SEMINAR

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Data-Driven Feature Learning for Myocardial Segmentation and Registration of CP-BOLD MRI

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Abstract: Cardiovascular disease (CAD) is the major cause of mortality in western world. Recently, Cardiovascular Magnetic Resonance (CMR) techniques have gained ground in diagnosis of cardiovascular disease. Cardiac Phase-resolved Blood Oxygen-Level-Dependent (CP-BOLD) MR is a new CMR technique, which is capable of diagnosing an ongoing ischemia by detecting changes in myocardial intensity patterns at rest without any contrast and stress agents. Visualizing and detecting these changes require significant post-processing, including myocardial segmentation and registration of the myocardium. But, changes in myocardial intensity pattern and myocardial shape due to the heart's motion challenge automated standard CINE MR myocardial registration and segmentation techniques resulting in a significant drop of accuracy. We hypothesize that the main reason behind this phenomenon is the lack of discernible features. In this talk, I will describe the multi scale discriminative dictionary learning approach, which is proposed for supervised learning and sparse representation of the myocardium, to improve the myocardial feature selection for image registration and segmentation. I will also briefly our recent work on ischemia and infarct detection utilizing shape changes of myocardium.

Bio:

Oksuz received his BS degree in Electronics Engineering from Istanbul Technical University in 2010 and his MS degree in Electrical and Electronics Engineering from Bahçesehir University in 2011. He worked with Assist. Prof. Dr. Devrim Unay during his MS thesis. He is currently a Ph.D. candidate at the IMT Institute for Advanced Studies Lucca on Computer, Decision, and Systems Science. He is a member of the PRIAN (Pattern recognition and Image Analysis Group) group and works under the supervision of Prof. Sotirios Tsaftaris. He will join the Diagnostic Radiology Group at Yale University in October 2015 as Postgraduate Fellow.

His research interests are in image segmentation, image registration and machine learning, with a certain focus on medical image analysis. His Ph.D. studies focus on cardiac phase resolved Blood-Oxygen-Level-Dependent (BOLD) MR images. He worked on joint registration and segmentation of the myocardium region in MR sequences.