

# A user behavior based recommendation system considering temporal event sequences

Student : Chen Shih-Huan

Advisor: Dr. Chieh-Yuan

Institute of Industrial Engineering and Management  
Yuan-Ze University

## ABSTRACT

In recent years, the advancement of information technology has enabled us to generate more massive amounts of data like never before. As a result, in the field of recommendation systems, analyzing massive data has become an important challenge. In practice, many e-commerce companies face many issues regarding inaccurate results and long processing time when analyzing user behavior. Although some studies indicate event sequence can be useful in describing user behaviors, few known recommendation models take temporal event sequence into account. This study proposes a user behavior based recommendation system that applies temporal event sequence to represent user behavior to fulfill the requirement. First, we construct five different feature extraction methods to show the user behavior. Including a single-period to represent a user behavior, and a multi-period behavior sequence to observe the user behavior in detail. Additionally, instead of recording user behavior from a fixed starting point, this study records the user behavior from the first activity and ignores inactive time to deal with the inactive user problem as first event function. Furthermore, to represent user behavior from recent to the past, both short-term and accumulated multi short-term periods to long-term period as accumulated approach. Lastly, both first event function and accumulated approach will be the fifth feature extraction method. In this way, our system will generate significant and varied user watching pattern sequences. Second, we use the Longest Common Subsequences (LCS) algorithm to find the users who are similar to the target user through user watching pattern sequence. Third, we construct a sequence based item recommendation model to apply similar users' watching patterns sequences, and considering both the counts of item ID, and the counts of the genres to recommend the item and genre for the target user. The effectiveness of the proposed recommendation system is measured by RecallMovie, which represents the accuracy of the recommended items, and RecallGenre, which represents the accuracy of the recommended genres. Experimental results show that both first event function and accumulated approach are helpful to increase the performance of recommendation.

Key words: : Recommendation systems 、 User behavior 、 Sequence behavior 、 LCS algorithm 、 Collaborative filtering