*The University of Alabama*
*Department of Computer Science*
*Colloquium Series Speaker*

**Dr. Yixin Chen**
**University of Mississippi**

**Depth, Outlier Detection, and Ranking**

**Friday, October 31st**
**11:00 a.m., EE 110**

**Abstract:**
Statistical depth functions provide from the "deepest" point a "center-outward ordering" of multi-dimensional data. In this sense, they can detect observations that appear extreme relative to the rest of the observations, i.e., outliers. Of the various statistical depths, the spatial depth is especially appealing because of its computational efficiency and mathematical tractability. In the first part of this talk, I introduce a novel statistical depth, the kernelized spatial depth (KSD), which generalizes the spatial depth via positive definite kernels. By choosing a proper kernel, the KSD can capture the local structure of a data set while the spatial depth fails. Based on the KSD, I propose a novel outlier detection algorithm, by which an observation with a depth value less than a threshold is declared as an outlier. The detector is simple in structure:  the threshold is the only one parameter for a given kernel. It can be learned from a collection of "normal" observations or from a mixture of normal observations and outliers with unknown labels. Upper bounds on the false alarm probability of a depth-based detector are derived. These upper bounds can be used to determine the threshold. In the second part of this talk, we generalize the KSD concept to graph data. This naturally leads to a ranking algorithm based on graph kernels.

**Bio**:
**Yixin Chen** received the B.S. degree from Beijing Polytechnic University, the M.S. degree in control theory and application from Tsinghua University, and the M.S. and Ph.D. degrees in electrical engineering from the University of Wyoming. In 2003, he received the Ph.D. degree in computer science from The Pennsylvania State University. From 2003 to 2006, he was an Assistant Professor in computer science at the University of New Orleans. Since August 2006, he has been an Assistant Professor in Computer and Information Science at The University of Mississippi. His research interests include machine learning, data mining, and computer vision.