Biomedical Image Processing with MATLAB

- A BioSyM Short Course -

Course Highlights:

This course will introduce participants to the basic techniques, algorithms, and principles in video and image processing for biological and medical applications. Lectures will be complemented with exercises in MATLAB to provide participants with practical experience in processing images.

Instructors and Organizers:

Dr. Sharon Ong, Research Scientist at BioSyM, and Professor Harry Asada, BioSyM PI and Ford Professor of Engineering, MIT

Course Overview:

This course presents the fundamentals of digital image processing with a particular emphasis on problems in biological and medical applications. This includes basic techniques to enhance image quality, reduce noise, and design filters. Various methods for extracting, classifying, and tracking features, patterns, and objects in images are introduced. A series of computer-based activities will show participants how operations affect real images. Learn how to implement techniques on MATLAB to solve practical image processing problems. By studying the fundamentals, participants are expected to make more informed uses of ready-to-use packages for image processing.

Who should attend:

Our target audience are researchers who use or plan to use image processing software for bio medical applications and are interested in understanding the fundamentals behind the algorithms. By attending this course, participants can make more acceptable and educated choices on what techniques to use or develop more customizable programs to meet their image processing needs. Participants are expected to bring their own laptops with MATLAB installed to run exercises in each session. Familiarity with MATLAB is not necessary.

<u>Enrolment is limited to 30 people.</u>

Course Meeting Times:

The course will be held from **June 9th 2014 to June 20th 2014** on **Mondays, Wednesdays and Fridays** from **10:00 a.m. to 12:00 noon**, at Level 5, Enterprise Wing.

Course Outline:

Imaging Fundamentals: Basic medical imaging techniques, imaging sensors, image representations and transformations. We will also introduce/review the MATLAB software used throughout the course.

Image enhancement: Techniques to pre-process and enhance images in the spatial and frequency domains. These include image filtering and denosing techniques.

Morphological Image Processing: Fundamentals of morphological operations, including dilation, erosion, opening, closing and top-hat operations.

Image Segmentation: Algorithms to extract features in an image including edge detection, point detection and region-based segmentation.

Classification: Basic techniques to detect patterns in images and machine learning methods to classify features segmented.

Object Tracking and Motion Estimation: Techniques to detect and track objects from time-lapse images. Introduction to Kalman filtering.
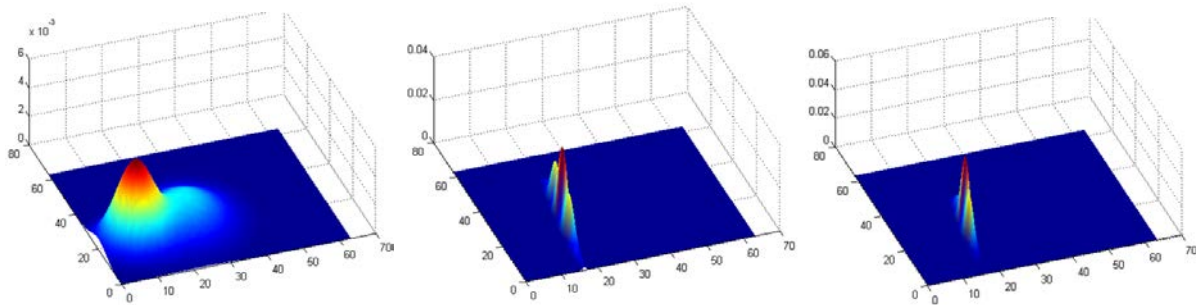
Interested persons can send email to sharon.ong@smart.mit.edu for registration.