

Zpracování obrazu

1. Continuous and discrete representation of 2-D signals (continuous and discrete convolution, Fourier transform, discrete Fourier transform, FFT)
2. Signal sampling and quantization (Shannon theorem, sampling in non-rectangular grids, sampling in real systems, aliasing effect, quantization)
3. Histogram transforms (definition of histogram, contrast stretching, histogram equalization, 2-D histogram)
4. Noise removal (additive noise model, low-pass linear filtering in the space and frequency domains, median filtering, edge-preserving methods), image sharpening
5. Image formation model, Inverse filter, Wiener filter
6. Identification and restoration of motion blur, out-of-focus blur and turbulence blur
7. Edge detection by first-order derivatives (Roberts gradient, Sobel and Prewitt operators)
8. Edge detection by second-order derivatives (Laplace operator, Marr-Hildreth theory)
9. Image segmentation: Thresholding, edge-based segmentation, segmentation by region growing
10. Image matching (correlation-like techniques, template matching, matching of point sets, object-based matching)
11. Image registration (control point selection, linear and nonlinear transform models, resampling techniques)
12. Image Compression: Lossy and loss-less methods (basic principles), run-length coding, quad trees, transform coding
13. Features for description of 2-D shapes (general properties, invariance, visual features, chain codes, shape vector, Fourier transform coefficient features, moment invariants)
14. Supervised classification techniques (minimum-distance classifier, k-NN classifier, linear classifier, Bayesian classifier, parameter estimation and training)
15. Unsupervised classification techniques (iterative clustering, hierarchical clustering)
16. Reduction of dimensionality (Principal component transform, discriminative analysis, criteria of separability, Mahalanobis distance, feature selection strategies)