

## SEMINAR NOTICE:

# Efficient Edge-Aware Smoothing Approach and its Applications to Vision Algorithms

***Dongbo Min***

Research Scientist at the Advanced Digital  
Sciences Center in Singapore

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**4:00 p.m.**  
**CSL 301**



### Abstract:

In low-level vision problems, one of the most important tasks is to smooth an image while preserving its important features, called an edge-preserving smoothing. In this talk, we present two novel filtering techniques: 1) cross-based local multipoint filtering (CLMF) and 2) weighted mode filtering (WMF). These approaches have been developed to process, represent, and interpret raw sensory data (signal) efficiently and effectively. The signal to be filtered can take different forms such as a noisy color image, a cost volume constructed in labeling tasks (e.g., stereo or optical flow), or a noisy depth map obtained from depth sensors.

First, in the CLMF, we formulate the filtering process as a local multipoint regression problem, consisting of two main steps: 1) multipoint estimation, calculating the estimates for a set of points within a shape-adaptive local support, and 2) aggregation, fusing a number of multipoint estimates available for each point. Leveraging a cross-based local support technique, the proposed filtering methods achieve strong results in an efficient manner.

Second, the WMF is proposed based on a joint histogram. Especially, this approach was developed for the purpose of enhancing a low resolution depth map using its corresponding single color image. When the histogram is generated, the weight between neighboring pixels on the color image is used for counting the joint histogram of the depth map. A final solution is determined by seeking a global mode on the histogram. We show that the proposed WMF provides the optimal solution with respect to L1 minimization.

### Biosketch:

Dongbo Min received the B.S., M.S., and Ph.D. degree in electrical and electronic engineering from Yonsei University, Seoul, Korea, in 2003, 2005, and 2009, respectively. He then worked with the Mitsubishi Electric Research Laboratories (MERL) as a post-doctoral researcher from June 2009 to June 2010. He is now working with the Advanced Digital Sciences Center (ADSC), which was jointly founded by the University of Illinois at Urbana-Champaign (UIUC) and the Agency for Science, Technology, and Research (A\*STAR), a Singapore government agency. His research interests include 3D computer vision, video processing, 3-D modeling, and hybrid sensor systems.

