ELECTRICAL & COMPUTER ENGINEERING **RESEARCH SEMINAR** **Fall 2018**

Statistical Models and Algorithms for Real-Time Anomaly Detection Using Multi-Modal Data

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Abstract

A framework is proposed to perform real-time anomaly detection using multi-modal data. A deep neural network-based object detector is employed to extract counts of objects and sub-events from image data. The counts of the number of Instagram posts in a geographical area is also obtained. Statistical models are proposed to model the observed nonstationary behavior of the sequence of counts. The anomaly detection problem is formulated as a problem of detecting deviations from a learned nonstationary behavior. Sequential algorithms are proposed to detect anomalies using the proposed models. The proposed algorithms are shown to be either optimal or asymptotically efficient in a well-defined sense. The developed algorithms are applied to a multi-modal data consisting of CCTV imagery and social media posts to detect a 5K run in New York City.

Biography

Taposh Banerjee is an Assistant Professor of ECE in the University of Texas at San Antonio (UTSA). He also holds the Cloud Technology Endowed Professorship IV at the College of Engineering, UTSA. He received his Ph.D. in ECE from the University of Illinois at Urbana-Champaign. His research interests lie in the areas of Statistical Signal Processing and Machine Learning. Specifically, he is interested in developing theory and algorithms in Sequential Analysis, High-Dimensional Statistics, and Multivariate Analysis, with applications to biology, medicine, cyber-physical systems, and data science. He is a recipient of the Abraham Wald Prize in Sequential Analysis 2016.