



The Hong Kong University of Science and Technology

Department of Mathematics

PHD THESIS EXAMINATION

Recommender system: analysis and its applications

By

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ABSTRACT

In this thesis, we mainly consider the application of two types of recommender system. In the first part, we propose a novel tensor-based method to provide POI recommendation to users. Location-based social networks (LBSNs) have attracted millions of users to share their social friendship and daily activity locations. Plenty of the available check-in record make it possible to mine user's preference on locations and provided POI recommendation to users. However, it is a challenge to learn the preference of users since check-in data is sparse, long-tail and influenced by the time and social relationship. Our proposed method could simultaneously deal with the above issues and experiments on a real-world dataset shows that our model could provide more accurate location recommendation to users.

In the second part, we illustrate a novel SAVER model for handling a dynamic treatment recommendation setting involving multiple diseases and medications. Most of the existing works based on the reinforcement learning just construct the reward function and state in a simple way since it is a hard task to find a proper metric to evaluate the condition of a patient with multi-morbidity and to model the complicate daily condition of patients. In this thesis, a novel reward function is defined to provide a preliminary signal for which action is responsible for a good or bad outcome and a state with more complicated structure is used to capture more features of patient's condition. Besides, a supervised constraint is fused into reinforcement learning framework to avoid unacceptable risk.

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