香港浸會大學理學院
HKBU Faculty of Science

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

PhD Candidate:	Mr Chen LI
Date	8 May 2018 (Tuesday)
Time:	2:00 pm - 4:00 pm (35 mins presentation and 15 mins Q & A)
Venue:	FSC703, Fong Shu Chuen Library, HSH Campus

"Automatic Extraction of Behavioral Patterns for Elderly Mobility and Daily Routine Analysis"

Abstract

The elderly living in smart homes can have their daily movement recorded and analyzed. Given the fact that different elders can have their own living habits, a methodology that can automatically identify their daily activities and discover their daily routines will be useful for better elderly care and support. In this thesis research, we focus on developing data mining algorithms for automatic detection of behavioral patterns from the trajectory data of an individual for activity identification, daily routine discovery, and activity prediction.

The key challenges for the human activity analysis include the need to consider longer-range dependency of the sensor triggering events for activity modelling and to capture the spatio-temporal variations of the behavioral patterns exhibited by human. We propose to represent the trajectory data using a behavior-aware flow graph which is a probabilistic finite state automaton with its nodes and edges attributed with some local behavior-aware features. Subflows can then be extracted from the flow graph using the kernel k-means as the underlying behavioral patterns for activity identification. Given the identified activities, we propose a novel nominal matrix factorization method under a Bayesian framework with Lasso to extract highly interpretable daily routines. To better take care of the variations of activity durations within each daily routine, we further extend the Bayesian framework with a Markov jump process as the prior to incorporate the shift-invariant property into the model.

For empirical evaluation, the proposed methodologies have been compared with a number of existing activity identification and daily routine discovery methods based on both synthetic and publicly available real smart home data sets with promising results obtained. In the thesis, we also illustrate how the proposed unsupervised methodology could be used to support exploratory behavior analysis for elderly care.

*** ALL INTERESTED ARE WELCOME ***