Three-dimensional Image Processing

2 units (selection)

Yoshiki Kawata · Associate Professor / Optical Materials and Devices, Optical Systems Engineering, Systems Innovation Engineering

Target〉 Introduce the fundamental concepts of 3-D image processing.

Outline〉 This course is intended to introduce the fundamentals of three-dimensional image processing which covers basic concepts as image restoration, image segmentation, registration, shape representation, and computational geometry etc. The class begins with a brief overview of the various technologies used to analyze medical and industrial images. The focus then shifts to in-depth descriptions of individual algorithms beginning with a description of the mathematical technique of image processing. The course emphasizes the design, analysis, and implementation of algorithms in the context of 3-D medical images.

Keyword〉 ***3-D image processing, medical image analysis,*** 工業計測

Relational Lecture〉 "**Virtual Reality**"(0.5)

Requirement〉 It is desired to finish a course of digital signal processing, image processing, and programming (C or C++).

Goal〉

1. To understand fundamentals of 3-D image processing.
2. To understand various 3-D image processing algorithms used to obtain medical and industrial fields

Schedule〉

1. Introduction to 3-D image processing
2. Signal Processing Fundamentals
3. 3-D imaging technology
4. 3-D image smoothing
5. 3-D image enhancement
6. Edge / region based segmentation
7. Deformable model segmentation
8. Graph cut segmentation
9. Geometrical properties of 3-D images- local feature of a connected component-
10. Geometrical properties of 3-D images- Calculation of the Euler number-
11. Surface/axis thinning algorithm
12. Morphology filter
13. Distance transformation
14. 3-D differential features
15. 3-D registration

Evaluation Criteria〉 Computer Project Report 100%

Textbook〉 3 , 2002

Reference〉

- ◇ Medial Imaging Signals and Systems, J.L. Prince, J.M. Links, 2006
- ◇ image Processing, Analysis, and Machin Vision, M. Sonka, V. Hlavac, R. R. Boyle, Thomson, 2008

Webpage〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=197132

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216673

Contact〉

⇒ Kawata (Opt.508, +81-88-656-9431, kawata@opt.tokushima-u.ac.jp) Mail

Note〉

- ◇ The computer projects should be done in C or C++.
- ◇ Preparation (2hrs) and Review (2hrs) are required to take this lecture (2hrs).