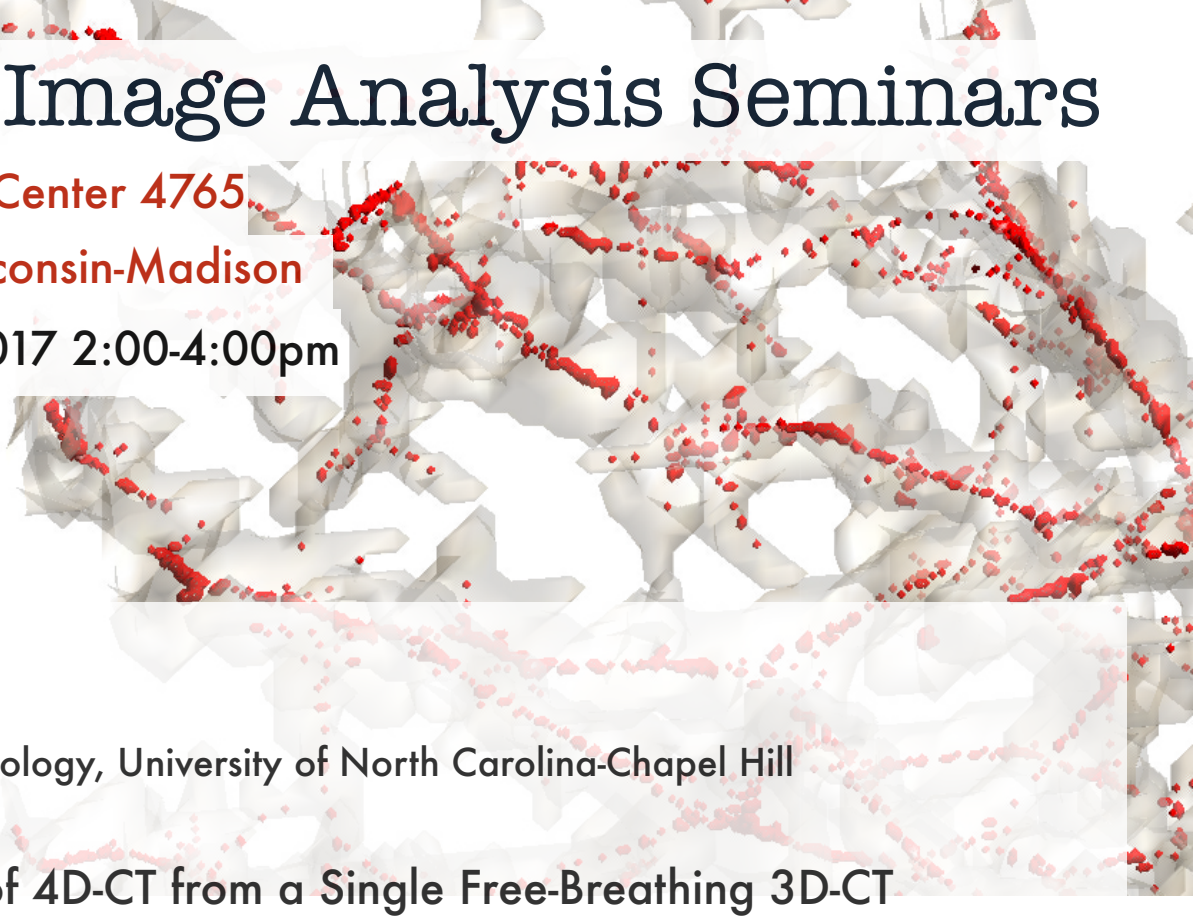
Medical Image Analysis Seminars

Medical Science Center 4765

University of Wisconsin-Madison

November 15, 2017 2:00-4:00pm



2:00-3:00pm

Guorong Wu

Department of Radiology, University of North Carolina-Chapel Hill

Reconstruction of 4D-CT from a Single Free-Breathing 3D-CT

Abstract: Neuroimaging research has developed rapidly in last decade, with various applications of brain mapping technologies that provide mechanisms for discovering neuropsychiatric disorders *in vivo*. The human brain is something of an enigma. Much is known about its physical structure, but how it manages to marshal its myriad components into a powerhouse capable of performing so many different tasks remains a mystery. In this talk, I will demonstrate that it is more important to understand how the brain regions are connected rather than study each brain region individually. I will introduce my recent research on human brain connectome, with the focus on revealing high-order brain connectome and functional dynamics using learning-based approaches, and the successful applications in identifying neuro-disorder subjects such as Autism and Alzheimer's disease.

Short Bio: Dr. Guorong Wu is an Assistant Professor in Department of Radiology at University of North Carolina, Chapel Hill (http://www.unc.edu/~grwu). His primary research interests are medical image analysis, big data mining, scientific data visualization, and computer assisted diagnosis. He has been working on medical image analysis since he started my PhD study in 2003. Dr. Wu has released more than 10 image analysis software packages to the medical imaging community, which count to more than 15,000 downloads since 2009. Dr. Wu is the recipient of NIH Career Development Award (K01) and PI of NIH Exploratory/Developmental Research Grant Award (R21). He also serves as the Co-PI and Co-Investigator in other NSF and NIH grants.

Contact Moo K. Chung mkchung@wisc.edu for additional information.

3:00-3:30pm Moo K. Chung

Dept. of Biostatistics and Medical Informatics, University of Wisconsin-Madison

Kernel Regression on Irregular Image Domains

Abstract: We present the discrete version of heat kernel smoothing on 3D irregular image domains by treating images as 3D dense graphs. Various new statistical properties are presented. As an application, we show how to smooth data in the lung blood vessel trees obtained from computed tomography (CT). The method can be further used in representing the complex vessel trees parametrically and extracting the skeleton representation of the trees. The talk is based on preprint: https://arxiv.org/abs/1710.07849.

3:30-4:00pm Andrey Gritsenko

Dept. of Biostatistics and Medical Informatics, University of Wisconsin-Madison

Extreme Learning Machines for Visualization

Abstract: Visualization of data is an important, but not simple task in the field of data analysis. Visualization of data in high-dimensional space can be described as a task of finding (or building) a new, low-dimensional (1D, 2D, or 3D), projection space, which allows to best represent the data. Also this task becomes even more complicated when we talk about Big Data problems. This talk will cover basics of the Extreme Learning Machines theory - a method which allows training of artificial neural networks in linear time. We will also discuss the implementation of this method for data visualization, applying the idea of reverse projection - ELMVIS. Further, the application of ELMVIS for classification and regression tasks will be presented, followed by the discussion on the influence of target information on visualization results.

Short Bio: Andrey Gritsenko graduated from Stavropol State University, Russia in 2010 with a Specialist degree in Applied Mathematics and Computer Science. He was conducting a postgraduate research on "Resource distribution in large-scale computational centers using workflow prediction" in North-Caucasus Federal University, Russia from 2010 until 2014. In 2017, Andrey Gritsenko graduated from the University of Iowa, USA with a PhD degree in Industrial Engineering. His research was mainly about Extreme Learning Machines and Big Data.