

Mathematical Modeling in Computer Vision

by

Gözde Ünal

Date and Time: November 22nd, 2017 (Wednesday), 13:00

Place: Room 207, Computer Engineering Building, GTU

All interested are cordially invited.

ABSTRACT:

In this seminar, I will present an overview of some of my group's recent work on computer vision. The first problem I will talk about consists of employing tensors in modelling either tree-like structures such as vascular trees in human brain or higher order mathematical structures in capturing inherent asymmetry in white matter fibers of the brain. I will show how we embed a tensor in a 4D space rather than 3D in order to untangle the bifurcating (or even n-furcating) structures/branches in the data in a higher-dimensional space. This led to a highly performing and efficient vessel segmentation framework, which is demonstrated on different applications. The second technique demonstrates the asymmetry of underlying fibers at the voxel level for bending, crossing or kissing fibers of the brain white matter. Following those, I'll show various methods from my group including machine learning-based methods in fiber clustering, image generation, segmentation, and novel volumetric shape representations as time permitting.

BIOGRAPHY:

Dr. Gozde Unal received her PhD in ECE with a minor in Mathematics from North Carolina State University, NC, USA, in 2002. She was a postdoctoral fellow at Georgia Institute of Technology, Atlanta GA, USA in 2002-2003. Dr. Unal worked as a research scientist at Siemens Corporate Research, Princeton, NJ, USA between 2003-2007. She held positions of assistant professor and associate professor at Sabancı University, Faculty of Engineering and Natural Sciences between 2007-2015. In Fall 2015, she joined Istanbul Technical University, Department of Computer Engineering, where she is currently a full professor. Her research interests are in computer vision and medical image analysis. Particularly, her recent work is focused on both mathematical and machine-learning based solutions to problems in image modelling, segmentation, image synthesis for inpainting and super resolution. She was the recipient of L'Oreal Turkey's Female Scientist Award in 2010 in Life Sciences. She received the Distinguished Young Scientist Award (GEBİP) from TÜBA in 2010. She was awarded the Marie Curie Alumni Career Award of European Commission in 2017.