, eyebrows, nose, and mouth are extracted using multi-resolution or derivative filters, edge detectors, morphological operations or thresholding. Statistical models are then built to describe their relationships and verify the existence of a face. Neural networks, graph matching, and decision trees were also proposed to verify face candidates. Skin color is another powerful cue for detection, because color scene segmentation is computationally fast, while being robust to changes in viewpoint, scale, shading, to partial occlusion and complex backgrounds. The color-based approach labels each pixel according to its similarity to skin color, and subsequently labels each sub-region as a face if it contains a large blob of skin color pixels. It is sensitive to illumination, existence of skin color regions, occlusion, and adjacent faces. There are also techniques that combine several features to improve the detection accuracy. Usually, they use features such as texture, shape and skin color to find face candidates and then use local facial features such as eyes, nose and mouth to verify the existence of a face. Feature invariant approaches can be problematic if image features are severely corrupted or deformed due to illumination, noise, and occlusion [Furht, 2006]

BTG face detection

feature selection

RUS выбор признаков

UF property selection

SEC PATTERN RECOGNITION

DEF Feature selection is the process by which the features to be used in the pattern recognition problem are determined. Sometimes feature selection is called property selection [Haralick, 1991]

Feature selection: Selection of suitable features (properties) for a specific task, for example, classification. Typically features should be independent, detectable, discriminatory and reliable [Fisher, 2005]

BTG pattern recognition task

RT feature

feature space

RUS пространство признаков

SEC PATTERN RECOGNITION

DEF Feature space: a set of all possible *n*-tuples that can be used to represent *n* features of a pattern [Jahne, 2004]

Feature space: The dimensions of a feature space are the feature (property) values of a given problem. An object or shape is mapped to feature space by computing the values of the set of features defining the space, typically for recognition and classification [Fisher, 2005]

RT feature

Fisher linear discriminant

RUS линейный дискриминант Фишера

UF FLD

SEC PATTERN RECOGNITION

DEF A classification method that maps high dimensional data into a single dimension in such a way as to maximize class separability [Fisher, 2005]

BTG pattern classification method

fold edge

RUS яркостный переход типа "складка"

SEC IMAGE

DEF Fold edge: A surface orientation

discontinuity. An edge where two locally planar surfaces meet [Fisher, 2005]
BTG edge

foreground
RUS передний план
SEC IMAGE
DEF Foreground: In computer vision, generally used in the context of object recognition. The area of the scene or image in which the object of interest lies [Fisher, 2005]
BTP image
RT background

Fourier descriptors
RUS Фурье-дескрипторы
SEC IMAGE ANALYSIS
DEF Fourier descriptors: The boundary of a region can be represented as an analytic function, such as tangent angle versus arc length, which can be expanded in a Fourier series. The Fourier or shape descriptors of the boundary are the coefficients of the Fourier series; these descriptors can be used to compare boundary shapes [Fischler, 1987]
BTG boundary descriptor

Fourier image processing
RUS обработка изображений в Фурье-пространстве
SEC IMAGE PROCESSING
DEF Fourier image processing: Image processing in the Fourier domain (i.e., processing images that have been transformed using the Fourier transform) [Fisher, 2005]
RT discrete Fourier transform
image processing

fractal-based image compression
RUS фрактальное сжатие изображений
UF fractal image compression
SEC IMAGE PROCESSING
DEF Fractal image compression: An image compression method based on exploiting self-similarity at different scales [Fisher, 2005]
BTG lossy image compression

fractal-based image representation
RUS фрактальное представление изображений
UF fractal image representation
SEC IMAGE
DEF Fractal representation: A representation based on self-similarity. For example a fractal representation of an image could be based on similarity of blocks of pixels [Fisher, 2005]
BTG image representation

frequency domain filter
RUS частотный фильтр
SEC IMAGE PROCESSING
DEF Frequency domain filter: A filter defined by its action in the Fourier space [Fisher, 2005]
BTG image filter
RT frequency domain filtering

frequency domain filtering
RUS фильтрация изображений в частотной области
SEC IMAGE PROCESSING
BTG image filtering method
RT frequency domain filter

frequency domain sharpening
RUS повышение резкости изображений в частотной области
UF frequency domain deblurring
image deblurring in frequency domain
image sharpening in frequency domain
SEC IMAGE PROCESSING
BTG image sharpening method
RT spatial domain sharpening

frequency domain smoothing
RUS сглаживание изображений в частотной области
UF image smoothing in frequency domain
SEC IMAGE PROCESSING
DEF Spatial domain smoothing: An implementation of smoothing in which each pixel is replaced by a value that is directly computed from other pixels in the image. In contrast, frequency domain smoothing first processes all pixels to create a linear transformation of the image, such as a Fourier transform and expresses the smoothing operation in terms of the transformed image [Fisher, 2005.]
BTG image smoothing method
RT spatial domain smoothing

G

Gabor filter
RUS фильтр Габора
SEC IMAGE PROCESSING
DEF Gabor filter: A filter formed by multiplying a complex oscillation by an elliptical Gaussian distribution (specified by two standard deviations and an orientation). This creates filters that are local, selective for orientation, have different scales and are tuned for intensity patterns (e.g., edges, bars and other patterns observed to trigger responses in the simple cells of the mammalian visual cortex) according to the frequency chosen

for the complex oscillation. The filter can be applied in the frequency domain as well as the spatial domain [Fisher, 2005]
BTG image filter

Gaussian filter
RUS фильтр Гаусса
SEC IMAGE PROCESSING
DEF The Gaussian filter is a linear spatial smoothing filter whose kernel is given by the two-dimensional Gaussian

$$k(r,c) = \frac{1}{2\pi} e^{-\frac{1}{2}(\frac{r^2}{\sigma_r^2}+\frac{c^2}{\sigma_c^2})}$$

Filtering an image with a Gaussian filter will smooth the image [Haralick, 1991]
BTG image filter
RT image smoothing method
linear filter

Gaussian noise
RUS гауссов шум
UF normal noise
SEC IMAGE
DEF Gaussian noise - a type of noise whose histogram is Gaussian (bell) shaped [Myler, 1993]

Gaussian noise: Noise whose distribution is Gaussian in nature. Gaussian noise is specified by its standard deviation about a zero mean, and is often modeled as a form of additive noise [Fisher, 2005]
BTG image noise

generalized Hough transform
RUS обобщенное преобразование Хафа
SEC IMAGE PROCESSING
DEF Generalized Hough transform: A version of the Hough transform capable of detecting the presence of arbitrary shapes [Fisher, 2005]
BTG Hough transform

geographic information system
RUS геоинформационная система
UF GIS
SEC APPLIED PROBLEMS
DEF A computer system that stores and manipulates geographically referenced data (such as images of portions of the Earth taken by satellite) [Fisher, 2005]

geometric distortion
RUS геометрическое искажение (изображения)
SEC IMAGE
BTG image distortion
RT geometric image transformation
geometric transformation method

geometric feature
RUS геометрический признак (изображения)
SEC IMAGE
DEF Geometric feature: A general term describing a shape characteristics of some data, that encompasses features such as edges, corners, geons, etc. [Fisher, 2005]
BTG image feature

geometric image transformation
RUS геометрическое преобразование изображений
UF geometric transformation
SEC IMAGE PROCESSING
BTG image processing task
RT geometric distortion
geometric operator
geometric transformation method

geometric operator
RUS геометрический оператор (изображений)
SEC IMAGE PROCESSING
DEF Geometrical operators map picture windows of the input image *f* onto picture windows of the resultant image *h*, according to a general coordinate transformation *K*. Examples are rotation, translation or mirroring at specified straight lines [Klette, 1996]
BTG image processing operator
RT geometric image transformation
geometric transformation method

geometric transformation method
RUS метод геометрического преобразования изображений
UF geometric transformation algorithm
geometric transformation technique
SEC IMAGE PROCESSING
DEF Geometric transformation: A class of image processing operations that transform the spatial relationships in an image. They are used for the correction of geometric distortions and general image manipulation. A geometric transformation requires the definition of a pixel coordinate transformation together with an interpolation scheme [Fisher, 2005]
BTG image processing method
NTG affine image transformation
RT geometric distortion
geometric operator
geometric transformation

GIF
RUS формат GIF
GIF file format
GIF format
graphics interchange file format
graphics interchange format
SEC IMAGE

DEF Graphic Interchange Format (GIF) -- file storage format for images developed by CompuServe Information Service, Inc.; uses LZW compression [Myler, 1993].

A common image file format using LZW (lossless) compression. Widely used on the world wide web for graphics [Smith, 1999]

GIF: graphics interchange format. Established by CompuServe for efficient transmission of image data over networks. Widely used, limited to monochrome and color images with up to 256 colors [Jahne, 2004]

GIF: Graphics Interchange Format. A common compressed image format based of the Lempel-Ziv-Welch algorithm [Fisher, 2005]

BTG image file format

global feature

RUS глобальный признак (изображения)
UF global image feature
SEC IMAGE
DEF A feature is considered global if, to determine it, some information about the whole image is used [Gurevich, 2006]
BTG image feature
RT local feature

global operator

RUS глобальный оператор (изображений)
UF global image operator
global image processing operator
global image transform operator
global transform
SEC IMAGE PROCESSING
DEF Global operators are a class of image processing operators, defined by functional dependencies of image values $h(p)$ upon image values in (potentially) any point position of input image f. Here, for an image point p it is not possible to specify a priori a local neighborhood in f such that $h(p)$ depends only upon this neighborhood. In principle, any position in image f can contribute to any position in image h under certain conditions. Typical representatives of this operator class are Fourier and Walsh transformation. Geometrical constructions such as image representations of Voronoi diagrams by means of a gray-value image h, based on point patterns in f, are also global operators [Klette, 1996]

Global transform: A general term describing an operator that transforms an image into some other space. Sample global transforms include the discrete cosine transform, the Fourier transform, the Haar transform, the Hadamard transform, the Hartley transform, histograms, the Hough transform, the Karhunen-Loeve transform, the Radon transform, and the wavelet transform [Fisher, 2005]

BTG image processing operator
RT discrete cosine transform
discrete Fourier transform
Haar transform
Hadamard transform
Hartley transform
Hough transform
Karhunen-Loeve transform
local operator
point operator

global thresholding

RUS пороговая обработка с глобальным порогом
SEC IMAGE ANALYSIS
DEF The simplest of all thresholding techniques is to partition the image histogram by using a single global threshold T. Segmentation is then accomplished by scanning the image pixel by pixel and labeling each pixel as object or background, depending on whether the gray level of that pixel is greater or less than the value of T. The success of this method depends entirely on how well the histogram can be partitioned [Gonzalez, 2002]
BTG image thresholding

gradient filter

RUS градиентный фильтр
SEC IMAGE PROCESSING
DEF Gradient filter: A filter that is convolved with an image to create an image in which every point represents the gradient in the original image in an orientation defined by the filter. Normally two orthogonal filters are used and by combining these a gradient vector can be determined for every point. Common filters include Roberts cross gradient operator, Prewitt gradient operator and the Sobel gradient operator [Fisher, 2005]
BTG image filter

gradient operator

RUS градиентный оператор
SEC IMAGE PROCESSING
DEF Gradient operator: vectorial operator containing the partial derivatives in all directions. In digital images, the partial derivatives are approximated by discrete differences. The magnitude and the angle of the gradient operator are a measure for

the edge strength and direction, respectively [Jahne, 2004]

Gradient operator: An image processing operator that produces a gradient image from a gray scale input image *I*. Depending on the usage of the term, the output could be 1) the vectors ∇I of the *x* and *y* derivatives at each point or 2) the magnitudes of these gradient vectors. The usual role of the gradient operator is to locate regions of strong gradients that signals the position of an edge [Fisher, 2005]

BTG image processing operator

gradient space

RUS градиентное пространство

SEC MATHEMATICS

DEF Gradient space: a two-dimensional space whose axes represent the first order partial derivatives of a surface of the form $z=f(x,y)$. Each point in gradient space corresponds to the orientation of a possible surface normal [Jahne, 2004]

gradient-based edge detector

RUS градиентный оператор выделения яркостных переходов

UF first-derivative-based edge detection operator
first-derivative-based edge detector
first-derivative-based edge operator
first-order edge detection operator
first-order edge detector
first-order edge operator
gradient-based edge detection operator
gradient-based edge operator

SEC IMAGE ANALYSIS

DEF If we define a local edge in an image to be a transition between two regions of significantly different intensities, then the gradient function of the image, which measures the rate of change, will have large values in these transitional boundary areas. Thus gradient-based, or first-derivative-based, edge detectors enhance the image by estimating its gradient function and then signal that an edge is present if the gradient value is greater than some defined threshold [Vernon, 1991]

Gradient edge detection: Edge detection based on image gradients [Fisher, 2005]

BTG edge detection method

NTG Kirsch compass edge detector
Prewitt edge detector
Roberts cross gradient operator
Sobel edge detector

gray level

RUS уровень серого тона

UF gray shade
gray tone
gray value

SEC IMAGE

DEF Gray level: A value associated with a pixel in a digital image, representing the brightness of the original scene in the vicinity of the point represented by the pixel. Syn: gray shade; gray tone [IEEE, 1990]

Gray level: integer in the range 0,1,...,G-1, with G>=2, corresponding to a gray shade of an image point. The maximum gray level G-1 corresponds to "white", and the minimum gray level 0 corresponds to "black" [Klette, 1996]

Gray level [gray value, image intensity, image density, image value]: a number or value assigned to a position on an image. The gray level is proportional to the integrated output, reflectance, or transmittance of a small area, usually called a resolution cell or pixel [Jahne, 2004]

RT gray level co-occurrence matrix
gray level distribution
gray level dynamics
gray scale
pixel

gray level co-occurrence matrix

RUS матрица совместной встречаемости уровней серого тона

UF gray level dependence matrix

SEC IMAGE

RT gray level

gray level distribution

RUS распределение уровней серого тона

SEC IMAGE

DEF Gray level distribution: distribution function of the random number ξ of gray levels in one or several images. The random number ξ takes on values in the set $\{0,1,\ldots,G-1\}$, and the general distribution function is defined by $P_\xi(B)=P(\xi^{-1}(B))$, with $B \subseteq \{0,1,\ldots,G-1\}$, where $\xi^{-1}(B)$ denotes the set of all image points (a subset of the raster R) in which ξ takes on a value out of the set B. However normally the special distribution function $P_\xi(u)=P("\xi=u")$, with $0 \le u \le G-1$, is considered. The gray level histogram is an estimation of this function [Klette, 1996]

RT gray level

gray level dynamics

RUS тоновый диапазон

SEC IMAGE
DEF Gray level dynamics: interval [max, min] in the range 0,1,...,G-1, where max and min are the largest and the smallest gray value occurring in an image, or in an image segment [Klette, 1996]
RT gray level

gray scale
RUS тоновая шкала
SEC IMAGE
DEF Gray scale: The range of gray levels that occur in an image [IEEE, 1990]

Grayscale — range of gray shades, or graylevels, corresponding to pixel values that a monochrome image incorporates [Myler, 1993].

Gray scale: the range of gray levels that occur in an image. Most commonly, a gray value image contains 256 gray values stored in one byte. The digital values 0 and 255 are assigned to black and white, respectively. Alternatively in a binary offset representation, the values -128 (the most negative number) and 127 (the largest positive number) can be assigned to black and white, respectively. In this representation, a gray value of 0 means a mean irradiance [Jahne, 2004]
RT gray level

gray scale feature
RUS тоновый признак (изображения)
SEC IMAGE
DEF By greyscale features, we mean features calculated by a function on a greyscale image. The greyscale features are widely used in texture analysis, recognition of characters, faces, medical images, fingerprints, and structural elements of an image [Gurevich, 2006]
BTG image feature
RT gray scale image
binary feature
color feature

gray scale gradient
RUS тоновый градиент
SEC IMAGE
DEF Gray scale gradient: The rate of change of the gray levels in a gray scale image [Fisher, 2005]
RT gray scale image

gray scale image
RUS тоновое изображение
UF gray level image
gray level picture
gray scale picture
gray-tone image
gray-tone picture
gray value image
gray value picture
SEC IMAGE
DEF A gray scale image or a gray level image is an image in which each pixel has a value in a range larger than just 0 or 1. Gray scale images typically have values in the range 0 to 63, 0 to 255, or 0 to 1023 corresponding to 6 bit, 8 bit, or 10 bit digitizations [Haralick, 1991]

Gray level image: scalar image f with image values f(x,y) in the set {0,1,...,G-1} of gray levels [Klette, 1996]

A grey scale image is a monochrome digital image I[r,c] with one intensity value per pixel [Shapiro, 2001]

Gray scale image: A monochrome image in which pixels typically represents brightness values ranging from 0 to 255 [Fisher, 2005]
BTG image
RT binarization
binarization method
gray scale
gray scale gradient

H

Haar transform
RUS преобразование Хаара
SEC IMAGE PROCESSING
DEF Haar transform: A wavelet transform that is used in image compression. The basis functions used are similar to those used by first derivative edge detectors, resulting in images that are decomposed into horizontal, diagonal and vertical edges at different scales [Fisher, 2005]
BTG image processing operator
RT global operator

Hadamard transform
RUS преобразование Адамара
SEC IMAGE PROCESSING
DEF Hadamard transform — transform that resolves a data set into sets of square waves, where the maximum value is 1 and the minimum value is -1. Sometimes called the Walsh-Hadamard transform, the Hadamard Transform is distinguished from the Walsh in that the transform matrices may be generated recursively using the lowest order Hadamard matrix, $H_2 = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$ and the recursive matrix,

$$H_{2N} = \begin{bmatrix} H_N & H_N \\ H_N & -H_N \end{bmatrix}$$ The H_{2N} matrix is the Hadamard matrix of order 2N and higher orders are easily generated by applying the recursive relation shown above [Myler, 1993].

Hadamard transform: A transformation that can be used to transform an image to its constituent Hadamard components. A fast version of the algorithms exists that is similar to the fast Fourier transform, but all values in the basis functions are either +1 or -1. It requires significantly less computation and as such is often used for image compression [Fisher, 2005]

BTG image processing operator
RT global operator

halftone image
RUS полутоновое изображение
UF halftone picture
half-tone image
half-tone picture
SEC IMAGE
BTG bilevel image

handwritten character recognition
RUS распознавание рукописных символов
SEC APPLIED PROBLEMS
DEF The automatic recognition of characters that have been written by hand [Fisher, 2005]
BTG optical character recognition

Hartley transform
RUS преобразование Хартли
SEC IMAGE PROCESSING
DEF Hartley transform: Similar transform to the Fourier transform, but the coefficients used are real (whereas those used in the Fourier transform are complex) [Fisher, 2005]
BTG image processing operator
RT global operator

Hausdorff distance
RUS расстояние Хаусдорфа
UF Hausdorff metric
SEC MATHEMATICS
DEF Hausdorff distance: A measure of the distance between two sets of (image) points. For every point in both sets determine the minimum distance to any point in the other set. The Hausdorff distance is the maximum of these minimum values [Fisher, 2005]
BTG distance function

Hessian
RUS матрица Гессе
SEC MATHEMATICS
DEF Hessian: the matrix of second derivatives of a multi-valued scalar function. It can be used to design an orientation-dependent second-derivative edge detector. $$H = \begin{bmatrix} \frac{\partial^2 f(i,j)}{\partial i^2} & \frac{\partial^2 f(i,j)}{\partial i \partial j} \\ \frac{\partial^2 f(i,j)}{\partial j \partial i} & \frac{\partial^2 f(i,j)}{\partial j^2} \end{bmatrix}$$ [Fisher, 2005]

hexagonal image representation
RUS представление изображений с помощью шестиугольных пикселов
SEC IMAGE
DEF Hexagonal image representation: An image representation where the pixels are hexagonal rather than rectangular. This representation might be used because 1) it is similar to the human retina or 2) the distances to all adjacent pixels are equal, unlike diagonally connected pixels in rectangular grids [Fisher, 2005]
BTG image representation

hierarchical decision rule
RUS иерархическое решающее правило
SEC PATTERN RECOGNITION
DEF A hierarchical decision rule is a decision rule in a tree form. In binary trees, each non-terminal node of the tree contains a simple decision rule which classifies patterns as belonging to its left child or to its right child. Each terminal node of the tree contains the assigned class or category of the observed unit [Haralick, 1991]
BTG decision rule

hierarchical image representation
RUS иерархическое представление изображений
SEC IMAGE
BTG image representation
NTG image pyramid

high-level feature
RUS признак высокого уровня
SEC IMAGE
DEF High-level features are calculated on the basis of either low-level features or a preprocessed image. It should be noted that, to calculate high-level features, some additional information (on the image, the problem being solved, laws of the physical world, etc.) is often employed. High-level features are calculated with the

use of an intensity histogram of the original image, the map of edges, wavelet transforms of the image, Fourier transforms of the image, extracted homogeneous regions, extracted skeletons or contours, etc. [Gurevich, 2006]
BTG image feature
RT low-level feature

high-pass filter
RUS фильтр высоких частот
UF high pass filter
highpass filter
SEC IMAGE PROCESSING
DEF A high pass filter is a linear spatial filter which attenuates the low spatial frequencies of an image and accentuates the high spatial frequencies of an image. It is typically used to enhance small details, edges, and lines [Haralick, 1991]

High-pass filter: filter for attenuating low spatial frequency components, and for enhancing spatial frequency components in an image [Klette, 1996]

High pass filter: A frequency domain filter that removes or suppresses all low-frequency components [Fisher, 2005]
BTG image filter
RT linear filter
low-pass filter

histogram
RUS гистограмма
SEC MATHEMATICS
DEF Histogram: A representation of the frequency distribution of some values [Fisher, 2005]
NTG multi-dimensional histogram
RT image histogram

histogram equalization
RUS выравнивание гистограммы
UF histogram linearization
SEC IMAGE PROCESSING
DEF Histogram equalization - process that converts an images histogram to a uniform distribution. This is accomplished by integrating (summing) the histogram over all graylevel values. The effect of equalization is improved contrast in the image [Myler, 1993]

Histogram equalization. Processing an image by using the integrated histogram of the image as the grayscale transform. Works by giving large areas of the image higher contrast than the small areas [Smith, 1999]

Histogram equalization: An image enhancement operation that processes a single image and results in an image with a uniform distribution of intensity levels (i.e., whose intensity histogram is flat). When this technique is applied to a digital image, however, the resulting histogram will often have large values interspersed with zeros [Fisher, 2005]
BTG histogram modification method
NTG adaptive histogram equalization
RT contrast enhancement method

histogram modification
RUS преобразование гистограммы
UF histogram manipulation
SEC IMAGE PROCESSING
BTG image processing task
RT histogram modification method
image histogram

histogram modification method
RUS метод преобразования гистограммы
UF histogram modification algorithm
histogram modification technique
SEC IMAGE PROCESSING
BTG image processing method
NTG histogram equalization
histogram specification
histogram stretching
RT histogram modification
image histogram

histogram specification
RUS задание гистограммы
UF histogram matching
SEC IMAGE PROCESSING
DEF Histogram specification - process that changes the shape of a given image histogram to that of another, specified by the user. The process is used when the histogram of one image is desired in another, or during an interactive histogram modification scheme where the user is allowed to change the histogram dynamically to achieve a desired contrast result [Myler, 1993]

It is useful sometimes to be able to specify the shape of the histogram that we wish the processed image to have. The method used to generate a processed image that has a specified histogram is called histogram matching or histogram specification [Gonzalez, 2002]
BTG histogram modification method

histogram stretching
RUS «растягивание» гистограммы
SEC IMAGE PROCESSING
DEF Histogram stretching - process that scales a histogram to the fullest possible range. This is distinguished from histogram

equalization, which is the conversion of a histogram to a uniform distribution [Myler, 1993]
BTG histogram modification method

hole of a region
RUS отверстие внутри области
SEC IMAGE
DEF Hole: In image processing, a connected component of the complement of a region, that is surrounded by the region [IEEE, 1990]

A set of pixels H constitutes a hole of a region R if H is a maximal connected set of pixels which do not belong to R but which are surrounded by R [Haralick, 1991]
RT Euler number of a region
region

homomorphic filter
RUS гомоморфный фильтр
SEC IMAGE PROCESSING
DEF Homomorphic filter - filter that uses logarithm to separate intensity and reflection components of an image so that each can be modified independently [Myler, 1993]
BTG image filter
RT homomorphic filtering

homomorphic filtering
RUS гомоморфная фильтрация
SEC IMAGE PROCESSING
DEF Homomorphic filtering: An image enhancement technique that simultaneously normalizes brightness and enhances contrast. It works by applying a high pass filter to the original image in the frequency domain, hence reducing intensity variation (that changes slowly) and highlighting reflection detail (that changes rapidly)[Fisher, 2005]
BTG image filtering method
RT contrast enhancement method
homomorphic filter

Hough transform
RUS преобразование Хафа
SEC IMAGE PROCESSING
DEF Hough transform: a multidimensional histogram used to estimate model parameters; each point in the parameter space corresponds to a complete specification of the model parameters. For example, for each edge point detected in an image, the Hough transform will increment the counters for each point in Hough space that corresponds to the parameters of a line that could pass through the given point. All the points in the image on the same line contribute a weight to the same point, allowing this line to be detected as a local maximum in the Hough space. The Hough transform can be generalized to detect arbitrary shapes. [Jahne, 2004]

Hough transform: A technique for transforming image features directly into the likelihood of occurrence of some shape [Fisher, 2005]
BTG image processing operator
NTG cascaded Hough transform
generalized Hough transform
randomized Hough transform
RT global operator
Hough transform line finder

Hough transform line finder
RUS оператор обнаружения линий Хафа
SEC IMAGE ANALYSIS
DEF Hough transform line finder: A version of the Hough transform based on the parametric equation of a line ($s=i\cos\theta+j\sin\theta$) in which a set of edge points $\{(i,j)\}$ is transformed into the likelihood of a line being present as represented in a (s, θ) space. The likelihood is quantified, in practice, by a histogram of the $\sin\theta$, $\cos\theta$ values observed in the images [Fisher, 2005]
BTG line detection method
RT Hough transform

hue
RUS цветовой тон
SEC IMAGE
DEF The characteristics generally used to distinguish one color from another are brightness, hue, and saturation. Brightness embodies the chromatic notion of intensity. Hue is an attribute associated with the dominant wavelength in a mixture of light waves. Hue represents dominant color as perceived by an observer. Thus, when we call an object red, orange, or yellow, we are specifying its hue. Saturation refers to the relative purity or the amount of white light mixed with a hue. The pure spectrum colors are fully saturated. Colors such as pink (red and white) and lavender (violet and white) are less saturated, with the degree of saturation being inversely proportional to the amount of white light added. Hue and saturation taken together are called chromaticity, and, therefore, a color may be characterized by its brightness and chromaticity [Gonzalez, 2002]

Hue: that aspect of color described by words such as red, yellow or blue.

Achromatic colors, such as white, gray and black, do not exhibit hue [Jahne, 2004]

Hue: Describes color using the dominant wavelength of the light. Hue is a common component of color image formats [Fisher, 2005]

RT color
saturation

Hueckel edge detector

RUS оператор выделения яркостных переходов Хюккеля
UF Hueckel edge detection operator
Hueckel edge operator
SEC IMAGE ANALYSIS
DEF Hueckel edge detector: A parametric edge detector that models an edge using a parameterized model within a circular window (the parameters are edge contrast, edge orientation and distance background mean intensity) [Fisher, 2005]
BTG parametric edge detector

Huffman coding

RUS кодирование Хаффмана
UF Huffman encoding
SEC IMAGE PROCESSING
DEF Huffman coding - coding technique that calculates probability of occurrence for data values and assigns smallest codes to most frequent data [Myler, 1993]

Huffman encoding: An optimal, variable-length encoding of values (e.g., pixel values) based on the relative probability of each value. The code lengths may change dynamically if the relative probabilities of the data source change. This technique is commonly used in image compression [Fisher, 2005]

BTG variable length coding

hybrid filter

RUS гибридный фильтр
SEC IMAGE PROCESSING
DEF Hybrid filters are constructed by the concatenation of two and more filters [Sachse, 2004]
BTG image filter

hyperspectral image

RUS гиперспектральное изображение
UF hyperspectral picture
SEC IMAGE
DEF Hyperspectral image: An image with a large number (perhaps hundreds) of spectral bands. An image with a lower number of spectral bands is referred to as multi-spectral image [Fisher, 2005]
BTG image
RT multi-spectral image

I

iconic image representation

RUS иконическое представление изображений
SEC IMAGE
DEF Image, iconic: image in its direct pictorial representation (array). Non-iconic image representations can be obtained by special coding schemes (e.g., run-length coding, contour coding, etc.) [Klette, 1996]
BTG image representation

image

RUS изображение
UF picture
SEC IMAGE
BTG ROOT
NTG 16-bit image
1-bit image
2.5D image
24-bit image
2D image
3D image
4-bit image
8-bit image
analog image
bilevel image
color image
difference image
digital image
edge image
feature image
gray scale image
hyperspectral image
intensity image
multi-channel image
multi-spectral image
one-channel image
raster image
reference image
scale space image
source image
symbolic image
target image
vector image
NTP background
edge
foreground
interest point
pixel
region
RT dynamic range
image analysis
image arithmetic
image distortion
image feature
image file format
image function
image histogram

image invariant
image matrix
image model
image processing
image recognition
image representation
image resolution
image size

image analysis
RUS анализ изображений
SEC IMAGE ANALYSIS
DEF Image analysis: A general term covering all forms of analysis of image data. Generally image analysis operations result in a symbolic description of the image contents [Fisher, 2005]
BTG ROOT
RT image
image analysis approach
image analysis method
image analysis task

image analysis approach
RUS подход к анализу изображений
UF image analysis strategy
SEC IMAGE ANALYSIS
NTG model-based image analysis
RT image analysis

image analysis method
RUS метод анализа изображений
UF image analysis algorithm
image analysis technique
SEC IMAGE ANALYSIS
NTG boundary detection method
boundary following method
boundary grouping method
corner detection method
edge detection method
edge linking method
edge detection method
image segmentation method
line detection method
region description method
region representation method
RT image analysis

image analysis task
RUS задача анализа изображений
SEC IMAGE ANALYSIS
DEF Image analysis: The process of describing or evaluating an image in terms of its parts, properties, and relationships [IEEE, 1990]

Image analysis: the process of extracting objects from images and measuring their geometrical and radiometric properties to gain an understanding of the presented scene [Jahne, 2004]
NTG boundary detection
boundary following
boundary grouping
boundary representation
corner detection
edge detection
edge linking
image segmentation
line detection
region description
region representation
RT image analysis

image arithmetic
RUS арифметические операции над изображениями
SEC IMAGE PROCESSING
DEF Image arithmetic: A general term covering image processing operations that are based on the application of an arithmetic or logical operator to two images. Such operations included addition, subtraction, multiplication, division, blending, AND, NAND, OR, XOR, and XNOR [Fisher, 2005]
BTG image processing task
RT arithmetic operator
logical operator

image blending
RUS взвешенное суммирование изображений
SEC IMAGE PROCESSING
DEF Image blending: An arithmetic operation similar to image addition where a new image is formed by blending the values of corresponding pixels from two input images. Each input image is given a weight for the blending so that the total weight is 1.0 [Fisher, 2005]
BTG arithmetic-based transformation method

image blur
RUS размытость изображения
SEC IMAGE
DEF A measure of sharpness in an image. Blurring can arise from the sensor being out of focus, noise in the environment or image capture process, target or sensor motion, as a side effect of an image processing operation, etc. [Fisher, 2005]
BTG image distortion
RT image sharpening
image sharpening method

image closing operation
RUS операция закрытия изображений
UF closing an image
image closing
SEC IMAGE PROCESSING
DEF Closing an image I with a structuring element s produces a closed image

denoted by $I \bullet s$ which is defined by
$I \bullet s = (I \otimes s) \ominus s$
Closing is an increasing, extensive, and idempotent operation. It is the dual operation to opening. Closing an image with a disk shaped structuring element smooths the contours, fuses narrow breaks and long thin gulfs, eliminates holes smaller in size than the disk structuring element and fills gaps on the contour [Haralick, 1991]

Closing — a morphological operation that smooths the geometrical contour of objects within an image. This operation is composed of a morphological dilation operation followed by a morphological erosion operation [Myler, 1993].
BTG morphological image operation

image coding
RUS кодирование изображений
UF image encoding
SEC IMAGE PROCESSING
DEF Image coding: transformation of pictorial data into a different data representation which needs less memory than the iconic representation, or which has some other benefits (e.g., encryption of images) [Klette, 1996]
Image encoding: The process of converting an image into a different representation [Fisher, 2005]
BTG image processing task
RT image coding method

image coding method
RUS метод кодирования изображений
UF image coding algorithm
image coding scheme
image coding technique
image encoding algorithm
image encoding method
image encoding scheme
image encoding technique
SEC IMAGE PROCESSING
DEF Image coding: The mapping or algorithm required to encode or decode an image representation (such as a compressed image) [Fisher, 2005]
RT image coding

image compression
RUS сжатие изображений
UF image data compression
SEC IMAGE PROCESSING
DEF Image compression: The process of eliminating redundancy or approximating an image in order to represent the image in a more compact manner [IEEE, 1990]

Image compression is an operation which preserves all or most of the information in the image and which reduces the amount of memory needed to store an image or the time needed to transmit an image [Haralick, 1991]

Image compression deals with reducing the amount of data required to represent a digital image by removing of redundant data [Furht, 2006]
BTG image processing task
RT image compression method

image compression method
RUS метод сжатия изображений
UF image compression algorithm
image compression technique
SEC IMAGE PROCESSING
DEF Image compression: A method of representing an image in order to reduce the amount of storage space that it occupies. Techniques can be lossless (which allows all image data to be recorded perfectly) or lossy (where some loss of quality is allowed, typically resulting in significantly better compression rates) [Fisher, 2005]
BTG image processing method
NTG lossless image compression
lossy image compression
RT image compression

image denoising
RUS подавление шума (на изображении)
UF noise reduction
noise removal
noise suppression
SEC IMAGE PROCESSING
DEF Noise suppression: image processing task aiming at reducing certain additive and/or multiplicative components which are not correlated with the pictorial content [Klette, 1996]
BTG image processing task
RT image denoising method
image noise

image denoising method
RUS метод подавления шума
UF image denoising algorithm
image denoising technique
noise reduction algorithm
noise reduction method
noise reduction technique
noise removal algorithm
noise removal method
noise removal technique
noise suppression algorithm
noise suppression method
noise suppression technique

SEC IMAGE PROCESSING
DEF Noise reduction: An image processing method that tries to reduce the distortion of an image that has been caused by noise. For example, the images from a video sequence taken with a stationary camera and scene can be averaged together to reduce the effect of Gaussian noise because the average value of a signal corrupted with this type of noise converges to the true value. Noise reduction methods often introduce other distortions, but these may be less significant to the application that the original noise [Fisher, 2005]

Noise reduction techniques are most often divided into two classes: i) linear techniques, and ii) non-linear techniques. Linear processing techniques have been widely used in digital signal processing applications, since their mathematical simplicity and the availability of a unifying linear system theory make these techniques relatively easy to analyze and implement. However, most of the linear techniques tend to blur structural elements such as lines, edges and other fine image details. Since image signals are nonlinear in nature due to the presence of structural information and are perceived via the human visual system which has strong nonlinear characteristics, nonlinear filters can potentially preserve important multi-channel structural elements, such as color edges and eliminate degradations occurring during signal formation or transmission through nonlinear channel [Furht, 2006]
BTG image processing method
NTG Beltrami flow
conservative smoothing
Crimmins smoothing operator
edge preserving smoothing
RT average filter
image denoising
image noise
Kuwahara filter
median filter
mode filter

image dilation operation
RUS операция дилатации изображений
UF dilating an image
image dilation
SEC IMAGE PROCESSING
DEF Dilating an image I by a structuring element s having support or domain S produces a dilated image denoted by $I \otimes s$ which is defined by
$(I \otimes s)(r,c) = \max_{(i,j)\in S} \{I(r-i, c-j) + s(i,j)\}$.

Dilating is a commutative, associative, translation invariant, and increasing operation. Dilating is the dual operation to eroding [Haralick, 1991]

Dilation — a morphological operation that enlarges the geometrical size of objects within an image [Myler, 1993].
BTG morphological image operation

image distortion
RUS искажение изображения
UF image degradation
SEC IMAGE
DEF Image distortion: Any effect that alters an image from the ideal image. Most typically this term refers to geometric distortions, although it can also refer to other types of distortion such as image noise and effects of sampling and quantization [Fisher, 2005]
NTG geometric distortion
image blur
image noise
RT image
image restoration
image restoration method

image enhancement
RUS улучшение качества изображений
UF image improvement
SEC IMAGE PROCESSING
DEF Image enhancement: Image processing task aiming at improving the visibility or identification of image structures or details. For example, the interference or noise suppression can be a specific aim of image enhancement [Klette, 1996]
BTG image processing task
RT brightness adjustment
color correction
contrast enhancement
edge enhancement
image enhancement method

image enhancement method
RUS метод улучшения качества изображений
UF image enhancement algorithm
image enhancement technique
image improvement algorithm
image improvement method
image improvement technique
SEC IMAGE PROCESSING
DEF Image enhancement: The process of improving the appearance of an image by using techniques such as contrast stretching, edge enhancement, gray scale manipulation, smoothing, and sharpening [IEEE, 1990]

Image enhancement is any one of a group of operations which improve the detectability of objects. These operations include, but are not limited to, contrast stretching, edge enhancement, spatial filtering, noise suppression, image smoothing, and image sharpening [Haralick, 1991]

Image enhancement: any type of operations which improve the detectability of objects or the appearance of an image [Jahne, 2004]

Image enhancement: A general term covering a number of image processing operations, that alter an image in order to make it easier for humans to perceive. Example operations include contrast stretching and histogram equalization [Fisher, 2005]

BTG image processing method
RT brightness adjustment method
color correction method
contrast enhancement method
edge enhancement method
image enhancement

image erosion operation
RUS операция эрозии изображений
UF eroding an image
image erosion
SEC IMAGE PROCESSING
DEF Eroding an image I by a structuring element s having support or domain S produces an eroded image denoted by I e s which is defined by

$$(I \text{ e } s)(r,c) = \min_{(i,j)\in S}\{I(r+i,c+j) - s(i,j)\}$$

Eroding is a translation invariant and increasing operation. It is the dual operation to dilating [Haralick, 1991]

Erosion — morphological operation that reduces the geometrical size of objects within an image [Myler, 1993].

Erosion: morphological operator decreasing the size of objects and removing small objects. It is the dual operation to dilation [Jahne, 2004]
BTG morphological image operation

image feature
RUS признак изображения
SEC IMAGE
DEF Feature: an attribute that may contribute to pattern classification; for example, size, texture, or shape. A feature can be related either to an entire region (extracted object) or a pixel [Jahne, 2004]

Image feature: A general term for an interesting image structure that could arise from a corresponding interesting scene structure. Features can be single points such as interest points, curve vertices, image edges, lines or curves or surface, etc. [Fisher, 2005]
NTG *<by type of image on which the feature is calculated>*
binary feature
color feature
gray scale feature
<by type of model representation used for feature calculation>
shape-based feature
spectral feature
statistical feature
<by region on which the feature is calculated>
global feature
local feature
<by type of the object on which the feature calculation is based>
contour-based feature
point-based feature
skeleton-based feature
segment-based feature
<by feature level>
high-level feature
low-level feature
<by method for determination of the feature>
computable feature
derivable feature
extractable feature
measurable feature
<by mathematical tools used for feature determination>
arithmetical feature
combinatorial feature
logical feature
matrix feature
topological feature
RT feature image
image
image recognition

image file format
RUS формат файла изображения
UF digital image format
image format
SEC IMAGE
NTG BMP
GIF
JPEG
TIFF
RT image

image filter
RUS фильтр изображений
UF filter operator
SEC IMAGE PROCESSING

DEF Filter: An operator that replaces the value of a pixel *P* by a function of *P* and its neighbors. Filtering is used to smooth, enhance, or detect some property or aspect of an image [Fischler, 1987]
BTG image processing operator
NTG adaptive filter
average filter
band-pass filter
binomial filter
box filter
butterfly filter
directional filter
frequency domain filter
Gabor filter
Gaussian filter
gradient filter
high-pass filter
hybrid filter
Kuwahara filter
linear filter
low-pass filter
maximum filter
median filter
minimum filter
mode filter
non-linear filter
quadrature mirror filter
rank-order filter
separable filter
steerable filter
Wiener filter
RT image filtering
image filtering method

image filtering
RUS фильтрация изображений
SEC IMAGE PROCESSING
BTG image processing task
RT image filter
image filtering method

image filtering method
RUS метод фильтрации изображений
UF image filtering algorithm
image filtering technique
SEC IMAGE PROCESSING
BTG image processing method
NTG adaptive filtering
anisotropic filtering
bilateral filtering
frequency domain filtering
homomorphic filtering
RT image filter
image filtering

image function
RUS функция изображения
UF picture function
SEC IMAGE
DEF An image function is a mathematical representation of an image. Most images are presented by functions of two spatial variables f(x)=f(x,y), where f(x,y) is the brightness of the gray level of the image at a spatial coordinate (x,y) [Ballard, 1982]

A picture function is a mathematical representation $f(x,y)$ of a picture as a function of two spatial variables x and y are real values defining points of the picture and $f(x,y)$ is usually also a real value defining the intensity of a picture at point (x,y) [Shapiro, 2001].
RT image

image histogram
RUS гистограмма изображения
SEC IMAGE
DEF A histogram or image histogram is a function h defined on the set of image intensity values to the non-negative integers. The value h(k) is given by the number of pixels in the image having image intensity k. For images having a large gray tone range, the image will often be quantized before being histogrammed or will be quantized on the fly during the histogramming process [Haralick, 1991]

Histogram - distribution of pixel graylevel values. A graph of number of pixels at each graylevel possible in an image. A histogram is a probability distribution of pixels values and may be processed using statistical techniques. These processes result in changes to the brightness and contrast in an image, but are independent of the spatial distribution of the pixels [Myler, 1993].

Histogram: graphical representation of frequencies of occurrence by means of a diagram. In computer vision this term is normally identified with the gray level histogram, used as an estimation of the global or local gray level distribution [Klette, 1996]
RT histogram
histogram modification
image

image interpolation
RUS интерполяция изображений
SEC IMAGE PROCESSING
DEF Image interpolation: A method for computing a value for a pixel in an output image based on non-integer coordinates in some input image. The computation is based on the values of nearby pixels in the input image. This type of operation is required for most geometric transformations and computations

requiring sub-pixel resolution. Types of interpolation scheme include nearest-neighbor interpolation, bilinear interpolation, bicubic interpolation, etc. [Fisher, 2005]
BTG image processing operation

image invariant
RUS инвариант изображения
UF invariant of an image
SEC IMAGE
DEF Image invariant: An image feature or measurement image that is invariant to some properties. For example invariant color features are often used in image database indexing [Fisher, 2005]

An invariant of an image is the mapping φ of a set $M = \{I_i\}_1^n$ of equivalent images to a set N of mathematical objects for which a certain equivalence relation ρ is introduced [Gurevich&Yashina, 2006]
RT image

image matrix
RUS матрица изображения
SEC IMAGE
DEF Image matrix: matrix representation of the *M* x *N* image raster [Klette, 1996]
RT image

image model
RUS модель изображения
SEC IMAGE
DEF Image model: abstract specification of a class of real images by means of ideal (typical) features of image segments. Each segment is homogenous in the sense of a certain criterion of uniformity. In structural image models, the gray value function of such segments is approximated by analytical functions with variables *x*,*y*. In statistical image models, homogenous segments are characterized by statistical features, e.g., by the average value, the variance, properties of the co-occurrence matrix, or prediction coefficients [Klette, 1996]

An image model $M(I)$ is a formal image description generated by a realization of an image representation $\Re(I)$[Gurevich, 2008]
NTG statistical image model
structural image model
RT image

image noise
RUS шум на изображении
SEC IMAGE
DEF Image noise: Degradation of an image where pixels have values which are different from the ideal values. Often noise is modeled as having a Gaussian distribution with a zero mean, although it can take on different forms such as salt-and-pepper noise depending upon the cause of the noise (e.g., the environment, electrical inference, etc.). Noise is measured in terms of the signal-to noise ratio [Fisher, 2005]
BTG image distortion
NTG additive noise
Erlang noise
exponential noise
Gaussian noise
impulse noise
pink noise
Rayleigh noise
uniform noise
white noise
RT image denoising
image denoising method
signal-to-noise ratio

image normalization
RUS нормализация изображений
SEC IMAGE PROCESSING
DEF Image normalization: The purpose of image normalization is to reduce or eliminate the effects of different illumination on the same or similar scenes. [Fisher, 2005]
BTG image processing task
RT image normalization

image normalization method
RUS метод нормализации изображений
UF image normalization algorithm
image normalization technique
SEC IMAGE PROCESSING
DEF Image normalization: The purpose of image normalization is to reduce or eliminate the effects of different illumination on the same or similar scenes. A typical approach is to subtract the mean of the image and divide by the standard deviation, which produces a zero mean, unit variance image. Since images are not Gaussian random samples, this approach does not completely solve the problem. Further, light source placement can also cause variations in shading that are not corrected by this approach [Fisher, 2005]
BTG image processing method
RT image normalization

image opening operation
RUS операция открытия изображений
UF image opening
opening an image

SEC IMAGE PROCESSING
BTG morphological image operation

image processing
RUS обработка изображений
UF picture processing
SEC IMAGE PROCESSING
DEF Image processing or picture processing encompasses all the various operations which can be applied to image data. These include, but are not limited to, image compression, image restoration, image enhancement, preprocessing, quantization, spatial filtering, matching, and recognition techniques [Haralick, 1991]

Image processing [picture processing]: the manipulation of images by computer. Encompasses a wide variation of operations which can be applied to an image in order to restore degradations, to enhance its appearance, to extract features for object recognition and classification, or to compress it for storage and transmission [Jahne, 2004]

Image processing: A general term covering all forms of processing of captured image data. It can also mean processing that starts from an image and results in an image, as contrasted to ending with symbolic descriptions of the image contents or scene [Fisher, 2005]
BTG ROOT
RT Fourier image processing
image
image processing method
image processing operation
image processing operator
image processing task
morphological image processing

image processing method
RUS метод обработки изображений
UF image processing algorithm
image processing technique
picture processing algorithm
picture processing method
picture processing technique
SEC IMAGE PROCESSING
NTG arithmetic-based transformation method
binarization method
color correction method
contrast enhancement method
edge enhancement method
geometric transformation method
histogram modification method
image coding method
image compression method
image denoising method
image enhancement method
image filtering method
image normalization method
image quantization method
image restoration method
image sharpening method
image smoothing method
RT image processing
image processing task

image processing operation
RUS операция обработки изображений
UF image operation
SEC IMAGE PROCESSING
NTG area-based image operation
binary image operation
image interpolation
morphological image operation
pixel-based image operation
RT image processing

image processing operator
RUS оператор обработки изображений
UF image operator
image transform
image transform operator
SEC IMAGE PROCESSING
DEF Image operator: A function that transforms an input image into an output image [IEEE, 1990]

An image operator, image transform, or image transform operator is a function which takes an image for its input and produces an image for its output. The domain of a transform operator is often called the spatial or space domain. The range of the transform operator is often called the transform domain. Some image transform operators have spatial and transform domains of entirely different geometry or character; the image in the spatial domain may appear entirely different from and have a different interpretation from the image in the transform domain. Specific examples of these kinds of image transforms include Fourier, Sine, Cosine, Slant, Haar, Hadamard, Mellin, Karhunen-Loeve, and Hough transforms. Image operators which have spatial and transform domains of similar geometry or character include point operators, neighborhood operators, and spatial filters [Haralick, 1991]

Image operator: synonym of image transformation. Image transformation: mapping of pictorial data into pictorial data. An image transformation generates one or several resultant images out of one or several given images. For example, the Fourier transformation produces two data arrays (real and imaginary part) for a given gray value image which can be

transformed into two gray value images [Klette, 1996]

Operator: transforms an image into another image by applying certain computations. The three basic classes of operators are point operators, neighborhood operators and global transforms such as the Fourier transform [Jahne, 2004]

Image processing operator: A function that may be applied to an image in order to transform it in some way [Fisher, 2005]

NTG arithmetic operator
correlation operator
discrete cosine transform
discrete Fourier transform
discrete Radon transform
discrete wavelet transform
geometric operator
global operator
gradient operator
Haar transform
Hadamard transform
Hartley transform
image filter
Karhunen-Loeve transform
Laplacian of Gaussian operator
Laplacian operator
logical operator
local operator
point operator
RT image processing

image processing task
RUS задача обработки изображений
UF picture processing task
SEC IMAGE PROCESSING
NTG binarization
brightness adjustment
color correction
geometric image transformation
histogram modification
image arithmetic
image coding
image compression
image denoising
image enhancement
image filtering
image normalization
image quantization
image restoration
image sharpening
image smoothing
RT image processing
image processing method

image pyramid
RUS пирамида изображений
SEC IMAGE
DEF Image pyramid: A hierarchical image representation in which each level contains a smaller version of the image at the previous level. Often pixel values are obtained by a smoothing process. Usually the reduction is by a power of two (i.e., 2 or 4) [Fisher, 2005]
BTG hierarchical image representation

image quantization
RUS квантование изображений
SEC IMAGE PROCESSING
BTG image processing task
RT image quantization method

image quantization method
RUS метод квантования изображений
UF image quantization algorithm
image quantization technique
SEC IMAGE PROCESSING
DEF Quantization: In image processing, a process in which each pixel in an image is assigned one of a finite set of gray levels [IEEE, 1990]
BTG image processing method
RT image quantization

image recognition
RUS распознавание изображений
UF pictorial pattern recognition
SEC IMAGE RECOGNITION
DEF Pictorial pattern recognition: the recognition of patterns in visual or pictorial data [IEEE, 1990]
BTG ROOT
RT image feature
image recognition method
image recognition task

image recognition method
RUS метод распознавания изображений
UF image recognition algorithm
image recognition technique
pictorial pattern recognition algorithm
pictorial pattern recognition method
pictorial pattern recognition technique
SEC IMAGE RECOGNITION
RT image recognition
image recognition task

image recognition task
RUS задача распознавания изображений
UF pictorial pattern recognition task
SEC IMAGE RECOGNITION
DEF Pictorial pattern recognition refers to techniques which treat the image as a pattern and either categorize the image or produce a description of the image [Haralick, 1991]
NTG cluster analysis
RT image recognition
image recognition method

image representation
RUS представление изображений
UF image data representation
SEC IMAGE
DEF Image representation: A general term for how the image data is represented. Image data can be one, two, three or more dimensional. Image data is often stored in arrays where the spatial layout of the array reflects the spatial layout of the data [Fisher, 2005]

An image representation $\Re(I)$ is a formal scheme for obtaining a standardized formal description of the surfaces, point configurations, and shapes forming the image and the relations between them [Gurevich, 2008]
NTG deterministic image representation
fractal-based image representation
hexagonal image representation
hierarchical image representation
iconic image representation
non-iconic image representation
statistical image representation
RT image

image resolution
RUS разрешение изображения
SEC IMAGE
DEF Resolution: A measurement that indicates how precisely an image can represent an object. The resolution limit is the smallest dimension of an object that can be discriminated or observed [Fischler, 1987]

Resolution: In image processing, the degree to which closely spaced objects in an image can be distinguished from one another [IEEE, 1990]

Resolution is a generic term which describes how well a system, process, component, material, or image can reproduce an isolated object consisting of separate closely spaced objects or lines. The limiting resolution, resolution limit or spatial resolution is described in terms of the smallest dimension of the target or object that can just be discriminated or observed. Resolution may be a function of object contrast and spatial position as well as element shape (single point, number of points in a cluster, continuum, or line etc.) [Haralick, 1991]

Resolution — smallest feature (spatial) or graylevel value (quantization) that an image system can resolve [Myler, 1993].

Resolution: the number of image points per image, e.g. 512 x 512. Image smoothing allows a gradual change from higher resolutions to lower resolutions [Klette, 1996]

Image resolution: Usually used to record the number of pixels in the horizontal and vertical directions in the image, but may also refer to the separation between pixels or the angular separation between the lines of sight corresponding to adjacent pixels [Fisher, 2005]
RT image

image restoration
RUS восстановление изображений
SEC IMAGE PROCESSING
DEF Image restoration is a process by which a degraded image is restored, as clearly or as best as possible, to its ideal condition. Perfect image restoration is possible only to the extent that the degradation transform is mathematically invertible. Common forms of restoration include inverse filtering, Wiener filtering, and constrained least squares filtering [Haralick, 1991]

Image restoration: Image processing task aiming at compensating or eliminating distortions or impairments due to the process of image acquisition or image transmission. An ideal compensation is only possible if the image acquisition or transmission process is mathematically describable [Klette, 1996]

Restoration: the process of returning an image to its original condition by reversing the effects of known or estimated distortions and degradations such as blurring by lens aberrations, velocity smearing, defocusing, vibration, and geometrical distortions [Jahne, 2004]

Image restoration: The process of removing some known (and modeled) distortion from an image, such as blur in an out-of-focus image. The process may not produce a perfect image, but may remove an undesired distortion (e.g., motion blur) at the cost of another ignorable distortion (e.g., phase distortion) [Fisher, 2005]
BTG image processing task
RT image distortion
image restoration method

image restoration method
RUS метод восстановления изображений
UF image restoration algorithm
image restoration technique

SEC IMAGE PROCESSING
DEF Restoration - algorithms and processes that attempt to remove a degradation (noise, blurring and defocusing effects) based on an objective criterion [Myler, 1993]
RT image distortion
image restoration
inverse filtering
maximum entropy restoration

image retrieval
RUS поиск изображений
SEC APPLIED PROBLEMS
NTG content-based image retrieval

image segmentation
RUS сегментация изображений
SEC IMAGE ANALYSIS
DEF Image segmentation: The process of dividing an image into regions [IEEE, 1990]

Image segmentation is a process which typically partitions the spatial domain of an image into mutually exclusive subsets, called regions, each one of which is uniform and homogeneous with respect to some property such as tone or texture and whose property value differs in some significant way from the property value of each neighboring region. Regions produced by an image segmentation process using image intensity as a property value produce regions which are called discrete tonal features [Haralick, 1991]

Image segmentation: The grouping of image pixels into meaningful, usually connected, structures such as curves and regions. The term is applied to a variety of image modalities, such as intensity data or range data and properties, such as similar feature orientation, feature motion, surface shape or texture [Fisher, 2005]
BTG image analysis task
RT image segmentation method

image segmentation method
RUS метод сегментации изображений
UF image segmentation algorithm
image segmentation technique
SEC IMAGE ANALYSIS
DEF Image segmentation: process of dividing an image into disjoint image segments. This can be achieved either by computing border lines (e.g., contour tracing), or by grouping of pixels (e.g., region growing, agglomeration) [Klette, 1996]
BTG image analysis method
NTG edge-based image segmentation
image thresholding
model-based image segmentation
morphological segmentation
region-based image segmentation
texture-based image segmentation
watershed segmentation
RT image segmentation

image sharpening
RUS повышение резкости изображений
UF image deblurring
SEC IMAGE PROCESSING
DEF Sharpening: increasing the visibility of image structures with high spatial frequencies (details or texture elements), or increasing the edge slope [Klette, 1996]
BTG image processing task
RT image blur
image sharpening method

image sharpening method
RUS метод повышения резкости изображений
UF image deblurring algorithm
image deblurring method
image deblurring technique
image sharpening algorithm
image sharpening technique
SEC IMAGE PROCESSING
DEF Sharpening: Any image enhancement technique in which the effect of blurring in the original image is reduced [IEEE, 1990]
BTG image processing method
NTG frequency domain sharpening
spatial domain sharpening
RT image blur
image sharpening

image size
RUS размер изображения
SEC IMAGE
DEF Image size: The number of pixels in an image, for example, 768 horizontally by 494 vertically [Fisher, 2005]
RT image

image smoothing
RUS сглаживание изображений
SEC IMAGE PROCESSING
DEF Image smoothing refers to any spatial filtering producing an output image which spatially simplifies and approximates the input image. Image smoothing suppresses small image details and enhances large or coarse image structures [Haralick, 1991]

Smoothing: Image transformation for enforcing an equalization of neighboring gray levels (reduction of high-frequency components). Gray value spikes (“outliers”) are suppressed, noisy gray

value variations are equalized, and texture patterns are attenuated. A secondary effect of smoothing is that steep edges are transformed onto smooth edges, and details are deleted. Global 2-D filters or local operators can be used for smoothing [Klette, 1996]
BTG image processing task
RT image smoothing method

image smoothing method
RUS метод сглаживания изображений
UF image smoothing algorithm
image smoothing technique
SEC IMAGE PROCESSING
DEF Smoothing: Any image enhancement technique in which the effect of noise in the original image is reduced [IEEE, 1990]
BTG image processing method
NTG adaptive smoothing
frequency domain smoothing
spatial domain smoothing
RT Gaussian filter
image smoothing`

image subtraction
RUS вычитание изображений
UF image difference
SEC IMAGE PROCESSING
DEF Image subtraction. This is one of the simplest techniques in point processing. It is used when we need to isolate the motion that occurred between two frame captures in a sequence and it has applications in the contexts of both enhancement and segmentation. One of the most common and recent applications of image subtraction is the compression of video images where the idea is to transmit or store only the information that changes from frame to frame [Watt, 1998]
BTG arithmetic-based transformation method

image thresholding
RUS пороговая обработка изображений
UF thresholding
SEC IMAGE ANALYSIS
DEF Thresholding: An operation that takes a gray scale image and produces a binary image. A pixel whose gray value is less than the threshold value is set to zero; otherwise, the pixel is set to one [Fischler, 1987]

Thresholding: The process of producing a binary image from a gray scale image by assigning each output pixel the value 1 if its corresponding input pixel is at or above a specified gray level (the threshold) and the value 0 if the input pixel is below that threshold [IEEE, 1990]

Thresholding: image transformation defined by one or several thresholds. The classical threshold operator transforms gray value images into bilevel images. It is characterized by a threshold S, with $0 \le S \le G-1$. Gray values u are either mapped to $G-1$, if $u>S$, or to 0 [Klette, 1996]

Thresholding is a point-based approach to image segmentation [Sachse, 2004]
BTG image segmentation method
NTG adaptive thresholding
global thresholding
local thresholding
multi-spectral thresholding
RT threshold

image watermarking
RUS нанесение «водяных» знаков на изображение
SEC APPLIED PROBLEMS
DEF The process of embedding a signature/watermark into digital data. In the domain of digital images this is most normally done for copyright protection. The digital watermark may be invisible or visible [Fisher, 2005]

Image watermarking deals with creating a metadata (a watermark) about the image content and hiding it within the image [Furht, 2006]

impulse noise
RUS импульсный шум
SEC IMAGE
DEF The probability density function of (bipolar) impulse noise is given by

$$p(z) = \begin{cases} P_a & for \quad z = a \\ P_b & for \quad z = b \\ 0 & otherwise \end{cases}.$$ If $b>a$, gray-level b will appear as a light dot in the image. Conversely, level a will appear like a dark dot. If either P_a or P_b is zero, the impulse noise is called unipolar. If neither probability is zero, and especially if they are approximately equal, impulse noise values will resemble salt-and-pepper granules randomly distributed over the image. For this reason, bipolar impulse noise also is called salt-and-pepper noise [Gonzalez, 2002]
BTG image noise
NTG salt-and-pepper noise

intensity image
RUS яркостное изображение
UF intensity picture

SEC IMAGE
DEF Intensity image: An image that records the measured intensity data [Fisher, 2005]
BTG image

interest point
RUS интересная точка (на изображении)
UF interest image point
point of interest
SEC IMAGE
DEF Interest point: A general term for pixels that have some interesting property. Interest points are often used for making feature point correspondences between images. Thus, the points usually have some identifiable property. Further, because of the need to limit the combinatorial explosion that matching can produce, interest points are often expected to be infrequent in an image. Interest point are often of high variation in pixel values [Fisher, 2005]
BTP image
RT interest point operator

interest point operator
RUS оператор выделения «интересных» точек на изображении
UF interest point detector
interest point feature detector
SEC IMAGE ANALYSIS
DEF Interest point feature detector: An operator applied to an image to locate interest points. Well-known examples are the Moravec and the Plessey interest point operators [Fisher, 2005]
NTG Moravec interest point operator
RT interest point

invariant
RUS инвариант
SEC MATHEMATICS
DEF Something that does not change under specified operations (e.g., translation invariant) [Fisher, 2005]

inverse filtering
RUS обратная фильтрация
SEC IMAGE PROCESSING
DEF Inverse filtering is an elegant technique in theory that can present significant practical problems. The operation relies on knowledge of the nature of a degradation in an image. Division (multiplication by an inverse filter) in the Fourier domain can then restore the image. The classic example is the restoration of an image that has been blurred due to relative motion between the camera and the scene. It seems that in the space domain all information of interest has been destroyed, but it so happens that a simple division in the Fourier domain will make everything right.
If the perfect image is *I(x,y)* and the degraded image is *g(x,y),* then we have in general *g(x,y)= I(x,y)*h(x,y)* where *h(x,y)* is the degrading function. In the Fourier domain we have *G(u,v)=F(u,v)H(u,v)* where *H(u,v)* is the Fourier transform of *h(x,y)*.
Inverse filtering simply means dividing *G(u,v)* by *H(u,v)* giving the Fourier transform of the undegraded image *F(u,v)*: $\frac{G(u,v)}{H(u,v)} = F(u,v)\frac{H(u,v)}{H(u,v)}$ (Note that dividing in the Fourier domain means dividing the magnitude components and subtracting the phase components.) [Watt, 1998]
RT image restoration method

J

JPEG
RUS формат JPEG
UF JPEG file
JPEG file format
SEC IMAGE
DEF A common image file format using transform (lossy) compression. Widely used on the world wide web for graphics [Smith, 1999]

JPEG: A common format for compressed image representation designed by the Joint Photographic Experts Group (JPEG) [Fisher, 2005]
BTG image file format
RT image

K

Karhunen-Loeve transform
RUS преобразование Карунена-Лоэве
SEC IMAGE PROCESSING
DEF Karhunen-Loeve transformation: The projection of a vector (or image when treated as a vector) onto an orthogonal space that has uncorrelated components constructed from the autocorrelation (scatter) matrix of a set of example vectors. An advantage is the orthogonal components have a natural ordering (by the largest eigenvalues of the covariance of the original vector space) so that one can select the most significant variation in the dataset. The transformation can be used as a basis for image compression, for estimating linear models in high dimensional datasets and estimating the dominant modes of variation in a dataset, etc. It is also known as the principal component transformation [Fisher, 2005]

BTG image processing operator
RT global operator

Kirsch compass edge detector
RUS оператор выделения яркостных переходов Кирша
UF Kirsch edge detector
Kirsch edge operator
Kirsch operator
SEC IMAGE ANALYSIS
DEF Kirsch compass edge detector: A first derivative edge detector that computes the gradient in different directions according to which calculation mask is used. Edges have high gradient values, so thresholding the intensity gradient magnitude is one approach to edge detection. A Kirsch mask that detects edges at 45° is: $\begin{bmatrix} -3 & 5 & 5 \\ -3 & 0 & 5 \\ -3 & -3 & -3 \end{bmatrix}$ [Fisher, 2005]
BTG gradient-based edge detector

knowledge-based face detection
RUS выделение лиц, основанное на знаниях
SEC APPLIED PROBLEMS
DEF Knowledge-based face detection methods are based on human knowledge of the typical human face geometry and facial features arrangement. Taking advantage of natural face symmetry and the natural top-to-bottom and left-to-right order in which features appear in the human face, these methods find rules to describe the shape, size, texture and other characteristics of facial features (such as eyes, nose, chin, eyebrows) and relationships between them (relative positions and distances). A hierarchical approach may be used, which can examines the face at different resolution levels. At higher levels, possible face candidates are found using a rough description of face geometry. At lower levels, facial features are extracted and an image region is identified as face or non-face based on predefined rules about facial characteristics and their arrangement. The main issue in such techniques is to find a successful way to translate human knowledge about face geometry into meaningful and well-defined rules. Another problem of such techniques is that they do not work very well under varying pose or head orientations [Furht, 2006]
BTG face detection

Kuwahara filter
RUS фильтр Кувахары
SEC IMAGE PROCESSING
DEF Kuwahara filter: An edge-preserving noise reduction filter. The filter uses four regions surrounding the pixel being smoothed. The smoothed value for that pixel is the mean value of the region with smallest variance [Fisher, 2005]
BTG image filter
RT image denoising method

L

Laplacian of Gaussian operator
RUS лапласиан гауссиана
UF Laplacian of Gaussian
LoG
SEC IMAGE PROCESSING
DEF Laplacian of Gaussian operator: A low-level image operator that applies the second derivative Laplacian operator (∇^2) after a Gaussian smoothing operation everywhere in an image. It is an isotropic operator. It is often used as part of a zero crossing edge detection operator because the locations where the value changes sign (positive to negative or vice versa) of the output image are located near the edges in the input image, and the detail of the detected edges can be controlled by use of the scale parameter of the Gaussian smoothing [Fisher, 2005]
BTG image processing operator

Laplacian operator
RUS оператор Лапласа
UF Laplacian
SEC IMAGE PROCESSING
DEF Laplacian: Loosely, the Laplacian of a function is the sum of its second order partial derivatives. For example, the Laplacian of $f(x,y,z): R^3 \mapsto R$ is $\nabla^2 f(x,y,z) = \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} + \frac{\partial^2 f}{\partial z^2}$. In computer vision, the Laplacian operator may be applied to an image, by convolution with the Laplacian kernel, one definition of which is given by the sum of second derivative kernels [-1, 2, -1] and $[-1, 2, -1]^T$, with zero padding to make the result 3 x 3: $\begin{pmatrix} 0 & -1 & 0 \\ -1 & 4 & -1 \\ 0 & -1 & 0 \end{pmatrix}$ [Fisher, 2005]
BTG image processing operator
RT Marr-Hildreth edge detector

line detection
RUS выделение линий
SEC IMAGE ANALYSIS
BTG image analysis task

RT line detection method

line detection method
RUS метод выделения линий
UF line detection algorithm
line detection operator
line detection technique
SEC IMAGE ANALYSIS
DEF Line detection: An image segmentation technique in which line pixels are identified by examining their neighborhoods [IEEE, 1990]

Line detection operator: A feature detection process that detects line. Depending on the specific operator, locally linear line segments may be detected or straight lines might be globally detected. Note that this detects lines as contrasted with edges [Fisher, 2005]
BTG image analysis method
NTG Hough transform line finder
RT line detection

linear filter
RUS линейный фильтр
UF linear image filter
SEC IMAGE PROCESSING
DEF Linear filter: A filter whose output is a weighted sum of its inputs, i.e., all terms in the filter are either constants or variables. If $\{x_i\}$ are the inputs (which may be pixel values from a local neighborhood or pixel values from the same position in different images of the same scene, etc.), then the linear filter output would be $\sum_{a_i} a_i x_i + a_0$, for some constants [Fisher, 2005]
BTG image filter
RT band-pass filter
binomial filter
box filter
butterfly filter
Gaussian filter
high-pass filter

local contrast adjustment
RUS локальное выравнивание контраста
SEC IMAGE PROCESSING
DEF Local contrast adjustment: A form of contrast enhancement that adjusts pixel intensities based on the values of nearby pixels instead of the values of all pixels in the image [Fisher, 2005]
BTG contrast enhancement method
RT contrast

local feature
RUS локальный признак (изображения)
UF local image feature
SEC IMAGE
DEF By local features, we mean characteristics of the image calculated at each its point or on each subset of the image that is the minimal possible for calculation of this characteristic. Local features are usually calculated by local operators. A value of a local feature $p_0=(x,y,P_0)$ is determined as the result Q_0 of application of a function $f(P_0, \ldots, P_N)$ of values of intensity levels $P_0, \ldots, P_N$ in a bounded window U (of size L x L) centered at a point p_0 , where $N=L^2$: $Q_0=f(P_0, \ldots, P_N)$. Here, the function f may be: (1) linear (the convolution with a given kernel) or nonlinear: (2) described by equations (analytic) or by look-up tables; (3) analytic or logical; (4) scale invariant or depending on pixel coordinates or logic data of the image; (5) computable in parallel (nonrecursive) or sequentially computable (recursive) [Gurevich, 2006]
BTG image feature
RT global feature

local operator
RUS локальный оператор
UF local image operator
local image processing operator
local image transform operator
window operator
SEC IMAGE PROCESSING
DEF Window operator: synonym of local operator. Operator, local: operator defined by a window F such that each computed image value $h(p)$ of the resultant image h depends only upon the original and eventually upon some processed image values within the placed window F(p) [Klette, 1996]

Local operator: An image processing operator that computes its output at each pixel from the values of the nearby pixels instead of using all or most of the pixels in the image [Fisher, 2005]
BTG image processing operator
RT global operator
point operator

local thresholding
RUS пороговая обработка с локальным порогом
SEC IMAGE ANALYSIS
BTG image thresholding

logical operator
RUS логический оператор (изображений)
SEC IMAGE PROCESSING
BTG image processing operator
NTG AND operator

NAND operator
NOT operator
OR operator
XOR operator
RT image arithmetic

logical feature
RUS логический признак (изображения)
SEC IMAGE
DEF By a logical feature, we mean the result of application of a logical function to the image. The logical features are often high-level features [Gurevich, 2006]
BTG image feature
RT arithmetical feature
combinatorial feature
matrix feature
topological feature

lossless image compression
RUS сжатие изображений без потерь
UF error-free image coding
error-free image encoding
error-free image compression
lossless image coding
lossless image encoding
loss-free image compression
SEC IMAGE PROCESSING
DEF Lossless encoding: any image compression technique that represents gray levels compactly but permits exact reconstruction of the image. Example: run length encoding; contrast with lossy encoding [Jahne, 2004]

Lossless compression: A category of image compression in which the original image can be exactly reconstructed from the compressed image. This contrasts with lossy compression [Fisher, 2005]
BTG image compression method
NTG bit plane coding
lossless predictive coding
LZW coding
variable length coding
RT lossy image compression

lossless predictive coding
RUS кодирование без потерь с предсказанием
SEC IMAGE PROCESSING
DEF The approach, commonly referred to as lossless predictive coding, is based on eliminating the interpixel redundancies of closely spaced pixels by extracting and coding only the new information in each pixel. The new information of a pixel is defined as the difference between the actual and predicted value of that pixel [Gonzalez, 2002]
BTG lossless image compression

lossy image compression
RUS сжатие изображений с потерями
UF lossy image coding
lossy image encoding
SEC IMAGE PROCESSING
DEF Lossy encoding: any image compression technique which only approximates the signal. An exact reconstruction is not possible. Example: JPEG; contrast with lossless encoding [Jahne, 2004]

Lossy compression: A category of image compression in which the original image cannot be exactly reconstructed from the compressed image. The goal is to lose insignificant image details (e.g., noise) while limiting perception of changes to the image appearance. Lossy algorithms generally produce greater compression than lossless compression [Fisher, 2005]

Lossy compression: Lossy compression techniques deliberately introduce a certain amount of distortion to the encoded image, exploring the psychovisual redundancies of the original image. These techniques must find an appropriate balance between the amount of error (loss) and the resulting bit savings [Furht, 2006]
BTG image compression method
NTG fractal image compression
lossy predictive coding
transform coding
wavelet coding
RT lossless image compression

lossy predictive coding
RUS кодирование с потерями с предсказанием
SEC IMAGE PROCESSING
BTG lossy image compression

low-level feature
RUS признак низкого уровня
SEC IMAGE
DEF Low-level features are features calculated directly on the basis of the original image, while, to calculate a high-level feature, the image must be preprocessed. Among the low-level features are such features as intensity, orientation, edges, and texture features whose calculation requires no additional information or interference with the user. These features are widely used for indexation and retrieval in image retrieval systems [Gurevich, 2006]
BTG image feature
RT high-level feature

low-pass filter
RUS фильтр низких частот

UF low pass filter
lowpass filter
SEC IMAGE PROCESSING
DEF Low-pass filter: filter for attenuating high spatial frequency components, and for enhancing low spatial frequency components in an image [Klette, 1996]

Low pass filter: This term is imported from 1D signal processing theory into image processing. The term "low" is a shorthand for "low frequency", that in the context of a single image, means low spatial frequency, i.e., intensity patterns that change over many pixels. Thus a low pass filter applied to an image leaves the low spatial frequency patterns, or large, slowly changing patterns, and removes the high spatial frequency components (sharp edges, noise). Low pass filters are a kind of smoothing or noise reduction filter. Alternatively, filtering is applied to the changing values of a given pixel over an image sequence. In this case the pixel values can be treated as a sampled time sequence and the original signal processing definition of "low pass filter" is appropriate. Filtering this way removes rapid temporal changes [Fisher, 2005]
BTG image filter
RT high-pass filter

LZW coding
RUS метод кодирования Лэмпеля-Зива-Уэлша
UF Lempel-Ziv-Welch coding
Lempel-Ziv-Welch compression
LZW compression
SEC IMAGE PROCESSING
DEF Lempel-Ziv-Welch (LZW) coding — coding scheme similar to Huffman where probabilities are recalculated when performance changes [Myler, 1993].

The technique, called Lempel-Ziv-Welch (LZW) coding, assigns fixed-length code words to variable length sequences of source symbols but requires no a priori knowledge of the probability of occurrence of the symbols to be encoded. LZW compression has been integrated into a variety of mainstream imaging file formats, including the graphic interchange format (GIF), tagged image file format (TIFF), and the portable document format (PDF) [Gonzalez, 2002]
BTG lossless image compression

M

Mahalanobis distance
RUS расстояние Махаланобиса
SEC MATHEMATICS
DEF Mahalanobis distance: The distance between two N-dimensional points scaled by the statistical variation in each component of the point. For example, if $\vec{x}$ and $\vec{y}$ are two points from the same distribution that has covariance matrix C then the Mahalanobis distance is given by $((\vec{x}-\vec{y})'C^{-1}(\vec{x}-\vec{y}))^{\frac{1}{2}}$. The Mahalanobis distance is the same as the Euclidean distance if the covariance matrix is the identity matrix. A common usage in computer vision systems is for comparing feature vectors whose elements are quantities having different ranges and amounts of variation, such as a 2-vector recording the properties of area and perimeter [Fisher, 2005]
BTG distance function

mammogram analysis
RUS анализ маммограмм
UF breast scan analysis
SEC APPLIED PROBLEMS
DEF A mammogram is an X-ray of the human female breast. The main purpose of analysis is the detection of potentional signs of cancerous growths [Fisher, 2005]

Marr-Hildreth edge detector
RUS оператор выделения яркостных переходов Марра-Хилдрета
UF Marr-Hildreth edge detection operator
Marr-Hildreth edge operator
SEC IMAGE ANALYSIS
DEF The developers of this edge detection technique claim that it is based on evidence that biological low-level vision systems exhibit a function that is similar. A Marr-Hildreth mask is a combination of a Gaussian smoothing function and a Laplacian difference operator. In the Marr-Hildreth technique the Laplacian is used to detect edges by finding zero crossings, the key idea being that edges as zero crossings are easier to detect than edges as extrema, the case with derivative images. The function *I′(x,y)* obtained after cross-correlating *I(x,y)* with the Marr-Hildreth operator has positive and negative values. Edges are marked in this function by some operation such as:

for all *x,y*:
if (*I′(x,y)*<-*t* and any_neighbour_of(*I′(x,y)*>*t*)
or (*I′(x,y)*>*t* and any_neighbour_of(*I′(x,y)*<*t*)
then *I′(x,y)* is an edge pixel

where any_neighbour_of() means any of the eight neighbours of (*x,y*), *t* is a threshold.

The Gaussian part of the operation is a more considered smoothing operation than the smoothing component of the Sobel operator and overall the method works better than simple gradient edge detection, particularly when edges are more blurred and the noise level is high [Watt, 1998]

Marr-Hildreth edge detector: An edge detector based on multi-scale analysis of the zero-crossings of the Laplacian of Gaussian operator [Fisher, 2005]

BTG edge detection method
RT Laplacian operator

mask
RUS маска
SEC IMAGE PROCESSING
DEF Mask — generally refers to a small image used to specify the area of operation to take place on a larger image in an algorithm. Mask also refers to a discrete convolution filter [Myler, 1993]

Mask: A term for an *m* x *n* array of numbers or symbolic labels. A mask can be the smoothing mask used in a convolution, the target in a template matching or the kernel used in a mathematical morphology operation, etc. Here is a simple mask for computing an approximation to the Laplacian operator:

0	1	0
1	-4	1
0	1	0

[Fisher, 2005]
NTG convolution mask
operator kernel
structuring element

matrix feature
RUS матричный признак (изображения)
SEC IMAGE
DEF By matrix features, we mean those obtained by applying functions typical in matrix analysis (such as the trace of a matrix, determinant, permanent, etc.) to the image. Matrix features may be calculated both on the original image and on the matrix of low-level features obtained from the original image [Gurevich, 2006]
BTG image feature
RT arithmetical feature
combinatorial feature
logical feature
topological feature

maximum entropy restoration
RUS восстановление методом максимума энтропии
SEC IMAGE PROCESSING
DEF Maximum entropy restoration: An image restoration technique based on maximum entropy [Fisher, 2005]
RT image restoration method

maximum filter
RUS фильтр, основанный на выборе максимального значения
SEC IMAGE PROCESSING
DEF Maximum filter - this filter replaces the pixel being operated on with the maximum graylevel of a set pixels located under a spatial mask [Myler, 1993]
BTG image filter
RT order statistics filter

maximum likelihood decision rule
RUS решающее правило по методу максимального правдоподобия
SEC PATTERN RECOGNITION
DEF A simple maximum likelihood decision rule is one which treats the units independently and assigns a unit U having pattern measurements or features D to that category C whose units are most probable to have given rise to pattern or feature vector D, that is, such that the conditional probability of D given C is highest [Haralick, 1991]
BTG decision rule

measurable feature
RUS измеряемый признак (изображения)
SEC IMAGE
DEF Measurable features consist of linear functions of the image, i.e., functions determined as the sum of pixels satisfying a constraint (this may be the membership in an object, constraints on the value of the pixel intensity, etc.). In a certain sense, this class of features is a subclass of computable features. Here, we distinguish it by two reasons: measurable features do not require significant computational resources and, hence, are widely used in image analysis. As an example, we may mention the sum of intensities of pixels in the image, the perimeter of the object, its volume, features obtained by partitioning into zones and by the watershed operation, etc. [Gurevich, 2006]
BTG image feature
RT computable feature
derivable feature
extractable feature

medial axis transformation
RUS преобразование срединных осей
UF MAT
SEC IMAGE ANALYSIS
DEF Medial axis transform: An operation on a binary image that transforms regions into sets of pixels that are the centers of circles that are bitangent to the boundary and that fit entirely within the region. The value of each point on the axis is the radius of the bitangent circle. This can be used to represent the region by a simpler axis-like structure and is most effective on elongated regions [Fisher, 2005]
BTG skeletonization

median filter
RUS медианный фильтр
UF median filtering
SEC IMAGE PROCESSING
DEF A median filter is a non-linear neighborhood image smoothing spatial filter in which the value of an output pixel is the median value of all the input pixels in the supporting neighborhood of the filter about the given pixel's position. Median filters are used to smooth and remove noise from images [Haralick, 1991]
The median filter replaces the value of a pixel by the median of the gray levels in the neighborhood of that pixel (the original value of the pixel is included in the computation of the median). Median filters are quite popular because, for certain types of random noise, they provide excellent noise-reduction capabilities, with considerably less blurring than linear smoothing filters of similar size. Median filters are particularly effective in the presence of impulse noise, also called salt-and-pepper noise because of its appearance as white and black dots superimposed on an image [Gonzalez, 2002].

The median filter uses the middle value in the sorting of element values. The filter reduces noise and preserves edges [Sachse, 2004]

Median filter: a nonlinear neighborhood operator in which the value of an output pixel is the median value of all the input pixels in the supporting neighborhood of the filter about the given pixel's position. Median filters are used to smooth and remove noise form images [Jahne, 2004]

Median smoothing: An image noise reduction operator that replaces a pixel's value by the median (middle) of the sorted pixel values in its neighborhood [Fisher, 2005]
BTG image filter
RT image denoising method
non-linear filter
order statistics filter

medical image registration
RUS регистрация медицинских изображений
SEC APPLIED PROBLEMS
DEF A general term for registration of two or more medical image types or an atlas with some image data. A typical registration would align X-ray CAT and NMR images [Fisher, 2005]

minimum distance classification
RUS классификация по минимуму расстояния
SEC PATTERN RECOGNITION
DEF Minimum distance classification: a classification technique in which a class is modeled by a vector in the feature space. The distance between the object's feature vector and the class vector decides to which class the object is associated. The class with the minimum distance is taken [Jahne, 2004]
BTG pattern classification method

minimum filter
RUS фильтр, основанный на выборе минимального значения
SEC IMAGE PROCESSING
DEF Minimum filter -- this filter replaces the pixel being operated on with the minimum gray level of a set pixels located under a spatial mask [Myler, 1993].
BTG image filter
RT order statistics filter

misidentification
RUS неверная идентификация
SEC PATTERN RECOGNITION
DEF Misidentification [type I error]: In pattern classification, the failure to assign a pattern to its true pattern class. Contrast with false identification [Jahne, 2004.]
RT false identification

mode filter
RUS фильтр мод
UF mode filtering
SEC IMAGE PROCESSING
DEF Mode filter: A noise reduction filter that, for each pixel, outputs the mode (most common) value in its local neighborhood [Fisher, 2005]
BTG image filter
RT image denoising method

model-based image analysis
RUS анализ изображений, основанный на модели
SEC IMAGE ANALYSIS
DEF Model-based image analysis: a strategy for image analysis which employs an explicit model of the object to be recognized. Recognition proceeds in a top-down control by matching the object data structure inferred from the features extracted from the image to the model data structure [Jahne, 2004]
BTG image analysis approach
RT model-based image segmentation

model-based image segmentation
RUS сегментация изображений, основанная на модели
SEC IMAGE ANALYSIS
DEF Model based segmentation: An image segmentation process that uses geometric models to partition the image into different regions. For example, aerial images could have the visible roads segmented by using a geographic information system model of the road network [Fisher, 2005]
BTG image segmentation method
RT model-based image analysis

Moravec interest point operator
RUS оператор выделения "интересных" точек Моравека
SEC IMAGE ANALYSIS
DEF Moravec interest point operator: An operator that locates interest points at pixels where neighboring intensity values change greatly in at least one direction. These points can be used for stereo matching or feature point tracking. The operator computes the sum of the squares of pixels differences in a line vertically, horizontally and both diagonal directions in a 5 x 5 window about the given pixel. The minimum of these four values is selected and then all values that are not local maxima or are below a given threshold are suppressed [Fisher, 2005]
BTG interest point operator

morphological edge detector
RUS морфологический оператор выделения яркостных переходов
UF morphological edge detection operator
morphological edge operator
morphologic edge detection operator
morphologic edge detector
morphologic edge operator
SEC IMAGE ANALYSIS
DEF The edge detection is realized by a point-to-point combination of the resultant images of two different morphological operations on gray value images. In this operator, edge detection is based on the fact that erosion and dilation shift the gray value edges into opposite directions. This operator is characterized by a good detection of edge positions and by noise robustness. The second property is ensured by including a smoothing operation [Klette, 1996]

Morphological edge operator: edge operator based on morphological operations [Jahne, 2004]
BTG edge detection method

morphological image operation
RUS морфологическая операция над изображением
UF mathematical morphology operation
morphological image processing operation
morphological operation
morphology-based image operation
morphology-based image processing operation
SEC IMAGE PROCESSING
DEF The basic morphological operations are dilation and erosion and from these operations of opening and closing are constructed. The latter two operations implicitly include shape information and can be used to decompose the object into parts.
It is useful to compare morphological operations on images with spatial filtering. Many operations can be considered as a kind of ‘shape filtering’. With morphological operations the position of certain shapes can be located in an image, an object can be decomposed into its constituent parts, and so on. Consider the fundamental difference between this and filters that operate on spatial frequencies. Spatial frequencies reflect properties of the entire image and the use of, for example, a bandpass/bandreject filter affects information over the complete extent of the image. This comparison brings out the difference between the two classes of operations. Spatial filtering is general to all of the image whereas morphological techniques operate only on parts of the image, leaving the remainder unaltered. Because shape is a specific property, a priori knowledge is required for morphological operations – we need to know the nature of the shape that we want to operate on. This contrasts with spatial filtering where we can invoke a general operation, such as enhancement of high

frequency content, without possessing any a priori knowledge concerning the image [Watt, 1998]

Mathematical morphology operation: A class of mathematically defined image processing operations in which the result is based in the spatial pattern of the input data values rather than values themselves. For example, a morphological line thinning algorithm would identify places in an image where a line description was represented by data more than 1 pixel wide (i.e., the pattern to match). As this is redundant the thinning algorithm would chose one of the redundant pixels to be set to 0. Mathematical morphology operations can apply to both binary and gray scale images [Fisher, 2005]

Morphological transformation: One of a large class of binary and gray scale image transformations whose primary characteristic is they react to the pattern of the pixel values rather than the values themselves. Examples include dilation, erosion, skeletonizing, thinning, etc. [Fisher, 2005]

BTG image processing operation
NTG image closing operation
image dilation operation
image erosion operation
image opening operation
RT morphological image processing
structuring element

morphological image processing

RUS морфологическая обработка изображений
UF image morphology
morphologic image processing
morphology-based image processing
SEC IMAGE PROCESSING
DEF Morphological image processing is a type of processing in which the spatial form or structure of objects within an image are modified. Dilation, erosion, and skeletonization are three fundamental morphological operations. With dilation, an object grows uniformity in spatial extent, whereas with erosion an object shrinks uniformity. Skeletonization results in a stick figure representation of an object. The basic concepts of morphological image processing trace back to the research on spatial set algebra by Minkowski and the studies of Matheron on topology. Serra developed much of the early foundation of the subject. Steinberg was a pioneer in applying morphological methods to medical and industrial vision applications [Pratt, 2001]

Morphology: an area of image processing concerned with the analysis of shape. The basic morphologic operations consist of dilating, eroding, opening, and closing an image with a structuring element [Jahne, 2004]

Image morphology: An approach to image processing that considers all operations in terms of set operations [Fisher, 2005]

RT image processing
morphological image operation
structuring element

morphological segmentation

RUS морфологическая сегментация (изображений)
SEC IMAGE ANALYSIS
DEF Morphological segmentation: Using mathematical morphology operations applied to binary images to extract isolated regions of the desired shape. The desired shape is specified by the morphological kernel. The process could also be used to separate touching objects [Fisher, K. Dawson-Howe, A. Fitzgibbon, C. Robertson, 2005]
BTG image segmentation method

multi-channel image

RUS многоканальное изображение
UF multi-channel picture
multichannel image
multichannel picture
SEC IMAGE
DEF Multichannel image [vectorial image]: any image with more than one channel. In a multichannel image with P channels, a pixel thus is a P-dimensional vector. Examples for multichannel images are color images, stereo images and multispectral images [Jahne, 2004]
BTG image
RT one-channel image

multi-dimensional histogram

RUS многомерная гистограмма
SEC MATHEMATICS
DEF Multi-dimensional histogram: A histogram with more than one dimension. For example consider measurements as vectors, e.g., from a multi-spectral image, with N dimensions in the vector. Then one could create a histogram represented by an array with dimension N. The N components in each vector are used to index into the array. Accumulating counts or other evidence values in the array makes it a histogram [Fisher, 2005]
BTG histogram

multi-spectral image
RUS многоспектральное изображение
UF multi-spectral picture
multispectral image
multispectral picture
SEC IMAGE
DEF A multi-spectral image is a multi-band image in which each band is an image taken at the same time, but sensitive in a different part of the electromagnetic spectrum [Haralick, 1991]

A multispectral image is a 2D image M[x,y] which has a vector of values at each spatial point or pixel. If the image is actually a color image, then the vector has 3 elements [Shapiro, 2001]

Multi-spectral image: An image containing data measured at more than one wavelength. The number of wavelengths may be as low as two (e.g., some medical scanners), three (e.g., RGB image data), or seven or more bands, including several infrared wavelengths (e.g., satellite remote sensing). Recent hyperspectral sensors can give measurements at 100-200 different wavelengths. The typical image representation uses a vector to record the different spectral measurements at each pixel of an image array [Fisher, 2005]
BTG image
RT hyperspectral image

multi-spectral thresholding
RUS многоспектральная пороговая обработка (изображений)
UF multispectral thresholding
SEC IMAGE ANALYSIS
DEF Multi-spectral thresholding: A segmentation technique for multi-spectral image data. A common approach is to threshold each spectral channel independently and then logically AND together the resulting images. An alternative is to cluster pixels in a multi-spectral space and choose thresholds that select desired clusters [Fisher, 2005]
BTG image thresholding

N

NAND operator
RUS оператор NAND
SEC IMAGE PROCESSING
DEF NAND operator: An arithmetic operation where a new image is formed by NANDing (logical AND followed by NOT) together corresponding bits for every pixel of the two images. This operator is most appropriate for binary images but may also by applied to gray scale images [Fisher, 2005]
BTG logical operator
RT AND operator
NOT operator
OR operator
XOR operator

non-iconic image representation
RUS неиконическое представление изображений
SEC IMAGE
DEF Non-iconic image representations can be obtained by special coding schemes (e.g., run-length coding, contour coding, etc.) [Klette, 1996]
BTG image representation

non-linear filter
RUS нелинейный фильтр (изображений)
UF non-linear image filter
nonlinear filter
nonlinear image filter
SEC IMAGE PROCESSING
DEF Non-linear filter: A process where the outputs are a nonlinear function of the inputs. This covers a large range of algorithms. Examples of nonlinearity might be: 1) doubling the values of all input data does not double the values of the output results (e.g., a filter that reports the position at which a given value appears), 2) applying an operator to the sum of two images gives different results from adding the results of the operator applied to the two original images (e.g., thresholding) [Fisher, 2005]
BTG image filter
RT median filter
rank-order filter

non-parametric decision rule
RUS непараметрическое решающее правило
UF distribution-free decision rule
SEC PATTERN RECOGNITION
DEF A distribution-free or non-parametric decision rule is one which makes no assumptions about the functional form of the conditional probability distribution of the patterns given the categories [Haralick, 1991]
BTG decision rule

NOT operator
RUS оператор NOT
UF invert operator
SEC IMAGE PROCESSING
DEF Invert operator: A low-level image processing operation where a new image is formed by replacing each pixel by an inverted value. For binary images, this is

1 if the input pixel is 0 or 0 if the input pixel is 1. For gray level images, this depends on the maximum range of intensity values. If the range of intensity values is [0, 255] then inverse of a pixel with value x is 256-x. The result is like a photographic negative [Fisher, 2005]
BTG logical operator
RT AND operator
NAND operator
OR operator
XOR operator

O

O'Gorrman edge detector
RUS оператор выделения яркостных переходов О'Гормана
UF O'Gorrman edge detection operator
O'Gorrman edge operator
SEC IMAGE ANALYSIS
DEF O'Gorman edge detector: A parametric edge detector. A decomposition of the image and model by orthogonal Walsh function masks was used to compute the step edge parameters (contrast and orientation). One advantage of the parametric model was a goodness of model fit as well as the edge contrast that increased the reliability of the detected edges [Fisher, 2005]
BTG parametric edge detector

occluding edge
RUS яркостный переход типа "загораживание"
SEC IMAGE
DEF An occluding edge is an image edge which arises from a range or depth discontinuity. This typically happens where one object surface projects to a pixel on one side of the edge and another object surface which is some distance behind the first object surface projects to a pixel on the other side of the edge. Step edges in depth maps are always occluding edges [Haralick, 1991]
BTG edge

one-channel image
RUS одноканальное изображение
UF one-channel picture
SEC IMAGE
BTG image
RT multi-channel image

operator kernel
RUS ядро оператора
UF window function
SEC IMAGE PROCESSING
DEF Operator kernel: synonym of window function. Window function: function defined for picture windows F(f,p). This function yields exactly one (new) image value, which must be stored at the position p at the resulting image [Klette, 1996]
BTG mask

optical character recognition
RUS оптическое распознавание символов
UF OCR
SEC APPLIED PROBLEMS
DEF A general term for extracting an alphabetic text description from an image of the text. Common specialisms include bank numerals, handwritten digits, hand-written characters, cursive text, Chinese characters, Arabic characters, etc. [Fisher, 2005]
NTG cursive script recognition
handwritten character recognition

optimum threshold
RUS оптимальный порог
SEC IMAGE ANALYSIS
DEF Optimum threshold - this is the best threshold value for a particular image to reveal the most possible objects [Myler, 1993]
BTG threshold

OR operator
RUS оператор логического сложения (изображений)
SEC IMAGE PROCESSING
DEF OR operator: A pixelwise logic operator defined on binary variables. It takes as input two binary images I_1 and I_2, and returns an image I_3 in which the value of each pixel is 0 if both I_1 and I_2 are 0, and 1 otherwise [Fisher, 2005]
BTG logical operator
RT AND operator
NAND operator
NOT operator
XOR operator

order statistics filter
RUS фильтр, основанный на порядковых статистиках
SEC IMAGE PROCESSING
DEF Order-statistics filters are nonlinear spatial filters whose response is based on ordering (ranking) the pixels contained in the image area encompassed by the filter, and then replacing the value of the center pixel with the value determined by the ranking result. The best-known example in this category is the median filter [Gonzalez, 2002]

Order statistics filter: A filter based on order statistics, a technique that sorts the

pixels of a neighborhood by intensity value, and assigns a rank (the position in the sorted sequence) to each. An order statistics filter replaces the central value of the filtering neighborhood with the value at a given rank in the sorted list. A popular example is the median filter. As this filter is less sensitive to outliers, it is often used in robust statistics process [Fisher, 2005]
BTG image filter
RT maximum filter
median filter
minimum filter

oriented texture
RUS ориентированная текстура
SEC IMAGE
DEF Oriented texture: A texture in which a preferential direction can be detected. For instance, the direction of the bricks in a regular brick wall [Fisher, 2005]
BTG texture

P

parametric edge detector
RUS параметрический оператор выделения яркостных переходов
UF parametric edge detection operator
parametric edge operator
SEC IMAGE ANALYSIS
DEF Parametric edge detector: An edge detection technique that seeks to match image data using a parametric model of edge points and thus detects edges when the image data fits the edge model well [Fisher, 2005]
BTG edge detection method
NTG Hueckel edge detector
O'Gorrman edge detector

pattern
RUS образ
UF measurement pattern
SEC PATTERN RECOGNITION
DEF Pattern: A meaningful regularity that can be used to classify objects or other items of interest [IEEE, 1990]

A measurement pattern or pattern is the data structure of the measurements resulting from observing a unit [Haralick, 1991]

Pattern: a meaningful regularity or a collection of features that can be used to classify objects or other items of interest [Jahne, 2004]
RT pattern class
pattern recognition

pattern class
RUS класс образов
UF pattern category
SEC PATTERN RECOGNITION
DEF Pattern class: One of a set of mutually exclusive categories into which a pattern can be classified [IEEE, 1990]

Each unit is assumed to be of one and only one given type. The set of types is called the set of pattern classes or categories C, each type being a particular category [Haralick, 1991]

Pattern class [pattern category]: one of a set of mutually exclusive categories into which a pattern can be classified. [Jahne, 2004]
RT compactness hypothesis
class region
classifier
pattern
pattern classification

pattern classification
RUS классификация образов
UF categoriazation
pattern identification
SEC PATTERN RECOGNITION
DEF The pattern classification problem is concerned with constructing the cluster assignment function which groups similar units. Pattern classification is synonymous with numerical taxonomy or clustering [Haralick, 1991]

Patter classification [pattern identification]: the process of assigning patterns to pattern classes [Jahne, 2004.]

Categorization: The subdivision of a set of elements into clearly distinct groups, or categories, defined by specific properties. Also the assignment of an element to a category or recognition of its category [Fisher, 2005]
BTG pattern recognition task
RT classifier
decision rule
pattern class
pattern classification method

pattern classification method
RUS метод классификации образов
UF pattern classification technique
SEC PATTERN RECOGNITION
NTG Fisher linear discriminant
minimum distance classification
RT pattern classification

pattern recognition
RUS распознавание образов

SEC PATTERN RECOGNITION
DEF Pattern recognition: The analysis, description, identification, and classification of objects or other meaningful regularities by automatic means. Syn: machine recognition [IEEE, 1990]

Pattern recognition: A large research area concerned with the recognition and classification of structures, relations or patterns in data. Classic techniques include syntactic, structural and statistical pattern recognition [Fisher, 2005]
BTG ROOT
RT pattern
pattern recognition approach
pattern recognition method
pattern recognition task

pattern recognition approach
RUS подход к распознаванию образов
SEC PATTERN RECOGNITION
NTG statistical pattern recognition
structural pattern recognition
RT pattern recognition

pattern recognition method
RUS метод распознавания образов
SEC PATTERN RECOGNITION
NTG pattern classification method
RT pattern recognition
pattern recognition task

pattern recognition task
RUS задача распознавания образов
UF pattern recognition problem
SEC PATTERN RECOGNITION
DEF Pattern recognition: identification of objects on the basis of their feature. In statistical pattern recognition, the features are P-dimensional vectors. In syntactic pattern recognition, they have the form of sentences form the language of a phrase structure grammar. In structural pattern recognition, the object being measured is encoded in terms of its parts and the relationships as well as properties of the parts. [Jahne, 2004]
NTG feature extraction
feature selection
pattern classification
RT pattern recognition
pattern recognition method

perimeter of a region
RUS периметр области (на изображении)
SEC IMAGE ANALYSIS
DEF Perimeter: In image processing, the number of pixels in the border of a region [IEEE, 1990]

Perimeter: the perimeter of a connected region R is the length of the bounding contour of R [Jahne, 2004]
BTG region descriptor
RT region

pink noise
RUS розовый шум
SEC IMAGE
DEF Pink noise: Noise that is not white, i.e., when there is a correlation between the noise at two pixels or at two times [Fisher, 2005]
BTG image noise
RT white noise

pixel
RUS пиксел
UF image element
picture element
pel
SEC IMAGE
DEF Pixel: In image processing, the smallest element of a digital image that can be assigned a gray level [IEEE, 1990]

A pixel, picture element, or pel is a pair whose first member is a resolution cell or (row, column) spatial position and whose second member is the image intensity value or vector of image values associated with the spatial position [Haralick, 1991]

Pixel - slang for picture element, the smallest element of an image; pixels are arranged in row and columns to create an image, frame or picture [Myler, 1993]

Pixel: picture element (x, y, $f(x,y)$), consisting of a grid point (x,y) and an image value $f(x,y)$ at this point (grid point model of the image plane), or of an image cell at position (x,y) and a constant value $f(x,y)$ within this cell (cellular model of the image plane) [Klette, 1996]

Picture element: A pixel. It is an indivisible image measurement. This is the smallest directly measured image feature [Fisher, 2005]

Pixel: The intensity values of a digital image are specified at the locations of a discrete rectangular grid; each location is a pixel. A pixel is characterized by its coordinates (position in the image) and intensity value. Values can express physical quantities other than intensity for different kinds of images, as in, e.g., infrared imaging. In physical terms, a pixel is the photosensitive cell on the CCD or other solid state sensor of a digital camera. The CCD pixel has a precise size, specified by the manufacturer and determining the CCD's aspect ratio [Fisher, 2005]

BTP image
RT edge pixel
exterior border pixel of a region
extremal pixel of a region
gray level
pixel-based image operation
pixel coordinates

pixel-based image operation
RUS попиксельная операция над изображением
UF pixel-based operation
SEC IMAGE PROCESSING
BTG image processing operation
RT pixel

pixel coordinates
RUS координаты пиксела
SEC IMAGE
DEF Pixel coordinates: The coordinates of a pixel in an image. Normally these are the row and column position [Fisher, 2005]
RT pixel

Plessey corner finder
RUS оператор обнаружения углов Плэсси
UF Harris corner detector
SEC IMAGE ANALYSIS
DEF Harris corner detector: A corner detector where a corner is detected if the eigenvalues of the matrix *M* are large and locally maximum (*f(i,j)* is the intensity at point *(i,j)*).

$$M = \begin{bmatrix} \frac{df}{di}\frac{df}{di} & \frac{df}{di}\frac{df}{dj} \\ \frac{df}{di}\frac{df}{dj} & \frac{df}{dj}\frac{df}{dj} \end{bmatrix}.$$

To avoid explicit computation of the eigenvalues, the local maxima of *det*(*M*)-0.004 x *trace*(*M*) can be used. This is also known as the Plessey corner finder [Fisher, 2005]

Plessey corner finder: A well-known corner detector also known as Harris corner detector, based on the local autocorrelation of first-order image derivatives [Fisher, 2005]

BTG corner detection method

point operator
RUS точечный оператор (изображений)
UF point image operator
point image processing operator
point image transform operator
SEC IMAGE PROCESSING
DEF Point operator: An image operator that assigns a gray level to each output pixel based on the gray level of the corresponding input pixel [IEEE, 1990]

A point operator is an image operator in which the output image value at each pixel position depends only on the input image value at the corresponding pixel position [Haralick, 1991]

Point operator: image transformation where a resultant image value only depends upon a single pixel of the input image [Klette, 1996]

BTG image processing operator
RT global
local operator

point-based feature
RUS точечный признак (изображения)
SEC IMAGE
DEF By point-based features, we mean features calculated at separate points of the image; i.e., each feature characterizes an individual pixel. Any point-based feature is a local feature; however, a point-based feature may be a feature of either low or high level [Gurevich, 2006]
BTG image feature
RT contour-based feature
skeleton-based feature
segment-based feature

polygonal approximation
RUS аппроксимация (границы области) ломаной линией
SEC IMAGE ANALYSIS
DEF A digital boundary can be approximated with arbitrary accuracy by a polygon. For a closed curve, the approximation is exact when the number of segments in the polygon is equal to the number of points in the boundary so that each pair of adjacent points defines a segment in the polygon. In practice, the goal of polygonal approximation is to capture the “essence” of the boundary shape with the fewest possible polygonal segments [Gonzalez, 2002]

BTG boundary representation method
RT boundary of a region

Prewitt edge detector
RUS оператор выделения яркостных переходов Превитт
UF Prewitt edge detection operator
Prewitt edge operator
Prewitt gradient operator
SEC IMAGE ANALYSIS
DEF Prewitt gradient operator: An edge detection operator based on template matching. It applies a set of convolution masks, or kernels, implementing matched filters for edges at various (generally eight) orientations. The magnitude (or strength) of the edge at a given pixel is the maximum of the responses to the masks. Alternatively, some implementations use the sum of the absolute value of the responses from the horizontal and vertical masks [Fisher, 2005]
BTG gradient-based edge detector
RT Prewitt kernel

Prewitt kernel
RUS ядро оператора Превитт
SEC IMAGE PROCESSING
DEF Prewitt kernel: The mask used by Prewitt gradient operator. The horizontal and vertical masks are:

-1	0	+1
-1	0	+1
-1	0	+1

Gx

+1	+1	+1
0	0	0
-1	-1	-1

Gy

[Fisher, 2005]
RT Prewitt edge detector

Q

quadrature mirror filter
RUS квадратурный зеркальный фильтр
SEC IMAGE PROCESSING
DEF Quadrature mirror filter: A class of filters occurring in wavelet and image compression filtering theory. The filter splits a signal into a high pass component and a low pass component, with the low pass component's transfer function a mirror image of that of the high pass component [Fisher, 2005]
BTG image filter

R

randomized Hough transform
RUS случайное преобразование Хафа
UF RHT
SEC IMAGE PROCESSING
DEF Randomized Hough transform: A variant of the standard Hough transform designed to produce higher accuracy with less computational effort. The line-finding variant of the algorithm selects pairs of image edge points randomly and increments the accumulator cell corresponding to the line through these two points. The selection process is repeated a fixed number of times [Fisher, 2005]
BTG Hough transform

rank-order filter
RUS ранговый фильтр
UF rank order filter
rank value filter
SEC IMAGE PROCESSING
DEF Rank-order filter: local operator in which the window function is a function of the rank-ordered gray values within the current picture window F(*f*,*p*). The median filter, or the so-called L-filters, where the window function is a weighted sum of the rank-ordered window gray values, are examples of rank-order filters [Klette, 1996]

Rank value filter: a class of shift-invariant nonlinear filter operators based on sorting the pixels in a neighborhood and selecting one of the sorted pixels. The best known rank value filter is the median filter. Others include the minimum and maximum filters if grays scale morphology [Jahne, 2004]

Rank-order filters replace an element's value with the value of an element inside of a given area. The shape of the area is commonly cubic or spherical. The replaceable element is located centrally in the area. The values of all elements in the given area are collected and sorted by size. Rank-order filters are nonlinear. Typical three-dimensional rank-order filters are median, erosion and dilation filters [Sachse, 2004]

Rank order filtering: A class of filters the output of which depends on an ordering (ranking) of the pixels within the region of support. The classic example is the median filter which selects the middle value of the set of input values. More generally, the filter selects the k^{th} largest value in the input set [Fisher, 2005]
BTG image filter
RT non-linear filter

raster
RUS растр
SEC IMAGE
DEF Raster: set of image points (x,y) at which image values are assumed, normally a rectangular array of M x N image points [Klette, 1996]
RT raster image

raster image
RUS растровое изображение
UF bitmap image
bitmap picture
bitmapped image
bitmapped picture
raster picture
SEC IMAGE
DEF Bitmapped image. A digital image composed of pixels. Bitmapped images are resolution-dependent; i.e., if the image is stretched, the resolution changes. Also called a raster image [Laplante, 2001]

An image formed by a rectangular grid of pixels, each one of which is assigned an address as X,Y co-ordinates and a value, either grey scale, or colour [Davies, 2005]
BTG image
RT raster
vector image

Rayleigh noise
RUS шум Релея
SEC IMAGE
DEF The probability density function of Rayleigh noise is given by

$$p(z) = \begin{cases} \frac{2}{b}(z-a)e^{-(z-a)^2/b} & for \quad z \geq a \\ 0 & for \quad z < a \end{cases}.$$

The mean and variance of this density are given by $\mu = a + \sqrt{\pi b / 4}$ and $\sigma^2 = \frac{b(4-\pi)}{4}$ [Gonzalez, 2002]
BTG image noise

recursive region growing
RUS рекурсивное наращивание области
SEC IMAGE ANALYSIS
DEF Recursive region growing: A class of recursive algorithms for region growing. An initial pixel is chosen. Given an adjacency rule to determine the neighbors of a pixel, (e.g., 8-adjacency), the neighboring pixels are explored. If any meets the criteria for addition to the region, the growing procedure is called recursively on that pixel. The process continues until all connected image pixels have been examined [Fisher, 2005]
BTG region growing

reference image
RUS эталонное изображение
UF reference picture
SEC IMAGE
DEF Reference image: An image of a known scene or of a scene at a particular time used for comparison with a current image [Fisher, 2005]
BTG image

region
RUS область (на изображении)
UF image region
region of an image
SEC IMAGE
DEF Region: A connected subset of an image [IEEE, 1990]

A region R of an image is any subset of resolution cells in the spatial domain of the image [Haralick, 1991]

Region: simply connected set of image points, i.e. without holes or cavities. The connectivity definition follows from the choice of a neighborhood relation for image points [Klette, 1996]

Region: a connected subset of an image, usually representing an object of interest [Jahne, 2004]

A connected part of an image, usually homogeneous with respect to a given criterion [Fisher, 2005]
BTP image
NTG connected region
NTP boundary of a region
RT area of a region
bounding contour of a region
bounding rectangle of a region
centroid of a region
compactness of a region
Euler number of a region
exterior border pixel of a region
extremal pixel of a region
hole of a region
perimeter of a region
region adjacency graph
region-based image segmentation
region description
region description method
region descriptor
region growing
region representation
region representation method

region adjacency graph
RUS граф смежности областей
UF RAG

region neighborhood graph
SEC IMAGE
DEF A region adjacency graph (RAG) is a graph in which each node represents a region of an image, and an edge connects two nodes if the two regions are adjacent [Shapiro, 2001].

Region adjacency graph (RAG): A graph expressing the adjacency relations among image regions, for instance generated by a segmentation algorithm [Fisher, 2005]
RT adjacency graph
region

region-based image segmentation
RUS сегментация изображений посредством выделения областей
UF region-based segmentation
region segmentation
SEC IMAGE ANALYSIS
DEF Region-based segmentation is where we proceed by dividing the image into regions that exhibit similar properties. Here we look at the properties in the neighbourhood of a pixel and "grow" a region while neighbouring pixels exhibit similar values [Watt, 1998]

Region based segmentation: A class of segmentation techniques producing a number of image regions, typically on the basis of a given homogeneity criterion. For instance, intensity image regions can be homogeneous by color; regions image can be homogeneous by shape or curvature properties [Fisher, 2005]
BTG image segmentation method
NTG region growing
RT region

region description
RUS описание области (на изображении)
SEC IMAGE ANALYSIS
BTG image analysis task
RT region
region description method

region description method
RUS метод описания области (на изображении)
SEC IMAGE ANALYSIS
BTG image analysis method
NTG boundary descriptor
region descriptor
RT region
region description

region descriptor
RUS дескриптор области (на изображении)
UF regional descriptor
SEC IMAGE ANALYSIS
DEF Region descriptor: 1) One or more properties of a region, such as compactness or moments. 2) The data structure containing all data pertaining to a region. For instance, for image regions this could include the region's position in the image (e.g., the coordinates of the center of mass), the region's contour (e.g., a list of 2D coordinates), some indicator of the region shape (e.g., compactness or perimeter squared over area), and the value of the region's homogeneity index [Fisher, 2005]
BTG region description method
NTG area of a region
centroid of a region
compactness of a region
Euler number of a region
perimeter of a region
RT region

region growing
RUS выделение областей путем наращивания
SEC IMAGE ANALYSIS
DEF Region growing: An image segmentation technique in which regions are formed by repeatedly taking union of subregions that are similar in gray levels or textures [IEEE, 1990]

Region growing refers to a sequential image segmentation process in which pixels are successively added to incomplete regions or initiate new regions when it is not appropriate to make them part of any of the existing incomplete regions. There are three basic kinds of region growing: region tracking, region aggregation, and region merging [Haralick, 1991]

Region growing: segmentation procedure based on a pixel grouping process. A larger segment is generated step by step, starting with a single pixel (seed), and merging a pixel with the current segment if it is a neighbor of a previously merged pixel, and if a predetermined uniformity criterion is still satisfied after merging this pixel (e.g., a special texture feature) [Klette, 1996]

Region growing: A class of algorithms that construct a connected region by incrementally expanding the region, usually at the boundary. New data are merged into the region when the data are consistent with the previous region. The region is often re-described after each new set of data is added to it. Many region growing algorithms have the form:

1) Describe the region based on the current pixels that belong to the region (e.g., fit a linear model to the intensity distribution). 2) Find all pixels adjacent to the current region. 3) Add an adjacent pixel to the region if the region description also describes this pixel (e.g., it has a similar intensity). 4) Return to step 1 as long as new pixels continue to be added. A similar algorithm exists for region growing with 3D points, giving a surface fitting. The data points could come from a regular grid (pixel or voxel) or from an unstructured list. In the latter case, it is harder to determine adjacency [Fisher, 2005]

BTG region-based image segmentation
NTG boundary-region fusion
recursive region growing
RT region

region representation
RUS представление области (на изображении)
SEC IMAGE ANALYSIS
BTG image analysis task
RT region
region representation method

region representation method
RUS метод представления области (на изображении)
SEC IMAGE ANALYSIS
DEF Basically, representing a region involves two choices: (1) We can represent the region in terms of its external characteristics (its boundary), or (2) we can represent it in terms of its internal characteristics (the pixels comprising the region) [Gonzalez, 2002]

Region representation: A class of methods to represent the defining characteristics of an image region. For encoding the shapes, see axial representation, convex hull, graph model, quadtree, run-length coding, skeletonization. For encoding a region by its properties, see moments, curvature scale space, Fourier shape descriptor, wavelet descriptor, shape representation [Fisher, 2005]
BTG image analysis method
NTG boundary representation method
skeletonization
RT region
region representation

remote sensing
RUS дистанционное зондирование
SEC APPLIED PROBLEMS
DEF The acquisition, analysis and understanding of imagery, mainly of the Earth's surface, acquired by airplanes or satellites. Used frequently in agriculture, forestry, meteorological and military applications [Fisher, 2005]

RGB color model
RUS цветовая модель RGB
UF red-green-blue color model
red-green-blue colour model
RCB color space
RGB colour model
RGB colour space
SEC IMAGE
DEF RGB: A format for color images, encoding the Red, Green, and Blue component of each pixel in separate channels [Fisher, 2005]
BTG color model

Roberts cross gradient operator
RUS перекрестный градиентный оператор Робертса
UF Roberts edge detection operator
Roberts edge detector
Roberts edge operator
SEC IMAGE ANALYSIS
DEF Roberts cross gradient operator: An operator used for edge detection, computing an estimate of perpendicular components of the image gradient at each pixels. The image is convolved with the two Roberts kernels, yielding two components, G_x and G_y, for each pixel. The gradient magnitude $\sqrt{G_x^2 + G_y^2}$ and orientation $\arctan\frac{G_y}{G_x}$ can then be estimated as for any 2D vector [Fisher, 2005]
BTG gradient-based edge detector
RT Roberts kernel

Roberts kernel
RUS ядро оператора Робертса
SEC IMAGE ANALYSIS
DEF Roberts kernel: A pair of kernels, or masks, used to estimate perpendicular components of the image gradient within the Roberts cross gradient operator:

0	1
-1	0

1	0
0	-1

The masks respond maximally to edge oriented to plus or minus 45˚ from the vertical axis of the image
[Fisher, 2005]
RT Roberts cross gradient operator

Robinson edge detector
RUS оператор выделения яркостных переходов Робинсона
UF Robinson edge detection operator
Robinson edge operator
SEC IMAGE ANALYSIS
DEF Robinson edge detector: An operator for edge detection, computing an estimate of the directional first derivatives of the image in eight directions. The image is convolved with the eight kernels, three of which as shown here

1	1	1
1	-2	1
-1	-1	-1

1	1	1
-1	-2	1
-1	-1	1

-1	1	1
-1	-2	1
-1	1	1

Two of these, typically those responding maximally to differences along the coordinate axes, can be taken as estimates of the two components of the gradient, G_x and G_y, for each pixel. The gradient magnitude $\sqrt{G_x^2 + G_y^2}$ and orientation $\arctan\frac{G_y}{G_x}$ can then be estimated as for any 2D vector [Fisher, 2005]
BTG edge detection method

roof edge
RUS яркостный переход типа "перегиб"
SEC IMAGE
DEF Roof edge: 1) An image edge where the values increase continuously to a maximum and then decrease continuously, such as the brightness values on a Lambertian cylinder when lit by a point light source, or an orientation discontinuity (or fold edge) in a range image. 2) A scene edge where an orientation discontinuity occurs [Fisher, 2005]
BTG edge

run
RUS серия
SEC IMAGE
DEF Run: In image processing, a sequence of consecutive pixels that all have the same gray level [IEEE, 1990]
RT run length

run length
RUS длина серии
SEC IMAGE
DEF Run length: The number of pixels in a run [IEEE, 1990]
RT run
run length encoding

run length coding
RUS кодирование длин серий
UF RLE
run length encoding
SEC IMAGE PROCESSING
DEF Run length encoding: An image compression technique in which the rows of an image are represented as a sequence of runs, each with a given run length and gray level [IEEE, 1990]

Run length encoding is a way to compactly represent binary images. There are a variety of run length encoding formats. Each format has a way of representing the starting column position of a maximally long horizontal string of binary one valued pixels as well as the number of pixels in a run. Many vision systems which recognize objects from their binary images use run length encoding to reduce the volume of data to be processed [Haralick, 1991]

Run-length encoding (RLE) - simple coding scheme consisting of number pairs where one number represents a pixel value and the other the number of times the value is repeated [Myler, 1993].

An effective alternative to constant area coding is to represent each row of an image or bit plane by a sequence of lengths that describe successive runs of black and white pixels. This technique, referred to as run-length coding, was developed in the 1950s and has become, along with its 2-D extensions, the standard compression approach in facsimile (FAX) coding. The basic concept is to code each contiguous group of 0's or 1's encountered in a left to right scan of a row by its length and to establish a convention for determining the value of the run [Gonzalez, 2002]

Run length coding: A lossless compression technique used to reduce the size of a repeating string of characters, called a "run", also applicable to images. The algorithm encodes a run of symbols into two bytes, a count and a symbol. For instance, the 6-byte string "xxxxxx" would become "6x" occupying 2 bytes only. It can compress any type of information content, but the content itself affects, obviously, the compression ratio. Compression ratios are not high compared to other methods, but the algorithm is easy to implement and quick to execute. Run-

length coding is supported by bitmap file formats such as TIFF, BMP and PCX [Fisher, 2005]

RLE is one of the simplest data compression techniques. It consists of replacing a sequence (run) of identical symbols by pair containing the symbol and the run length. It is used as the primary compression technique in the 1-D CCITT Group 3 fax standard and in conjunction with other techniques in the JPEG image compression standard [Furht, 2006]

BTG bit plane coding
RT run length

S

salt-and-pepper noise
RUS шум типа «соль и перец»
SEC IMAGE
DEF Salt and pepper noise - noise that contains both minimum and maximum outlier pixels. In a 256 gray level image, the pepper noise has gray level value of 0, while the salt noise has a gray level value 255 [Myler, 1993]

Salt-and-pepper noise: A type of impulse noise. Let $x, y \in [0,1]$ be two uniform random variables, I the true image value at a given pixel, and I_n the corrupted (noisy) version of I. We can define the effect of salt-and-pepper noise as $I_n=i_{min}+y(i_{max}-i_{min})$ if $x \geq l$, where l is a parameter controlling how much of the image is corrupted, and i_{min}, i_{max} the range of the noise [Fisher, 2005]
BTG image noise
BTG impulse noise
RT binary noise reduction

saturation
RUS цветовая насыщенность
UF color saturation
SEC IMAGE
DEF The characteristics generally used to distinguish one color from another are brightness, hue, and saturation. Brightness embodies the chromatic notion of intensity. Hue is an attribute associated with the dominant wavelength in a mixture of light waves. Hue represents dominant color as perceived by an observer. Thus, when we call an object red, orange, or yellow, we are specifying its hue. Saturation refers to the relative purity or the amount of white light mixed with a hue. The pure spectrum colors are fully saturated. Colors such as pink (red and white) and lavender (violet and white) are less saturated, with the degree of saturation being inversely proportional to the amount of white light added. Hue and saturation taken together are called chromaticity, and, therefore, a color may be characterized by its brightness and chromaticity [Gonzalez, 2002]

Saturation: Reaching the upper limit of a dynamic range. For instance, intensity saturation occurs for a 8-bit monochromatic image when intensities greater than 255 are recorded: any such value is encoded as 255, the largest possible value in the range [Fisher, 2005]
RT color
hue

scale space image
RUS изображение пространства масштабов
UF scale space picture
SEC IMAGE
DEF A scale space image is an image in which each pixel's value is a function indicating for each standard deviation the value at the pixel's position of the convolution of the image with a Gaussian kernel having standard deviation [Haralick, 1991]
BTG image

segment-based feature
RUS сегментационный признак (изображения)
SEC IMAGE
DEF Segment-based features are features calculated on pixels that belong to a region (segment) of the image. Similarly to contour-based features, segment-based features are of a high level, because they are calculated in several stages, after segmentation of the image and extraction of a region, which is of interest for further investigations. These features are often used for characterization of an image with several objects represented by separate segments. Segment-based features are widely used in analysis of medical images, in particular, cytological and histological specimens [Gurevich, 2006]
BTG image feature
RT contour-based feature
point-based feature
skeleton-based feature

separable filter
RUS сепарабельный фильтр
SEC IMAGE PROCESSING
DEF Separable filter: A 2D (in image processing) filter that can be expressed as the product of two filters, each of which acts independently on rows and columns.

The classic example is the linear Gaussian filter. Separability implies a significant reduction in computational complexity, typically reducing processing costs from $O(N^2)$ to $O(2N)$, where N is the filter size [Fisher, 2005]
BTG image filter

shape-based feature
RUS признак, характеризующий форму
SEC IMAGE
DEF Shape-based features are collections of primitives with corresponding relations and attributes. Primitives are calculated in the following main models of images: (1) an image is represented as a set of objects such that each object and the system as a whole are described by the corresponding structures of primitives; (2) an image is treated as a totality of points of a surface composed of parts of analytic surfaces. The form of primitives depends on the class of images being analyzed. Thus, in the analysis and synthesis of artificial scenes, classical geometrical figures are widely used as primitives, namely, circles, angles, straight lines, and generalized cones. The primitives in recognition problems for natural scenes are chosen on the basis of knowledge of the subject domain and may have a nonclassical shape. For example, in problems of identification of dactyloscopic fingerprints, the configurations for recognition that used to be employed "manually" by experts are used as primitives: forks, bridges, breaks, etc. Their mutual location determines the character of interconnections [Gurevich, 2006]
BTG image feature
RT spectral feature
statistical feature

signal-to-noise ratio
RUS отношение «сигнал-шум»
UF SNR
SEC IMAGE
DEF Signal-to-noise ratio (SNR): A measure of the relative strength of the interesting and uninteresting (noise) part of a signal. In signal processing, SNR is usually expressed in decibels as the ratio of the power of signal and noise, i.e., $10\log_{10}\frac{P_S}{P_n}$. With statistical noise, the SNR can be defined as 10 times the log of the ratio of the standard deviations of signal and noise [Fisher, 2005]
RT image noise

signature
RUS сигнатура
SEC IMAGE ANALYSIS
DEF A signature is a 1-D functional representation of a boundary and may be generated in various ways. One of the simplest is to plot the distance from the centroid to the boundary as a function of angle. Regardless of how a signature is generated, however, the basic idea is to reduce the boundary representation to a 1-D function, which presumably is easier to describe that the original 2-D boundary [Gonzalez, 2002]
BTG boundary representation method
RT boundary of a region

signature identification
RUS
UF dynamic signature verification
SEC APPLIED PROBLEMS
DEF A class of techniques for verifying a written signature. Also known as Dynamic Signature Verification. An area of biometrics [Fisher, 2005]
BTG biometrics

simple decision rule
RUS простое решающее правило
SEC PATTERN RECOGNITION
DEF A simple decision rule is a decision rule which assigns a category to a unit solely on the basis of the measurements or features associated with the unit. Hence, the units are treated independently and the decision rule f may be thought of as a function which assigns one and only one category to each pattern in measurement space or to each feature in feature space [Haralick, 1991]
BTG decision rule

skeleton-based feature
RUS остовной признак (изображения)
SEC IMAGE
DEF Skeleton-based features are features that are calculated on pixels which belong to the skeleton of an object of the image. These are high-level features, because they are calculated not on the original image but on an image obtained by preprocessing the image. The preprocessing includes the following steps. 1. Extraction of objects of interest at the image. 2. Extraction of the skeleton of the object of the image obtained at the previous step. 3. Calculation of the skeleton-based features. Skeleton-based features are widely used in recognition of typewritten and handwritten texts, as well as in recognition of handwritten hieroglyphs and fingerprints [Gurevich,

2006]
BTG image feature
RT contour-based feature
point-based feature
segment-based feature

skeletonization
RUS построение остова (области на изображении)
UF skeletonizing
SEC IMAGE ANALYSIS
DEF Skeletonization — algorithm used to find the central axis (skeleton) of an image object [Myler, 1993].

An important approach to representing the structural shape of a plane region is to reduce it to a graph [Gonzalez, 2002]

Skeletonization: A class of technique that try to reduce a 2D (or 3D) binary image to a "skeleton" form in which every remaining pixel is a skeleton pixel, but the essential shape of the input image is captured. Definitions of the skeleton include the set of centers of circles bitangent to the object boundary and smoothed local symmetries [Fisher, 2005.]
BTG region representation method
NTG medial axis transformation

Sobel edge detector
RUS оператор выделения яркостных переходов Собела
UF Sobel gradient operator
Sobel edge detection operator
Sobel edge operator
Sobel operator
SEC IMAGE PROCESSING
DEF Sobel edge detector: An edge detector based on the Sobel kernels. The edge magnitude image E is the square root of the sum of squares of the convolution of the image with horizontal and vertical Sobel kernels, given by $E = \sqrt{(K_x * I)^2 + (K_y * I)^2}$ [Fisher, 2005]
BTG gradient-based edge detector
RT Sobel kernel

Sobel kernel
RUS ядро оператора Собела
SEC IMAGE ANALYSIS
DEF Sobel — directional edge detection discrete convolution masks of the following form:

vertical $\begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & -2 \\ -1 & 0 & 1 \end{bmatrix}$, horizontal $\begin{bmatrix} -1 & -2 & 1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix}$ [Myler, 1993].

Sobel kernel: A gradient estimation kernel used for edge detection. The horizontal kernel is the convolution of a smoothing filter, s=[1,2,1] in the horizontal direction and a gradient operator d=[-1,0,1] in the vertical direction. The kernel $K_y = s * d^T = \begin{pmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{pmatrix}$ highlights horizontal edges. The vertical kernel K_x is the transpose of K_y [Fisher, 2005]
RT Sobel edge detector

source image
RUS исходное изображение
UF source picture
SEC IMAGE
DEF Source image: The image on which an image processing or an image analysis operation is based [Fisher, 2005]
BTG image
RT target image

spatial domain sharpening
RUS пространственное повышение резкости изображений
UF spatial domain deblurring
image deblurring in spatial domain
image sharpening in spatial domain
SEC IMAGE PROCESSING
BTG image sharpening method
RT frequency domain sharpening

spatial domain smoothing
RUS пространственное сглаживание изображений
UF image smoothing in spatial domain
SEC IMAGE PROCESSING
DEF Spatial domain smoothing: An implementation of smoothing in which each pixel is replaced by a value that is directly computed from other pixels in the image. In contrast, frequency domain smoothing first processes all pixels to create a linear transformation of the image, such as a Fourier transform and expresses the smoothing operation in terms of the transformed image [Fisher, 2005]

BTG image smoothing method
RT frequency domain smoothing

spatial filtering
RUS пространственная фильтрация (изображений)
SEC IMAGE PROCESSING
BTG image filtering method

spectral feature
RUS спектральный признак (изображения)
SEC IMAGE
DEF The calculation of spectral features is based on representation of the image as a quantified and discretized signal. In problems of image recognition, the most widely used are the image spectrum, its individual elements and functions of the spectrum, Fourier transforms (the Fourier transform of an image is often used for improving the image quality, namely, in filtering), two-dimensional cosine transformation (in face recognition), and the Gabor transformation. Features based on calculation of the gradient should also be classified as spectral features rather than shape ones, because their determination is based on the spatial frequency, not a representation of the image as a surface. Features based on gradients are used for detecting obstacles, edges, recognition of handwritten digits, and analysis of medical images [Gurevich, 2006]
BTG image feature
RT shape-based feature
statistical feature

split and merge
RUS разделение и слияние областей
UF split and merge algorithm
split and merge method
split and merge procedure
split and merge technique
SEC IMAGE ANALYSIS
DEF A two-stage procedure for segmentation or clustering. The data is divided into subsets, with the initial division being a single set containing all the data. In the split stage, subsets are repeatedly subdivided depending on the extent to which they fail to satisfy a coherence criterion (for example, similarity of pixel colors). In the merge stage, pairs of adjacent sets are found that, when merged, will again satisfy a coherence criterion. Even if the coherence criteria are the same for both stages, the merge stage may still find subsets to merge [Fisher, 2005]
BTG region-based image segmentation

statistical feature
RUS статистический признак (изображения)
SEC IMAGE RECOGNITION
DEF Statistical features are finding ever wider application in various problems of image recognition. In calculating statistical features, we assume that the image investigated is a realization of a field of random numbers. Actually, the statistical features are characteristics of the occurrence frequency for pixels of different intensity levels in an image, of different subsets of the image, or of values of some functions defined on the subsets. The most widely used features of this type are histograms of intensity levels, co-occurrence matrices, entropy features, different types of fractal dimension, and statistical moments [Gurevich, 2006]
BTG image feature
NTG entropy-based feature
RT shape-based feature
spectral feature

statistical image model
RUS статистическая модель изображения
SEC IMAGE
DEF Image model: abstract specification of a class of real images by means of ideal (typical) features of image segments. Each segment is homogenous in the sense of a certain criterion of uniformity. In statistical image models, homogenous segments are characterized by statistical features, e.g., by the average value, the variance, properties of the co-occurrence matrix, or prediction coefficients [Klette, 1996]
BTG image model

statistical image representation
RUS статистическое представление изображений
SEC IMAGE
DEF For a statistical image representation, the image is specified by average properties [Pratt, 2001]
BTG image representation
RT deterministic image representation

statistical pattern recognition
RUS статистическое распознавание образов
UF statistical pattern classification
SEC PATTERN RECOGNITION
DEF Statistical pattern recognition: A methodology for solving classification (naming) problems as decision problems posed in probabilistic terms; the relevant statistical distributions and prior probabilities must be known [Fischler,

1987]

Statistical pattern recognition: An approach to pattern recognition that uses probability and statistical methods to assign patterns to pattern classes [IEEE, 1990]

Pattern recognition techniques can be used to construct decision rules which enable units to be identified on the basis of their measurement patterns. Pattern recognition techniques can also be employed to cluster together units having similar enough measurement patterns. In statistical pattern recognition, the measurement patterns have the form of n-tuples or vectors [Haralick, 1991]

Statistical pattern recognition: Pattern recognition that depends on classification rules learned from examples rather than constructed by designers [Fisher, 2005]

BTG pattern recognition approach
RT structural pattern recognition

steerable filter
RUS управляемый фильтр (изображений)
SEC IMAGE PROCESSING
DEF Steerable filter: A filter applied to a 2D image, whose response is dependent on an scalar "orientation" parameter θ, but for which the response at any arbitrary value of θ may be computed as a function of a small number of basis responses, thus saving computation. For example, the directional derivative at orientation θ may be computed it terms of the x and y derivatives I_x and I_y as $\frac{dI}{d\vec{n}_\theta} = \begin{pmatrix} \cos\theta I_x \\ \sin\theta I_y \end{pmatrix}$. For non-steerable filters such as Gabor filters, the response must be computed at each orientation, leading to higher computational complexity [Fisher, 2005]
BTG image filter

steganography
RUS стеганография
SEC APPLIED PROBLEMS
DEF Concealing of information in non-suspect "carrier" data. For example, encoding information in the low-order bits of a digital image [Fisher, 2005]

step edge
RUS идеальный яркостный переход
SEC IMAGE
DEF Step edge: 1) A discontinuity in image intensity. 2) An idealized model of a step-change in intensity [Fisher, 2005]
BTG edge

structural image model
RUS структурная модель изображения
SEC IMAGE
DEF Image model: abstract specification of a class of real images by means of ideal (typical) features of image segments. Each segment is homogenous in the sense of a certain criterion of uniformity. In structural image models, the gray value function of such segments is approximated by analytical functions with variables x,y. [Klette, 1996]
BTG image model

structural pattern recognition
RUS структурное распознавание образов
SEC PATTERN RECOGNITION
DEF Structural pattern recognition: An approach to pattern recognition in which patterns are represented in terms of primitives and relationships among those primitives in order to describe and classify pattern structure [IEEE, 1990]

Pattern recognition techniques can be used to construct decision rules which enable units to be identified on the basis of their measurement patterns. Pattern recognition techniques can also be employed to cluster together units having similar enough measurement patterns. In structural pattern recognition, the measurements do not have the form of an n-tuple or vector. Rather, the unit being measured is encoded in terms of its parts and the relationships as well as properties of the parts [Haralick, 1991]

Structural pattern recognition: Pattern recognition where classification is achieved using high-level rules or patterns, often specified by a human designer [Fisher, 2005]

BTG pattern recognition approach
NTG syntactic pattern recognition
RT statistical pattern recognition

structural texture
RUS структурная текстура
SEC IMAGE
DEF Structural texture: A texture that is formed by the regular repetition of a primitive structure, for example an image of bricks or windows [Fisher, 2005]
BTG texture

structuring element
RUS структурирующий элемент

SEC IMAGE PROCESSING
DEF The structuring element of a morphologic operator is a function defined on the domain of the spatial pattern of the morphologic operator and whose value at each pixel of the domain is the weight or coefficient employed by the morphologic operator at that pixel position. The structuring element of a morphologic operator has a role in morphology exactly analogous to the role of the kernel in a convolution operation [Haralick, 1991]

Structuring element: window (in general, non-rectangular) for defining the area of influence in basic operations (erosion, dilation) of the mathematical morphology. The set of image points in the placed window has to be checked for intersection with object segments or background segments. Defining a structuring element requires to define also the position of its reference point [Klette, 1996]

Structuring element: The basic neighborhood structure of morphological image processing. The structuring element is an image, typically small, that defines a shape pattern. Morphological operations on a source image combine the structuring element with the source image in various ways [Fisher, 2005]
BTG mask
RT morphological image operation
morphological image processing

SUSAN corner finder
RUS оператор обнаружения углов SUSAN
UF SUSAN corner detector
SEC IMAGE ANALYSIS
DEF SUSAN corner finder: A popular interest point detector developed by Smith and Brady. Combines the smoothing and central difference stages of a derivative-based operator into a single center-surround comparison [Fisher, 2005]
BTG corner detection method

symbolic image
RUS символьное изображение
UF symbolic picture
SEC IMAGE
DEF Symbolic image: A digital image in which the value associated with each pixel is a symbol, rather than a gray level [IEEE, 1990]

A symbolic image is an image in which the value of each pixel is an index or symbol [Haralick, 1991]
BTG image

syntactic pattern recognition
RUS синтаксическое распознавание образов
SEC PATTERN RECOGNITION
DEF Syntactic pattern recognition: A type of structural pattern recognition that identifies primitives and relationships in natural or artificial language patterns [IEEE, 1990]

Syntactic pattern recognition: Object identification by converting an image of the object into a sequence or array of symbols and using grammar parsing techniques to match the sequence of symbols to grammar rules in a database [Fisher, 2005]
BTG structural pattern recognition

T

target image
RUS искомое изображение
UF target picture
SEC IMAGE
DEF Target image. The image resulting from an image processing operation [Fisher, 2005]
BTG image
RT source image

test set
RUS тестовое множество
SEC PATTERN RECOGNITION
DEF Test set: The set used to verify a classifier or other algorithm. The test set contains only examples not included in the training set [Fisher, 2005]
RT training set

texture
RUS текстура
SEC IMAGE
DEF Texture: A spatial distribution of image intensities or patterning of primitive image shapes [Fischler, 1987]

Texture: In image processing, an attribute representing the spatial arrangement of the gray levels of the pixels in a region [IEEE, 1990]

Texture is concerned with the spatial distribution of the image intensities and discrete tonal features. When a small area of the image has little variation of discrete tonal features, the dominant property of that area is gray tone. When a small area has wide variation of discrete tonal features, the dominant property of that area is texture. There are three things crucial in this distinction: (1) the size of the small areas, (2) the relative sizes of

the discrete tonal features, and (3) the number of distinguishable discrete tonal features. Texture can be described along dimensions of uniformity, density, coarseness, roughness regularity, intensity and directionality [Haralick, 1991]

Texture: structured variations of the surface radiance of real world objects with repetitive character, or synthetically generated gray value, or color value patterns. A texture can be characterized by elementary structural texture elements (e.g., brick-work, magnified views of textiles), or by random distributions of image values, single or in groups (e.g., grass, moss, leaves). The description of a texture depends upon the resolution of the image [Klette, 1996]

Texture: The phenomenon by which uniformity is perceived in regular (etymologically, "woven") patterns of (possibly irregular) elements. In computer vision, texture usually refers to patterns in the appearance or reflectance on a surface. The texture may be regular, i.e., satisfy some texture grammar or may be statistical texture, i.e., the distribution of pixel values may vary over the image. Texture could also refer to variations in the local shape on a surface, e.g., its degree of roughness [Fisher, 2005]

NTG oriented texture
structural texture
NTP texture element
RT texture-based image retrieval
texture-based image segmentation
texture descriptor
texture model

texture-based image retrieval
RUS поиск изображений, основанный на текстуре
SEC APPLIED PROBLEMS
DEF Content-based image retrieval that uses texture as its classification criterion [Fisher, 2005]
BTG content-based image retrieval
RT texture

texture-based image segmentation
RUS сегментация изображений, основанная на текстуре
UF texture-based segmentation
texture segmentation
SEC IMAGE ANALYSIS
DEF Many images of man-made and natural scenes contain areas that are differentiated clearly by texture. There are many ways of measuring texture in an image. The two most popular are: give a texture label to a pixel by examining the intensity variations over a small neighbourhood and map the complete image into the Fourier domain where particular textures that exist over areas of the image map into distinct points or lines in the frequency domain [Watt, 1998]

Texture segmentation: Segmentation of an image into patches of coherent texture [Fisher, 2005]
BTG image segmentation method
RT texture

texture descriptor
RUS дескриптор текстуры
SEC IMAGE ANALYSIS
DEF An important approach to region description is to quantify its texture content. The three principal approaches used in image processing to describe the texture of a region are statistical, structural, and spectral. Statistical approaches yield characterizations of textures as smooth, coarse, grainy, and so on. Structural techniques deal with the arrangement of image primitives, such as the description of texture based on regularly spaced parallel lines. Spectral techniques are based on properties of the Fourier spectrum and are used primarily to detect global periodicity in an image by identifying high-energy, narrow peaks in the spectrum [Gonzalez, 2002]
BTG region descriptor
NTG texture energy measure
RT texture

texture element
RUS элемент текстуры
UF texel
SEC IMAGE
DEF Texture element (texel): A small geometric pattern that is repeated frequently on some surface resulting in a texture [Fisher, 2005]
BTP texture

texture model
RUS модель текстуры
SEC IMAGE
DEF Texture model: The theoretical basis for a class of texture descriptor. For example, autocorrelation of linear filter responses, statistical texture descriptions or syntactic texture descriptions [Fisher, 2005]
RT texture

threshold
RUS порог
UF threshold value
SEC IMAGE ANALYSIS

DEF Threshold: In image processing, a specified gray level used for producing a binary image [IEEE, 1990]

Threshold — a value used to segment the graylevel values of an image into two different regions. Also called the binarization of an image. For example, if a threshold value of 128 is chosen, then any pixel below this value would be set to 0 and all pixels greater than and equal to this value would be set to 255 [Myler, 1993].

Threshold: selected value dividing a value scale into two intervals, e.g., into values that are equal to or lower than the threshold, and into values that are higher that the threshold [Klette, 1996]

NTG optimum threshold

RT image thresholding

TIFF

RUS формат TIFF

UF tagged image file format
TIFF file
TIFF image format

SEC IMAGE

DEF Tagged Image File Format (TIFF) - image storage file format developed by Microsoft and Aldus corporations; most commonly used in desktop publishing applications and with image scanner hardware [Myler, 1993].

A common image file format used in word processing and similar programs. Usually not compressed, although LZW compression is an option [Smith, 1999]

BTG image file format

RT image

topological feature

RUS топологический признак (изображения)

SEC IMAGE

DEF By topological features, we mean the results of application of topological functions to the image. These features characterize the image topology, namely, continuous connected areas and parts of images [Gurevich, 2006]

BTG image feature

RT arithmetical feature
combinatorial feature
logical feature
matrix feature

training set

RUS обучающая выборка

SEC PATTERN RECOGNITION

DEF Training set: The set of labeled examples used to learn the parameters of a classifier. In order to build an effective classifier, the training set should be representative of the examples that will be encountered in the eventual domain of application [Fisher, 2005]

RT test set

transform coding

RUS трансформационное кодирование

SEC IMAGE PROCESSING

DEF In transform coding, a reversible, linear transform (such as the Fourier transform) is used to map the image into a set of transform coefficients, which are then quantized and coded. For most natural images, a significant number of the coefficients have small magnitudes and can be coarsely quantized (or discarded entirely) with little image distortion [Gonzalez, 2002]

Transform coding: Transform coding techniques use a reversible, linear mathematical transform to map the pixel values onto a set of coefficients, which are then quantized and encoded. The key factor behind the success of transform-based coding schemas many of the resulting coefficients for most natural images have small magnitudes and can be quantized (or discarded altogether) without causing significant distortion in the decoded image. Different mathematical transform, such as Fourier (DFT), Walsh-Hadamard (WHT), and Karhunen-Loeve (KLT), have been considered for the task. For compression purposes, the higher the capability of compressing information is fewer coefficients, the better the transform; for that reason, the Discrete Cosine Transform (DCT) has become the most widely used transform coding technique [Furht, 2006]

BTG lossy image compression

U

uniform noise

RUS равномерный шум

SEC IMAGE

DEF Uniform noise - a type of noise described by a uniform histogram [Myler, 1993].

The probability density function of uniform noise is given by

$$p(z) = \begin{cases} \dfrac{1}{b-a} & for \quad a \le z \le b \\ 0 & otherwise \end{cases}.$$ The mean of this density function is given by

$\mu = \frac{a+b}{2}$ and its variance by $\sigma^2 = \frac{(b-a)^2}{12}$ [Gonzalez, 2002]

Uniform noise: Additive corruption of a sampled signal. Of the signal's samples are s_i then the corrupted signal is $\widetilde{s}_i = s_i + n_i$ where the n_i are uniformly randomly drawn from a specified range [α,β] [Fisher, 2005]

BTG image noise

unsharp masking
RUS нерезкое маскирование
SEC IMAGE PROCESSING
DEF Unsharp masking: In image processing, a sharpening technique in which an intentionally blurred version of the image is subtracted from the image itself [IEEE, 1990]
BTG image sharpening method

V

variable length coding
RUS неравномерное кодирование
UF VLC
SEC IMAGE PROCESSING
DEF The simplest approach to error-free image compression is to reduce only coding redundancy. Coding redundancy normally is present in any natural binary encoding of the gray levels in an image. The most popular technique for removing coding redundancy is due to Huffman. When coding the symbols of an information source individually, Huffman coding yields the smallest possible number of code symbols per source symbol [Gonzalez, 2002]

Variable Length Coding (VLC): Most entropy-based encoding techniques rely on assigning variable-length codewords to each symbol, whereas the most likely symbols are assigned shorter codewords. In the case of image coding, the symbols may be raw pixel valus or the numerical values obtained at the output of the mapper stage (e.g., differences between consecutive pixels, run-lengths, etc.). The most popular entropy-based encoding technique is the Huffman code. It provides the least amount of information units (bits) per source symbol [Furht, 2006]
BTG lossless image compression
NTG arithmetic coding
Huffman coding

vector image
RUS векторное изображение
UF vector picture
vectored image
vectored picture
SEC IMAGE
BTG image
RT raster image

W

watershed segmentation
RUS сегментация по морфологическим водоразделам
SEC IMAGE ANALYSIS
DEF Watershed segmentation: Image segmentation by means of the watershed transform. A typical implementation proceeds thus: 1. Detect edges; 2. Compute the distance transform D of the edges; 3. Compute watershed regions in – D [Fisher, 2005]
BTG image segmentation method

wavelet coding
RUS вейвлетное кодирование
SEC IMAGE PROCESSING
DEF Wavelet coding: Wavelet coding techniques are based on the idea that coefficients of a transform that decorrelates the pixels of an image can be coded more efficiently that the original pixels themselves. The main difference between wavelet coding and DCT-based coding is the omission of the first stage. Because wavelet transforms are capable of representing an input signal with multiple levels of resolution, and yet maintain the useful compaction properties of the DCT, the subdivision of the input image into smaller subimages is no longer necessary. Wavelet coding has been at the core of the latest image compression standards, most notably JPEG 2000 [Furht, 2006]
BTG lossy image compression
RT discrete wavelet transform

white noise
RUS белый шум
SEC IMAGE
DEF White noise: A noise process in which the noise power at all frequencies is equal (as compared to pink noise). When considering spatially distributed noise, white noise means that there is distortion at all spatial frequencies (i.e., large distortions as well as small) [Fisher, 2005]
BTG image noise
RT pink noise

Wiener filter
RUS фильтр Винера
SEC IMAGE PROCESSING
DEF Wiener filter: A regularized inverse convolution filter. Given as signal *g* that is known to be the convolution of an unknown signal *f* and a known corrupted signal *k*, it is desired to undo the effect of *k* and recover *f*. If (*F*,*G*,*K*) are the respective Fourier transforms of (*f*,*g*,*k*), then $G=F \cdot K$, so the inverse filter can recover $F = G \div K$. In practice, however, *G* is corrupted by noise, so that when an element of *K* is less than the average noise level, the noise is amplified. Wiener's filter combats this tendency by adding as estimate of the noise to the divisor. Because the divisor is complex, a real formulation is as follows: $F = \frac{G}{K} = \frac{GK^*}{KK^*} = \frac{GK^*}{|K|^2}$ and adding the frequency domain noise estimate *N*, we obtain the Wiener reconstruction of *F* given G and *K*: $F = \frac{GK^*}{|K|^2 + N}$ [Fisher, 2005]
BTG image filter

X

XOR operator
RUS оператор XOR
SEC IMAGE PROCESSING
DEF XOR operator: A combination of two binary images *A*, *B* where each pixel (*i*,*j*) in *A* XOR *B* is 1 if exactly one of *A*(*i*,*j*) and *B*(*i*,*j*) is 1. The output is the complement of the XNOR operator [Fisher, 2005]
BTG logic operator
RT AND operator
NAND operator
NOT operator
OR operator

Z

Zuniga-Haralick operator
RUS оператор Зунайджея-Харалика
SEC IMAGE ANALYSIS
DEF Zuniga-Haralick operator: A corner detection operator that is based on the coefficients of a cubic polynomial approximating the local neighborhood [Fisher, 2005]
BTG corner detection method

References

[Ballard, 1982] D.H. Ballard, C.M.Brown. Computer Vision. Prentice Hall, Inc., 1982.

[Davies, 2005] A. Davies. The Focal Digital Imaging A-Z. Focal Press, 2005.

[Fisher, 2005] R.B. Fisher, K. Dawson-Howe, A. Fitzgibbon, C. Robertson, E. Trucco. Dictionary of Computer Vision and Image Processing. - John Wiley & Sons, Ltd., 2005.

[Fischler, 1987] M.A. Fischler, O.Firschein. Readings in Computer Vision: Issues, Problems, Principles, and Paradigms. Morgan Kaufmann, 1987. – P.773-779.

[Furht, 2006] B. Furht (Ed.). Encyclopedia of Multimedia. NY: Springer Science+Business Media, Inc., 2006.

[Gonzalez, 2002] R.C.Gonzalez, R.E.Woods. Digital Image Processing. 2nd ed. – Prentice-Hall, Inc., 2002.

[Gurevich, 2006] I.B. Gurevich, I.V. Koryabkina. Comparative Analysis and Classification of Features for Image Models // Pattern Recognition and Image Analysis: Advances in Mathematical Theory and Applications. - Pleiades Publishing, Inc., 2006. - Vol.16, No.3. - P. 265-297.

[Gurevich&Yashina, 2006] I.B. Gurevich and V.V. Yashina. Computer-Aided Image Analysis Based on the Concepts of Invariance and Equivalence // Pattern Recognition and Image Analysis: Advances in Mathematical Theory and Applications. - MAIK "Nauka/Interperiodica"/Pleiades Publishing, Inc., 2006. - Vol.16, No.4. – P.564-589.

[Gurevich, 2008] I.B. Gurevich and V.V. Yashina. Descriptive Approach to Image Analysis: Image Models // Pattern Recognition and Image Analysis: Advances in Mathematical Theory and Applications. - MAIK "Nauka/Interperiodica"/Pleiades Publishing, Inc., 2008. - Vol.18, No.4. - P. 518-541.

[Haralick, 1991] R.M.Haralick, L.G.Shapiro. Glossary of computer vision terms // Pattern Recognition, 1991. – Vol.24, No.1. – pp.69-93.

[IEEE, 1990] IEEE Std. 610.4-1990. IEEE Standard Glossary of Image Processing and Pattern Recognition Terminology. The Institute of Electrical and Electronics Engineers, Inc., 1990.

[Jahne, 2004] B.Jahne. Practical Handbook on Image Processing for Scientific and Technical Applications. - 2nd ed. - CRC Press, 2004.

[Kindratenko, 2003] V.V. Kindratenko. On Using Functions to Describe the Shape // Journal of Mathematical Imaging and Vision. - Kluwer Academic Publishers, 2003. - Vol.18. - pp.225-245.

[Klette, 1996] R. Klette, P.Zamperoni. Handbook of image processing operators. - John Wiley & Sons, Ltd., 1996.

[Laplante, 2000] Dictionary of computer science, engineering, and technology / edited by Phillip Laplante. - CRC Press LLC, 2000.

[Pratt, 2001] W.K.Pratt. Digital Image Processing: PIKS Inside, 3rd edition. John Wiley & Sons, Inc., 2001.

[Myler, 1993] H.R.Myler, A.R.Weeks. Computer Imaging Recipes in C. Prentice Hall, 1993.

[Relf, 2003] Ch.G. Relf. Image Acquisition and Processing with LabVIEW. - CRC Press, 2003.

[Ritter, 2001] G.X. Ritter. Image Algebra. Center for computer vision and visualization, Department of Computer and Information science and Engineering, University of Florida, Gainesville, FL 32611, 2001.

[Sachse, 2004] Digital Image Processing // F.B. Sachse: LNCS 2966. - Springer-Verlag Berlin Heidelberg, 2004. - pp. 91-118.

[Sankur, 2004] B. Sankur and M. Sezgin. Survey over image thresholding techniques and quantitative performance evaluation // Journal of Electronic Imaging, 2004, Vol. 13(1), 146-165.

[Shapiro, 2001] L.G.Shapiro, G.C.Stockman. Computer Vision. Prentice Hall, 2001.

[Smith, 1999] S.W. Smith. The Scientist and Engineer's Guide to Digital Signal Processing. - 2nd ed. - USA: California Technical Publishing, 1999.

[Sternberg, 1980] S.R. Sternberg. Language and Architecture for Parallel Image Processing // Proceedings of the Conference on Pattern Recognition in Practice, Amsterdam, 1980.

[Teh, 1988] C.-H.Teh and T. Chin Roland. On Image Analysis by the Methods of Moments // IEEE Transactions on Pattern Analysis and Machine Intelligence, 1988. – Vol.10, No.4. – P.496-512.

[Tuceryan, 1998] M.Tuceryan and A.K.Jain. Texture Analysis / The Handbook of Pattern Recognition and Computer Vision (2nd Edition), by C. H. Chen, L. F. Pau, P. S. P. Wang (eds.), pp. 207-248, World Scientific Publishing Co., 1998.

[Vernon, 1991] D.Vernon. Machine Vision. Automated Visual Inspection and Robot Vision. Prentice Hall, 1991.

[Watt, 1998] A.Watt, F.Policarpo. The Computer Image. Addison-Wesley Longman Limited, 1998.

[Zhang, 2003] D.Zhang, G.Lu. Review of shape representation and description techniques // Pattern Recognition. – Elsevier Ltd., 2003. - Vol. 37. – P.1 – 19.