

Radiomics, Pathomics and Deep Learning for Disease Diagnosis, Prognosis and Treatment Evaluation on Digital Pathology, CT and MRI scans

Overview

The aim of this course will be to provide students and scientific researchers with an overview of biomedical image computing from the perspective of precision medicine.

Objectives

Traditional biology generally looks at only a few aspects of an organism at a time and attempts to molecularly dissect diseases and study them part by part with the hope that the sum of knowledge of parts would help explain the operation of the whole. Rarely has this been a successful strategy to understand the causes and cures for complex diseases. The motivation for a systems based approach to disease understanding aims to understand how large numbers of interrelated health variables, gene expression profiling, its cellular architecture and microenvironment, as seen in its histological image features, its 3 dimensional tissue architecture and vascularization, as seen in dynamic contrast enhanced (DCE) MRI, and its metabolic features, as seen by Magnetic Resonance Spectroscopy (MRS) or Positron Emission Tomography (PET), result in emergence of definable phenotypes. At the Center for Computational Imaging and Personalized Diagnostics at Case Western Reserve University, there is significant work undergoing related to developing computerized knowledge alignment, representation, and fusion tools for integrating and correlating heterogeneous biological data spanning different spatial and temporal scales, modalities, and functionalities. There is thus a need to explore via efficient computational and pattern recognition methods, the existence and correspondence of biological patterns across heterogeneous data scales and modalities. An understanding of the interplays of different hierarchies of biological information from proteins, tissue, metabolites, and imaging will provide conceptual insights and practical innovations that will profoundly transform people's lives.

The teaching objectives of this short course are to convey to students and scientific researchers the state of the art in biomedical image computing and integrated multi-modal and multi-scale data convergence from the perspective of precision medicine. For this course we will specifically focus on use cases in cancer, i.e. breast, prostate and lung cancers and the role of integrated diagnostics.

Modules	Dates: 26th to 30th December 2017 A: Radiomics : Day 1 and Day 2 B: Pathomics : Day 3 and Day 4 C: Companion Diagnostics : Day 5 Number of participants for the course will be limited to fifty. Registration is on first come first serve basis!!
Who can Attend?	<ul style="list-style-type: none">• Students and Faculty members of Computer and Information Science and Engineering, Biotechnology, Instrumentation Technology, Electronics and Communication Engineering, Research scholars working or interested in the area of Bio Medical Image Processing / Engineering.• Students and Faculty members from School of Medicine, in the branch of Radiology, Pathology and any other interested participants from other disciplines of medicine• Employees of Industry/Consulting Firms/ Research Organizations and Medical Practitioners interested in Radiology, Pathology and Companion diagnostics.

Pre-requisites	Basic Knowledge of Biomedical Imaging.
Fees	<p>The participation fees for taking the course is as follows:</p> <p>Participants within India : ₹1000</p> <p>Participants from abroad : US \$100</p> <p>The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, free internet facility.</p>
General Instructions	Participants are encouraged to bring their own laptop. Also participants need to make their own arrangements for food and accommodation.

The Faculty



Prof. Anant Madabhushi is currently the Director and F. Alex Nason Professor II at Center for Computational Imaging and Personalized Diagnostics (CCIPD), Department of Biomedical Engineering, Case Western Reserve University, Cleveland, Ohio, USA. He obtained his Ph.D in

Bioengineering from University of Pennsylvania and his MS in Biomedical Engineering at The University of Texas, Austin. Between 2006-2012 he served on the faculty of the Department of Biomedical Engineering at Rutgers University. He is the co-founder of two start-ups Ibris Inc. and vascuVis Inc and serves on the scientific advisory board for a number of companies. He has into his credits 36 International honours and awards 147 media recognitions. He has been in the 14 editorial boards such as many IEEE transactions and journals, BMC medical imaging, Medical Image Analysis, Medical Physics etc. He has chaired and been a member of around 88 conferences and technical symposiums. He has been a reviewer for 54 grant proposals, 48 journals. He is a senior member of IEEE, EMBS, ISMRM, AIMBE and New York academy of Sciences. He has 25 patents into his credits and 20 more to be approved. He has 16 licensed technologies into his credits. He has authored 7 books, 4 book chapters. He has published over 120 Peer-reviewed journals papers, 150 peer reviewed conference papers, 140 peer reviewed Abstracts and 19 non-peer reviewed abstracts. His citation count is over 7600 with an h-index of 43 and an i0-index of 149. He has had nearly \$25 Million in grant funding as a Principal Investigator and over \$10 Million as a Co-Investigator from various organization such as NIH, NSF, and the Department of Defence. He has given over 180 invited lectures and is the recipient of a number of teaching awards. He has mentored and been mentoring many post-doctoral researchers, doctoral, masters and undergraduate students.



Prof. P M Shivamurthy is an Assistant Professor, in the Department of Computer Science & Engineering, Sri Jayachamarajendra College of Engineering, Mysuru. He has obtained in Masters of Technology in Software Engineering from VTU, Belgaum and Bachelors of

Engineering in Computer Science from Mysore University. He is currently exploring computational solutions for disease diagnosis through histopathological Image processing techniques. He has published three papers at IEEE conferences IC3I-2014, CCIP-2015 and 2016, a poster at medical conference. He has won best paper award in one of his conference publications. He is currently pursuing his Ph.D at Mysore University. He has been awarded best programing coach award by ACM at International programming contest and a certificate of product design by Mobility Research Forum, Microsoft. He has a total of 16 years of teaching experience.

Course Co-ordinator

Prof. P M Shivamurthy

Assistant Professor
Department of Computer Science
and Engineering
Sri Jayachamarajendra College of
Engineering,
JSS Technical Institutions Campus
Mysuru 570 006 Karnataka

.....
Tel: +91 0821 254 8286 (O),
+91 9480326986 (M)

Email: pmshiva@gmail.com
pmshiva@jssce.ac.in
.....

Register to this course at:

<http://www.gian.iitkgp.ac.in/GREGN>