

**Major Field of Comprehensive
Examination**

Digital Image Processing

Syllabus

Theoretical background and tools of image processing, classic and perceptually uniform color spaces, multispectral imaging, 3D color spaces, integral and image transformations (Fourier, Walsh, Haar, Radon, Karhunen-Loeve, Wavelet), filtering in the frequency domain. Intensity based transformations (pixel operations, histogram transformation), convolution, correlation, noise removal, edge and corner detection, segmentation based on thresholding or edges, contour tracing, Hough transformation, template based segmentation. Basic elements of mathematical morphology and digital geometry/topology, textures, motion detection and tracking, 3D image processing, geometric transformations, object description (contour and region based approaches), image coding, clustering algorithms and their applications. Hardware solutions for image processing purposes.

Bibliography

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2. J. Serra: Image Analysis and Mathematical Morphology, Academic Press, January 1983.
3. R. O. Duda, P. E. Hart, D. G. Stork: Pattern Classification, Wiley-Interscience, 2000.
4. R. C. Gonzalez, R. E. Woods: Digital Image Processing, Prentice Hall, 2008.
5. R. C. Gonzalez, R. E. Woods, S. L. Eddins: Digital Image Processing Using MATLAB, McGraw-Hill Education (Asia), 2011.