A SEQUENTIAL PATTERN BASED ROUTE SUGGESTION SYSTEM

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ABSTRACT. *To improve museum service quality, researchers developed variant mobile systems to help visitors smoothly interact with exhibits or other companions. These systems concentrated mainly on how to improve communication approaches and information query functions. However, none of them discussed how to provide visitors a customized museum visiting itinerary. To bridge the gap, this research takes previous popular visiting behaviors as the suggestion foundation and develops a sequential pattern based route suggestion system to generate personalized tours. First, to increase suggestion feasibility, exhibits are grouped into a set of exhibit sections. Based on the exhibit sections, time-interval sequential patterns are determined from a museum historical route database using the I-PrefixSpan algorithm. If the time-interval sequential patterns meet visitors' intended visiting time and must-see exhibits, they are regarded as candidate routes and ranked according to their expected crowd degree, time variance degree and incompleteness degree. The candidate routes with higher rankings are suggested to visitors' mobile devices. It is believed that the proposed system will increase museum visitor satisfaction.*
Keywords: Data mining, Sequential pattern, Guide system, Museum

1. **Introduction.** Museums are now regarded as places for displaying as articles, photographs, videos, sounds and oral histories and also educational centers open to visiting members of the public [23]. In past years, traditional multilingual tour expositor and audio machines have widely been used in museums to guide visitors. Traditional multilingual tour guides provide expert explanations, but require higher expense on training and wages. An audio guide service in the form of a portable CD player or tape machine provides another choice. Visitors can hear the audio introduction by simply pressing the room or exhibit number. This service is cheaper and easier to implement, but lacks interactive functions [22].

Currently, museums have or are running projects that allow visitors access to exhibit information using varied image, voice and video formats using portable handheld devices. Wireless communication and localization technologies such as ultrasonic sensors, infrared (IR) sensors, and radio frequency identification (RFID) are integrated with these handheld devices to enhance the interaction with visitors [8]. Abowd et al. [1] proposed a mobile context aware tour guide, called CyberGuide, which allows its user to leave messages to exhibit owners and send reports about his/her location to some central service that others can access. This system detects the user's location using GPS for an outdoor environment and RF for the indoor version. Oppermann and Specht [14] developed the Hippie system that allows its users to take notes and annotate visited exhibits during the visit. Users can send SMS-like messages to dedicated persons such as family or group members in the museum. Fleck et al. [6] developed the "guidebook" system for the Exploratorium in San Francisco. The guidebook prototype provides two communication