

Image Processing

2 units (selection)

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Target) Understanding indispensable basic image processing methods for visual recognition.

Outline) Image processing engineering is an entrance level lecture to master the basics of digital image processing techniques in medical imaging, industrial images, vision pattern processing, etc. The lectures includes the fundamental concepts of binary image processing, image conversion, emphasis, restoration, feature abstraction, pattern matching, classification, application of image processing systems and industrial image processing. Computer laboratory exercises will be conducted quarterly. When possible, a lecture on the most recent trends in industrial image processing by a specialist in the field could also be included.

Keyword) *image processing, pattern recognition*

Fundamental Lecture) “[Linear System Analysis](#)”(1.0), “[Signal Processing](#)”(1.0), “[Microprocessors](#)”(1.0)

Relational Lecture) “[Signal Processing](#)”(0.5)

Requirement) “Linear system analysis” (1.0), “Signal processing” (1.0), “Micro-processors” (1.0)

Notice) none

Goal) Understanding indispensable basic image processing methods for visual recognition

Schedule)

1. Features of digital image processing and image data structures
2. Histogram
3. Image formation, binary images, distance
4. Transformation operations, connected elements, shape features
5. Image conversion and emphasis
6. Smoothing and noise elimination
7. Restoration, re-composition and geometrical conversion
8. Edge and line detection
9. Domain decomposition and texture analysis
10. 3D image processing and motion sequence analysis
11. Pattern matching and classification
12. Image processing system

13. Industrial image processing and shape recognition

14. Defects and surface information recognition

15. Questions and summary

16. Exam

Evaluation Criteria) Result: attendance (10%) and reports, programming exercise and continuous assessment tests (50%), final exam (40%).

Textbook) Hideyuki Tamura ”Introduction to computer image processing”

Reference) Mikio Takagi and Shimoda Yohisashi ”Image analysis handbook”

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=215735>

Student) Can be taken by only students in the night course

Contact)

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Note)

- ◇ - To pass this class and to fully understand each lecture, two hours each for preparation and review are necessary.
- ◇ This course will be evaluated as indicated in the evaluation criteria above
The final exam will cover the whole course