

Title:

1. Spatiotemporal Event Forecasting in Social Media
2. Multi-Task Learning for Spatio-Temporal Event Forecasting

Speaker:**Chang-Tien Lu**

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Abstract:**Spatiotemporal Event Forecasting in Social Media :**

Social media has become a popular data source as a surrogate for monitoring and detecting events. Analyzing social media (e.g., tweets) to reveal event information requires sophisticated techniques. Tweets are written in unstructured language and often contain typos, non-standard acronyms, and spam. In addition to the textual content, Twitter data form a heterogeneous information network where users, tweets, and hashtags have mutual relationships. These features pose technical challenges for designing event detection and forecasting methods. In this talk, I will present the design and implementation of EMBERS, a fully automated 24x7 forecasting system for significant societal events using open source data including tweets, blog posts, and news articles. I will describe the system architecture of EMBERS, individual models that leverage specific data sources, and a fusion engine that supports trading off specific evaluation criteria. I will also demonstrate the superiority of EMBERS over base rate methods and its capability to forecast significant societal happenings.

Multi-Task Learning for Spatio-Temporal Event Forecasting :

Spatial event forecasting from social media is an important problem but encounters critical challenges, such as dynamic patterns of features and geographic heterogeneity. Most existing approaches are designed to address some of these challenges, but not all of them. In this talk, I will present a novel multi-task learning framework which aims to concurrently address all the challenges. Specifically, given a collection of locations, we propose to build forecasting models for all locations simultaneously by extracting and utilizing appropriate shared information that effectively increases the sample size for each location, thus improving the forecasting performance. We combine both static features derived from a predefined vocabulary by domain experts and dynamic features generated from dynamic query expansion in a multi-task feature learning framework; we investigate different strategies to balance homogeneity and diversity between static and dynamic terms. Efficient algorithms based on Iterative Group Hard Thresholding are developed to achieve efficient and effective model training and prediction. Extensive experimental evaluations on Twitter data from four different countries in Latin America demonstrated the effectiveness of our proposed approach.

Bio:

Chang-Tien Lu is a Professor of Computer Science and Associate Director of the Discovery Analytics Center at Virginia Tech. He received his Ph.D. from the University of Minnesota at Twin Cities in 2001. He served as Program Chair of the 18th IEEE International Conference on Tools with Artificial Intelligence in 2006, and General Chair of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems in 2009 and the International Symposium on Spatial and Temporal Databases in 2017. He also served as Secretary (2008-2011) and Vice Chair (2011-2014) of the ACM Special Interest Group on Spatial Information (ACM SIGSPATIAL). His research interests include spatial databases, data mining, urban computing, and intelligent transportation systems. He has published over 140 articles in top rated journals and conference proceedings. His research has been supported by NSF, NIH, DoD, IARPA, VDOT, and DCDOT. He is an ACM Distinguished Scientist and Virginia Tech College of Engineering faculty fellow.