

Biomedical Image Analysis

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Course Keywords

Biomedical Engineering, Medical Imaging, Image Analysis, Digital Image Processing, Information and Communication Technology

Overview

This course will cover, Image formation and visual perceptual processing. Digital image representation. Two-dimensional signals and systems. The two-dimensional Fourier transform. Removal of noise and artifacts in images. Image enhancement. Image segmentation and detection of regions of interest. Shape analysis. Texture analysis. Introduction to image understanding and computer-aided diagnosis. Case studies from current applications and research.

This is a full course of duration 10 days and requiring 40 hours of lectures contact hours. It is proposed to have two sessions of two lecture hours per day. It is highly recommended that the course attendees work on laboratory exercises and/or a project on biomedical image analysis; see <http://people.ucalgary.ca/~ranga>. This part and any exams may be managed by host faculty member or staff of the sponsoring local organization.

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Mini Course

Course Details:

- 1) Nature of Biomedical Images [2]
- 2) Multiframe averaging in confocal microscopy [2]
- 3) Noise reduction in nuclear medicine imaging [3]
- 4) Digital Subtraction angiography [2]
- 5) Dual-energy and energy subtraction X-ray imaging [2]
- 6) Temporal subtraction [2]
- 7) Medical image enhancement methods [2]
- 8) Region of interest detection [4]
 - (a). Edge Detection
 - (b). Segmentation and region growing
 - (c). Breast tumor detection using fuzzy-sets
 - (d). Object of known geometry
 - (e). Detection of spinal canal
 - (f). Detection of Breast boundary in mammograms
 - (g). Detection of Pectoral muscles in mammograms
 - (h). Improved segmentation of Breast masses
- 9) Shape analysis of calcification, Breast masses and tumors [2]
- 10) Texture analysis and application to biomedical images [2]
- 11) Analysis of oriented patterns [4]
- 12) Image reconstruction from projections [4]
- 13) Restoration of nuclear medicine images [4]
- 14) Biomedical image and compression formats and standards [1]
- 15) Pattern classification and diagnostic decisions [6]

Course Objectives

- Learn about the nature and characteristics of biomedical images.
- Understand concepts of two-dimensional signals, systems, transforms, and filters.
- Learn image processing techniques for filtering, noise removal, and enhancement of biomedical images.
- Design and implement techniques for the detection of regions of interest.
- Explore techniques for the analysis of shape and texture of regions.
- Learn about spectral analysis of images using the two-dimensional Fourier transform.
- Investigate pattern classification and decision techniques for computer-aided diagnosis.
- Design, develop, implement, and analyze computer methods for the analysis of biomedical images.

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Who may Attend	<ul style="list-style-type: none">• Post Graduate Engineering Students• Undergraduate students with a good grasp of signals and systems.• Practicing engineers, Computer Scientists and even Medical physicist.• Anyone who has ever been curious of Medical Imaging.
Fees	<p>(a). Participants from abroad: US \$ 500</p> <p>(b). Industry/ Research Organizations: Rs. 10,000/-</p> <p>(c). Faculty from Academic Institutions: Rs.5,000/-</p> <p>(d). Students: Rs.2,000/-</p> <p>(SC/ST students eligible for 50% fee waiver).</p> <p><i>The above fee includes all instructional materials with internet access. The participants will be provided with a single bed accommodation (additional charge).</i></p>
Course Dates	December 15-23, 2016
Coordinator	Dr. Satish Singh GIAN Courses coordinator, IIIT Allahabad Department of Information Technology, IIIT Allahabad Devghat, Jhalwa, Allahabad 211012 E-mail: sk.singh@iiita.ac.in Mobile:+91 -9532096413
Registration and additional Information	Please visit: https://gian.iiita.ac.in/ for further information. To register, please follow the steps listed at “How to Register”