



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 2, February 2023

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

An Efficient Approach Behavior Pattern Mining and Prediction in Mobile Web Systems

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ABSTRACT-- Mobile commerce is an emerging technology in both industry and academic. Among them, one of the active topic areas is the mining and prediction of user's mobile commerce behaviors. In this paper, we propose a system for mining and prediction of mobile users movements and purchase transactions under the context of mobile commerce. Location and time based analysis is applied on a variety of mobile service analysis application. User behavior analysis is carried out using the sequential pattern mining methods. Clustering techniques are used to group the mobile users based on their frequent mobile transaction. Most of the Existing technique not focused on differentiated mobile behaviors among users and temporal periods. In proposed system mobile users are clustered. Temporal periods are predicted by using CT Miner (Coincidence Temporal Miner) which is developed to discover frequent time-interval based patterns.

KEYWORDS: mobile sequential patterns, Temporal mining, mobile commerce

I.INTRODUCTION

Due to rapid advance of wireless communication technology and the popularity of powerful mobile devices, mobile users can access worldwide information from anywhere at any time and also use their mobile devices to make business transactions easily. Meanwhile, the availability of location acquisition technology facilitates easy acquisition of a moving trajectory, which is used to records a user movement history. Meanwhile, the availability of location acquisition technology facilitates easy acquisition of a moving trajectory, which is used to records a user movement history. Thus, we predict that, in the coming future of Mobile Commerce (m-Commerce) will be able to capture the moving trajectories and purchase transactions of users. A mobile transaction database is complicated because a huge amount of mobile transaction logs is produced based on the mobile user's behaviors. Data mining is a technique which is for discovering valuable information in a complex data set and a number of studies have discussed the issue of mobile behavior mining. To achieve a quick response from the system, data mining is used successfully in many applications.

Previous works addressed the problem of mining associated service patterns in mobile web network. Previous works also proposed methods to efficiently mine users' sequential mobile access patterns, based on the FP-Tree. Path traversal patterns for mining mobile web user behaviors have been proposed. The moving path was taken into consideration in the above studies to increase the accuracy of predictions. However, mobile behaviors vary among different user clusters and at various time intervals. The prediction of mobile behavior is more precise if it is possible to find the corresponding mobile patterns in each user cluster and time interval. Mining time interval-based patterns (referring as temporal patterns) from such data is undoubtedly more complex and arduous, and requires a different approach from mining time point-based data. So far, very less attention has been paid to the issue of mining time interval-based sequential pattern. This is partly due to the complex relations among event intervals. Since the feature of time interval is quite different from time point, the pair wise relationships between any two time interval-based events are intrinsically complex.

Clustering of mobile transaction data helps in the discovery of social groups, that can be used in applications like shared data allocation, targeted advertising and personalization of content services. In earlier studies, users are typically clustered according to their personal profiles (e.g., age, sex and occupation).In real applications of mobile environments; it is often not easy to obtain users' profiles. That is, users' mobile transaction data only available to access. To achieve the aim of user clustering without user profiles, need to evaluate the similarities of mobile transaction sequences. The time interval segmentation method helps us to find various user behaviors in different time

intervals. For example, users may demand different services at different time (e.g., day or night) even in the identical location. If the time interval factor is not taken into consideration, some behaviors may be missed during specific time intervals. Hence a time interval table is required to find out the complete mobile behavior patterns. The main aim of this paper is prediction of the time intervals and clustering of mobile user based on their transactions. In order to improve the performance of mobile commerce, this can be carried out.

The remaining part of the paper is organized as follows, the related work briefly review in Section II, mobile sequential pattern mining model will be explained in Section III, Finally, Conclusions and future work of the paper are presented in Section IV.

II.RELATED WORKS

The Mobile Commerce Explorer Framework for mining and prediction of mobile users' movements and purchases and also it facilitates mining and prediction of mobile users' commerce behaviors in order to recommend stores and items previously unknown to a user [1]. A novel frequent-pattern tree (FP-tree) structure, which is an extended prefix-tree structure for storing shorten, crucial information regarding frequent patterns, and an efficient FP-tree based mining method is developed FP-growth, for mining the complete set of frequent patterns by pattern fragment growth[2].An Automated Collaborative Filtering is quickly becoming a trendy technique for reducing information overload, often as a technique to balance content-based information filtering systems. This collaborative filtering is applied to the prediction of user's behavior and it can be divided into user-based collaborative filtering and item-based collaborative filtering. Based on the behaviors of other similar users the user-based collaborative filtering is done and the item based collaborative filtering is based on user behavior associated with similar items [3].A prediction approach called Hybrid Prediction Model [4] for estimating an object's future locations based on its pattern information. An object's trajectory patterns for prediction are discovered and it can be indexed by a novel access method for efficient query processing. A novel data mining algorithm named TMSP-Mine[5]for efficiently discovering the Temporal Mobile Sequential Patterns (TMSPs) of users in LBS environments. This is the first work on mining the mobile sequential patterns associated with moving paths and time intervals in LBS environments. Additionally, propose a novel location prediction strategy to utilize the discovered TMSPs for effectively predicting the next movement of mobile users. In[6]Cluster-based Temporal Mobile Sequential Pattern Mine(CTMSP-Mine),for discovering the Cluster-based Temporal Mobile Sequential Patterns. Furthermore, a prediction strategy is proposed to predict the subsequent mobile behaviors. In CTMSP-Mine, user clusters are formed by a novel algorithm named Cluster-Object based Smart Cluster Affinity Search Technique and similarities between users are evaluated by the proposed measure, Location-Based Service Alignment (LBS-Alignment). In the meantime, a time segmentation approach is existing to find segmenting time intervals where similar mobile characteristics exist [6].

An incision strategy and coincidence representation for minimizing the processing of complex relations among event intervals. Then, an efficient algorithm, CTMiner (Coincidence Temporal Miner) is developed to discover frequent time-interval based patterns. [7]. In[8] propose a weighted frequent pattern mining is to find the frequent pattern with calculation of weight values for each item set in the transaction database. The proposed work finds important weighted frequent item set in transaction databases, with low minimum support. Temporal patterns expose time related information that can be extracted from database with time series properties. Temporal pattern or periodical pattern found by assigns the time series or periodical intervals between the items set in transaction database. The periodic pattern is the process of continuously mining the changes in the purchase mobile user information at periodic intervals. Temporal mobile access patterns [9] can efficiently discover mobile user's temporal behavior patterns associated with location and requested services. Furthermore, T-MAP to efficiently find the mobile users' mobile access patterns in distinct time intervals and to store the temporal mobile access patterns.

In[10],proposed a method called credit point system which is used to improve the mobile commerce. Even if Similarity Inference model suggests similar stores, the result is not so accurate. In order to overcome such difficulties we introduce user interests. Whenever a user login into the system or during registration, user can specify their interests. Users add their interests based on the category that is added by admin. So based on the interests, the system can respond to their predictions. User can add the interests from a list of interests which are leaf nodes of the category tree. So user can view the available categories. Also when entering a shop, the user should get a service regarding the interests specified. This work is a motivation to customers, which improves Mobile Commerce applications. In Credit point system each shop can set the minimum credit point for an item. As users purchase and their number of transactions increase, their credit point's increase. As a result users are more interested in mobile commerce.

III.MOBILE SEQUENTIAL PATTERN MINING MODEL

In this section, we describe Architecture design with their processes. The processes are,

- Measuring store and Item similarities
- Frequent Transaction mining
- Clustering of mobile users
- Time Interval calculation
- Mobile commerce behavior predictor

A. Architectural Model

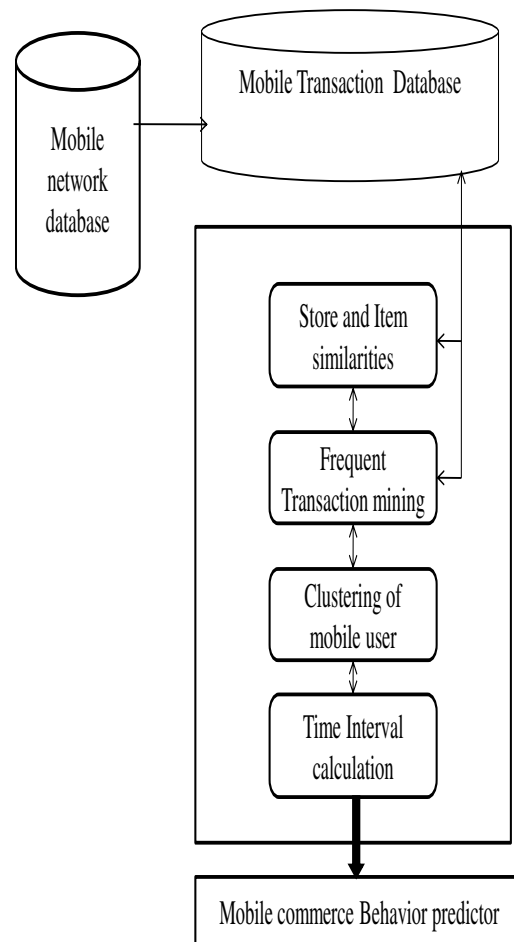


Figure 1. Architecture Design

Fig.3.1.1 shows the proposed system Architecture. The mobile network database maintains detailed store information which includes locations. Our system has an “offline” mechanism for measuring stores-Items similarities and also for frequent transaction mining and an “online” engine for mobile commerce behavior prediction. When the mobile users moves among the stores, the mobile information’s are user ID, purchased items and stores details can be stored in the mobile transaction database.

Clustering of mobile users can be done based on their transaction Time. Discovering of frequent time-interval can also be done by using coincidence temporal Miner. This algorithm also employs two pruning techniques to reduce the search space effectively. Finally, the possible mobile user behavior can be predicted by using mobile commerce behavior predictor.

B.Measuring store and Item similarities

The store and item similarities can be computed from the mobile transaction database, From this database, we have the following informations, for a given store, we know which items are available for sale and for a given item, we know which stores sell this item.

C. Frequent Transaction mining

When the mobile user's making transaction repeatedly from some stores means that type of transaction can be identified as a frequent transaction. This can be done by using personal mobile commerce pattern mine algorithm. The Personal Mobile Commerce Pattern Mine algorithm is inspired by the TJPF algorithm which is an Apriori-like algorithm. However, we observe that the TJPF algorithm does not consider user ID, which is essential for discovering personal mobile behaviors. And also TJPF algorithm is not consider the factors of user cluster and time interval, which are also essential in discovering the complete information regarding personal mobile behavior. These are all consider in this system to effectively predict the mobile behavior.

D. Clustering of mobile users

Based on the frequent transactions mobile users can be clustered. Each cluster contains user with different mobile transaction behaviors in a mobile transaction database. This clustering can be done by satisfying the minimum threshold of frequent transactions, from which frequent and infrequent users are identified.

E. Time Interval calculation

Time intervals are used to find various behaviors in different time intervals. For Example user can request different services at different times even in the same location. This Time Interval can be calculated by using CTMiner, which can effectively avoid the effort on candidate generation and testing for mining temporal patterns. It transforms every interval sequence in database to coincidence format. CTMiner recursively projects the temporal database into a set of smaller projected databases, and grows temporal patterns in each projected database by appending locally frequent slices. Furthermore, CTMiner employs the proposed optimization strategies to reduce the search space and avoids non-promising projection. The performance in both synthetic datasets and real datasets shows that CTMiner outperforms previous algorithms.

F. Mobile commerce behavior predictor

Based on the frequent and infrequent mobile user clusters, possible behaviors of mobile user can be predicted and also Location based services are provided. Location based services can include mobile commerce when taking the form of coupons or advertising directed marketing at customers based on their current location. so that the frequent users will get benefit.

IV. CONCLUSIONS AND FUTURE WORK

Location and time based analysis is applied on a variety of mobile service analysis application. User behavior analysis is carried out using the sequential pattern mining methods. Mobile sequential patterns are identified with temporal and spatial information. Mobile users are clustered based on their transaction where the similar transaction exists. Time Interval can be predicted by using CTMiner algorithm. This can effectively reduce the search space effectively.

Future work is to explore more efficient mobile commerce pattern mining algorithm. Additionally this system can be used for other applications, like object tracking, sensor networks, and plan to achieve high precision in predicting object behaviors.

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BIOGRAPHY



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