

Research Talk ComTec/ITeG

Senior Lecturer Dr. Flora Salim

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"Context recognition and urban intelligence from mining spatio-temporal sensor data"



Flora Salim is a Senior Lecturer at the Computer Science and IT discipline, School of Science, RMIT University. She obtained her PhD in Computer Science from Monash University in 2009. Her research interests are in the intersection of human mobility behaviour, context and activity recognition, time-series data mining, and spatio-temporal analytics of sensor data from mobile, pervasive computing, smart cities, buildings, transportation, and urban environments. Dr Salim's research has been evaluated across multiple externally funded projects, including indoor monitoring and analytics in university and retail precincts, driving behaviour recognition, road risk analysis, and trajectory analysis in airports. She was a recipient of the prestigious Australian Research Council (ARC) Postdoctoral Fellowship (Industry) in 2012-2015 and the 2016 RMIT Vice-Chancellor's Award for Research Excellence – Early Career Researcher. She has secured grants from Australian Research Council, IBM Smarter Cities Lab, Australian Urban Research Infrastructure Network, and numerous local and multi-national industry partners, including Northrop Grumman Corporations USA, and most recently, Microsoft Cortana. She is a regular paper reviewer for IEEE Transactions on Services Computing, IEEE Transactions on Cloud Computing, and IEEE Transactions on Human-Machine Systems, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Vehicular Technology, ACM Transactions on Internet Technology, Elsevier Pervasive and Mobile Computing, and Elsevier Big Data Research. She is one of the Technical Program Committee Co-Chairs of IEEE PerCom 2018.

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Abstract:

Effective and efficient techniques for analyzing spatio-temporal sensor data from the urban environment are paramount, particularly in addressing these key growth areas in urbanization: human mobility, transportation, and energy consumption. One main challenge in spatio-temporal analytics of large scale sensor data is to discover meaningful correlations among thousands of sensors. It is important to observe and learn the context from which the data is generated in, particularly when dealing with heterogenous highdimensional data from buildings, cities, and urban areas.

A new concept of cyber, physical, social contexts will be introduced, and how they translate in various domain applications of our research for smarter cities and smarter buildings, human mobility analysis, intelligent transportation, indoor analytics, and energy consumption prediction.

I will then present the applicability of some of our generic methods for time-series and spatio-temporal data.

IGTS is an Information-Gain based temporal segmentation techniques that can be used for discovering transitions in human mobility data, segmenting multidimensional time series, extracting temporal features from multiple different sensor data, finding change points in data streams, and summarising temporal patterns. I will also briefly present a recent paper on a Bayesian Non Parametric technique to discover both contexts (eg social contexts, physical activities) and also groups of users that have similar observable contexts (which may indicate that they belong to a social group).

Clustering spatio-temporal interval data is required in many domains e.g. parking sensor, WiFi data in shopping malls, etc. for hot-region detection, anomaly detection, and many other applications. We present a new approach to evaluate clustering methods across spatial, temporal, and data domains, and propose new similarity and balance metrics to evaluate these clusters.

We will then demonstrate the applications of such techniques for real-world problems, such as parking violation monitoring or predicting daily trajectories.

Wednesday, March 14, 2018, 10:15 to 11:15 a.m.

Room -1418, Wilhelmshöher Allee 73, 34121 Kassel