Developing a Location-Item-Time Sequential Pattern Mining algorithm for Personalized Route Recommendation Service

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ABSTRACT

Recently, amusement parks are now facing strict challenges from other business competition. How to survive in a rapidly changing environment and provide a high quality service in terms of consumer preference has become a critical issue for amusement park managers. To satisfy the requirement, this research proposes a personalized route recommendation system that provides tourists with the facilities in which theme they should visit. In the proposed system, to detect which region a visitor is in, all regions are covered by Radio-Frequency Identification (RFID) readers. The tourist behaviors (i.e. visiting sequences and corresponding timestamps) will be collected until the tourist leaves the amusement park and stored in a route database. The proposed route recommendation system consists of two major stages. The first step is to preprocess the route sequences so that unreasonable routes are modified and corrected. After the preprocessing the route database, the second step is to discover the frequent Location-Item-Time (LIT) sequential patterns using the proposed Location-Item-Time PrefixSpan (LIT-PrefixSpan) mining procedure. In the second stage, the route suggestion procedure will filter the LIT sequential patterns under the constraints of intended-visiting time, favorite regions with its related visiting time, and favorite recreation facilities. In addition, this research develops the similarity measurement between the new user's input vector and the candidate LIT routes from the user point of view. Finally, the route recommendation system will select the top-three suggested routes to guide the visitors. To show the feasibility of the proposed route recommendation system, the Tokyo DisneySea in Japan is used as an example. The experiments for different parameters and user preference settings are conducted to demonstrate the quality of route recommendation. Based on the experimental results, it is clear that the recommended route satisfies visitor requirement based on previous visiting experiences of tourists.

Keyword: Recommendation systems   Visiting sequence   Route suggestion   RFID   Time-interval sequential pattern mining   Amusement park