ISSN 2250-3153

Mining User Mobile Behavior in Location Based Services

Balamurugan.V

Department of Computer Science and Engineering, Angel College of Engg. And Tech, Tiruppur, India

Abstract- The advancement of Wireless Communication devices have created a new business model. Mobile users can request services through their mobile devices via Information Service and Application Provider (ISAP) from anywhere at any time are enhanced by mining and prediction of mobile user behaviors. But such discovery may not be precise enough for predictions since the differentiated mobile behaviors among users and temporal periods are not considered simultaneously in the previous works. User relations and temporal property are used simultaneously in this work. Prediction strategy is used to predict the subsequent mobile behavior. Here CTMSP-Mine (Cluster-based Temporal Mobile Sequential Pattern - Mine) algorithm is used to mine CTMSPs. In CTMSP-Mine requires user clusters, which are constructed by Cluster-Object-based Smart Cluster Affinity Search Technique (CO-Smart-CAST) and similarities between users are evaluated by Location-Based Service Alignment (LBS-Alignment) to construct the user groups. The temporal property is used by time segmenting the logs using time intervals. The specific time intervals to segment the huge data logs are found using Genetic Algorithm based method called GetNTSP (Get Number of Time Segmenting Points). The user cluster information resulting from CO-Smart-CAST and the time segmentation table are provided as input to CTMSP-Mine technique, which creates CTMSPs. The prediction strategy uses the patterns to predict the mobile user behavior in the near future.

Index Terms- mining, mining methods and algorithms, mobile environments

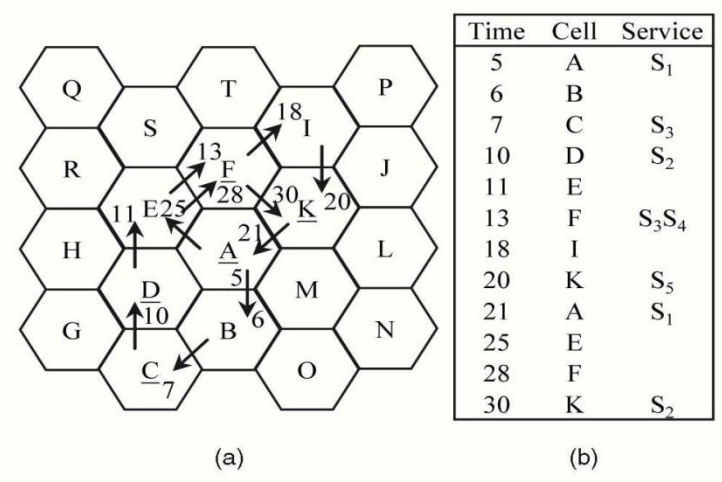
I. INTRODUCTION

The advancement of wireless communication techniques and the popularity of mobile devices such as mobile phones, PDA, and GPS-enabled cellular phones, have contributed to a new business model. Mobile users can request services through their mobile devices via Information Service and Application Provider (ISAP) from anywhere at any time.

MC is expected to be as popular as e-commerce in the future and it is based on the cellular network composed of several base stations. The communication coverage of each base station is called a cell as a location area. The average distance between two base stations is hundreds of meters and the number of base stations are usually more than 10,000 in a city. When users move within the mobile network, their locations and service requests are stored in a centralized mobile transaction database.

Fig. 1 shows an MC scenario, where a user moves in the mobile network and requests services in the corresponding cell through the mobile devices. Fig. 1a shows a moving sequence of a user, where cells are underlined if services are requested there. Fig. 1b shows the record of service transactions, where the service S1 was requested when this user moved to the location A at time 5. In fact, there exists insightful information in these data, such as movement and transaction behaviors of mobile users. Mining mobile transaction data can provide insights for various applications, such as prediction of subsequent locations visited by user and user's service requests and service recommendations.

A mobile transaction database is complicated since a huge amount of mobile transaction logs is produced based on the user's mobile behaviors. Data mining is a widely used technique for discovering valuable information in a complex data set and a number of studies have discussed the issue of mobile behavior mining. The main difference between these literatures is the involved information of proposed patterns. Previous works addressed the problem of mining associated service patterns in mobile web networks. Previous works also proposed methods to efficiently mine users' sequential mobile access patterns, based on the FP-Tree.



Time	Cell	Service
5	A	S_1
6	B	
7	C	S_3
10	D	S_2
11	E	
13	F	S_3S_4
18	I	
20	K	S_5
21	A	S_1
25	E	
28	F	
30	K	S_2

Fig. 1 shows an MC scenario, where a user moves in the mobile network and requests services in the corresponding cell through the mobile devices.

Fig.1 An example for a mobile transaction sequence.
(a) Moving sequences.
(b) Service sequences.

Fig. 1a shows a moving sequence of a user, where cells are underlined if services are requested there.

Fig. 1b shows the record of service transactions, where the service S1 was requested when this user moved to the location A at time 5. In fact, there exists insightful information in these data, such as movement and transaction behaviors of mobile users.

Mining mobile transaction data can provide insights for various applications, such as data prefetching and service recommendations.

1.1 Location Based Services:

A Location-Based Service (LBS) is an information or entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device. LBS include services to identify a location of a person or object, such as discovering the nearest banking cash machine or the whereabouts of a friend or employee. LBS include parcel tracking and vehicle tracking services. LBS can include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location.

Some examples of location-based services are:

- Requesting the nearest business or service, such as an ATM or restaurant
- Turn by turn navigation to any address
- Locating people on a map displayed on the mobile phone
- Receiving alerts, such as notification of a sale on gas or warning of a traffic jam
- Location-based mobile advertising
- Real-time Q&A revolving around restaurants, services, and other venues.

II. ANALYSIS

2.1. Existing System:

In a mobile network consisting cells with a base station for each, users of wireless mobile devices move from one location to another in a random manner. The mobile users are served by ISPs and ISAP to access the World Wide Web, to get necessary information in their daily life. When user's movement and their service requests are predicted in advance, it helps to provide customized and efficient service to the users. Efficiency is increased to help mobile users experience the usage of web applications and web pages as if they access from a PC. The Existing system for prediction uses the moving paths of users or the time a user requests for a service. This system does not consider groups of users in mining, but it considers only individual users. This did not provide efficient Prediction of mobile user behavior and it consumes more time to predict and also it lacks in accuracy. Therefore a new system is proposed to solve the problems in prediction.

Limitations of Existing System

- Existing Clustering Algorithms are not applicable to LBS Scenario
- Prediction process consumes more time.
- No precise prediction of mobile user behavior.

2.2 Proposed System:

- A novel method, named Cluster-based Temporal Mobile Sequential Pattern Mine (CTMSP-Mine), for discovering CTMSPs in LBS environment is proposed.
- In the data mining mechanism, two techniques and the CTMSP-Mine algorithm are designed to discover the knowledge. First, the CO-Smart-CAST algorithm is used to form user cluster groups.
- Clustering of Mobile Transaction Data base without consideration of user profiles
- The time interval segmentation method helps us find various user behaviors in different time intervals. For example ,users may request different services at different times (e.g., day or night) even in the same location..
- If time interval factor is not taken into account, some behaviors may be missed during specific time intervals
- Genetic Algorithm (GA) is automatic time segmentation method. GA produces a more suitable time interval table

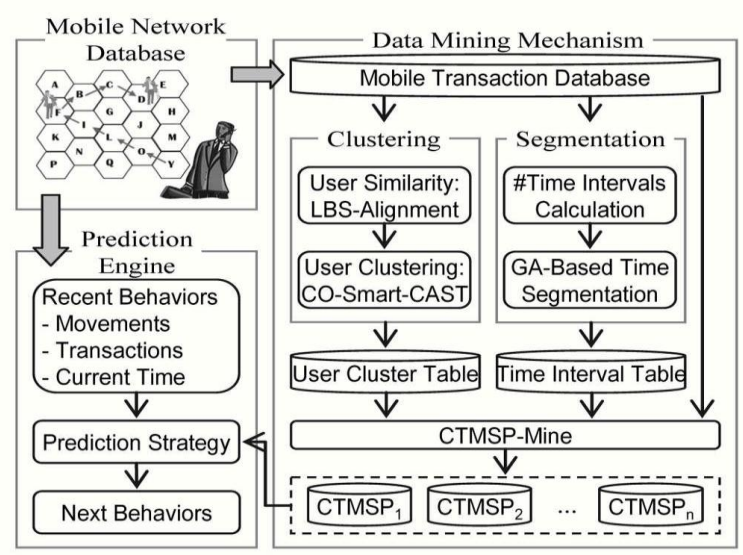


Fig. 2 Overall Proposed System

III. SYSTEM IMPLEMENTATION

After Careful analysis our Concept is Implemented by developing following modules

- Client Module.

- Centralized Server Module.

3.1 Client Module:

Mobile users will not be stable in one location ,they may move from one location to another location. During the movement they need to identify the service available in particular location. So, they request service via mobile device from various locations.

3.2 Server Module:

The major works of the centralized server is to find the service requested by the mobile users in various locations. They have to provide response to the service requested by the client and also they have to find and Location and Time .The major works of server is listed below.

- Find the requested service.
- Provide response to the service and also find time and location.
- Formation of Mobile Transaction Database.
- Apply LBS alignment algorithm
- Apply CO-SMART-CAST to form user groups
- Group users according to Mobile Numbers
- Form User Cluster Table
- Apply CTMSP to mine Cluster Groups
- Use GA Based Time Segmentation algorithm to find most suitable time interval table

The above concepts are implemented using Java as the front end and SQL Server as a Back End in Windows XP Operating System.

IV. Conclusion and Future Enhancements

4.1 Conclusion:

CO-SMART-CAST algorithm is proposed to find the user groups.Using this algorithm User Cluster Table has been formed. GA based Time segmentation algorithm have been used to find the most suitable time interval table. The proposed algorithms are used to deliver the excellent performance.

4.2 Future Enhancements:

When the required service is not provided in a location, the user details are registered, so that the next time when the user enters, the service is provided as required by the user. For example, when the mobile user enters a specific location and surfs for the information about the nearest Library. When the user is not serviced with the required information, the user's details are logged and registered. Later, when the user enters the same location, he is identified by his registered details. The service is provided efficiently as required by the user.

Activating prioritization, so that it is possible to provide priorities for selected users among the complex user behavior. Huge numbers of users utilize the mobile services every day. Some users access specific services frequently. Such users are prioritized over other mobile users. Those prioritized services help to satisfy the needs of mobile users completely.

References

[1] Baoyao Zhou, Siu Cheung Hui, Kuiyu Chang, (2006), "*Enhancing* mobile Web access using intelligent recommendations", Intelligent Systems, IEEE.

[2] Chen, T.S., Chou, Y.S., Chen, T.-C, (2011), "*Mining User Movement* Behavior Patterns in a Mobile ServiceEnvironment", Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE.

[3] Halvey, M., Keane, M.T., Smyth. B (2005), "*Time-based segmentationof log data for user navigation prediction in personalization", Web* Intelligence Proceedings. The IEEE/WIC/ACM.

[4] Lu, E.H., Tseng, V.S., Yu, P.S. (2011), "*Mining Cluster-Based temporal*MobileSequential Patterns in Location-Based Service Environments",Knowledge and Data Engineering, IEEE Transactions.

[5] Tseng, V.S., Lu, R.H.-C., Cheng-Hsien Huang (2007), "*Mining temporal mobile sequential patterns in location-based service environments*", Parallel and Distributed Systems.

[6] Tseng, V.S.M.; Lin, K.W.C, (2005) "*Mining sequential mobile access patterns efficiently in mobile web systems*", Advanced Information Networking and Applications, AINA.

Authors

First Author – Balamurugan.V, Department of Computer Science and Engineering, Angel College of Engg. and Tech., Tiruppur,India, Email: balamuruganvsrit@gmail.com