International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

IJIEMR Transactions, online available on 3rd Aug 2019. Link :http://www.ijiemr.org/downloads.php?vol=Volume-08&issue=ISSUE-08

Title **DATA MINING USER BEHAVIORS IN MOBILE ENVIRONMENTS**

Volume 08, Issue 08, Pages: 129–136.

Paper Authors

B.PRASAD BABU, AGGALACHIRANJEEVI

Rama Chandra College of Engineering, Eluru,

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

DATA MINING USER BEHAVIORS IN MOBILE ENVIRONMENTS

B.PRASAD BABU[1] AGGALACHIRANJEEVI[2]
[1]Assistant Professor, Department in Computer Science andEngineering, Rama Chandra College of Engineering, Eluru,
[2]Assistant Professor, Department in Computer Science andEngineering, Rama Chandra College of Engineering, Eluru.
[1]prasaddb98@gmail.com [2]aggala.chiranjeevi@gmail.com

Abstract. Mining client practices in portable situations is a developing and imperative theme in information mining fields. Past inquires about have consolidated moving ways and buy exchanges to discover versatile consecutive examples. Be that as it may, these examples can't reflect real benefits of things in exchange databases. In this work, we investigate another issue of mining high utility versatile consecutive examples by coordinating portable information mining with utility mining. To the best of our insight, this is the primary work that joins versatility designs with high utility examples to discover high utility portable consecutive examples, which are portable successive examples with their utilities. Two tree-based strategies are proposed for mining high utility versatile successive examples. A progression of investigations on the execution of the two calculations are led through trial assessments. The outcomes demonstrate that the proposed calculations convey preferred execution over the cutting edge one under different conditions.

Keywords: High utility mobile sequential pattern; utility mining; mobilitypattern mining; mobile environment

1 Introduction

With the quick advancement of media transmission innovations, cell phones and remote applications turn out to be progressively famous. One's present position can be gained by means of a cell phone with GPS benefit. With a progression of clients' moving logs, we can know the moving ways of portable clients. Also, a more prominent number of individuals are utilizing cell phones to buy versatile administrations online by Visas. Joining moving logs and installment records, portable exchange arrangements, which are the groupings of moving ways with exchanges, are gotten. Yun et al. [14] first proposed a structure for finding versatile consecutive examples, i.e., the successive examples with their moving ways in portable exchange arrangement databases. Versatile consecutive examples can be connected in numerous applications, for example, course arranging in portable business condition and keeping up site structures of internet shopping sites.

In any case, in portable consecutive example mining, the significance of things isn't considered. In the system of customary continuous example mining, utility mining [3, 4, 7, 8, 12, 13] is proposed for taking care of this issue. Rather than finding incessant examples, utility mining finds the examples with high utilities, which are called high utility examples. By utility mining, designs with higher significance/benefit/client interests can be found. For example, the continuous examples including iceboxes may not be effortlessly found from the exchange databases of hypermarkets since the recurrence of obtaining coolers is considerably less than that of different things. In any case, on the off chance that we apply utility mining, the high utility examples about coolers might be found since the utilities, i.e., the benefits, of fridges are higher than that of others. Hence, clearly pushing utility mining into the structure of portability design mining is a fundamental subject. In the event that chiefs know which designs are more important, they can pick more fitting activities in light of the valuable data. Considering the utilities of things in clients' incessant obtaining designs and moving ways is pivotal in numerous areas, for example, discovering important examples in portable business situations, metropolitan arranging and keeping up the structure and planning advancements for web based shopping sites.

In perspective of the above issues, we go for incorporating portability design mining with utility mining to discover high utility versatile consecutive examples in this examination. The proposed design must be high utility as well as incessant. At the end of the day, it is made out of both high utility buying design and regular moving way. This is on the grounds that applying just utility mining to the versatile situations is lacking. A moving way with high utility however low recurrence is eccentric. Clients might be mistaken for some of these repetitive examples. By this thought, the proposed design is more valuable than the examples that apply just utility mining or incessant example mining to the portable situations.

In this paper, we propose two tree-based techniques, specifically UMSPDFG (mining high Utility Mobile Sequential Patterns with a tree-based Depth First Generation procedure) and UMSPBFG (mining high Utility Mobile Sequential Patterns with a tree-based Breadth First Generation system). The fundamental distinction of the two calculations is the strategy for producing the length 2 designs amid the mining procedure, which is the bottleneck of example mining. Both of the calculations utilize a tree structure MTS-Tree (Mobile Transaction Sequence Tree) to abridge the data about areas, things, ways and utilities in versatile exchange databases. To the best of our insight, this is the main work that investigates the coordination of versatility design mining and utility mining. The test comes about demonstrate that UMSPBFG has preferred execution over UMSPDFG. Also, the execution of the two proposed tree-based techniques outflanks the looked at level-wise calculation which is enhanced by the condition of-theart portable consecutive example calculation [14].

2 Related Work

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

Broad investigations have been proposed for finding incessant examples in exchange databases [1, 2, 5, 10]. Visit itemset mining [1, 5] is the most prominent subject among them. Apriori [1] is the pioneer for mining continuous itemsets from exchange databases by a level-wise competitor age and-test strategy. Tree-based continuous itemset mining calculations, for example, FP-Growth [5] were proposed a short time later. FP-Growth enhances the proficiency of incessant itemset mining since it doesn't need to create applicant itemsets amid the mining procedure and it just outputs the database twice.

A short time later, successive example mining [2, 10] is proposed for discovering client practices in exchange databases. As an expansion strategy for Apriori, AprioriAll [2] likewise utilize a level-wise system to discover consecutive examples. Actually, PrefixSpan [10] finds successive examples straightforwardly from anticipated databases without producing any hopeful example. Therefore, the execution can be more moved forward.

Mining client practices in versatile conditions [6, 9, 11, 14] is a rising subject in the successive example mining field. SMAP-Mine [11] was first proposed for discovering clients' versatile access designs. Be that as it may, in various eras, clients' well known administrations might be very surprising. Along these lines, T-Map calculation [6] was proposed to discover transient portable access designs in various time interims. Despite the fact that clients' versatile access designs are imperative, their moving ways are likewise fundamental. In this manner, Yun et al. [14] proposed a system which joins moving ways and successive examples to discover versatile consecutive examples. Besides, Lu et al. [9] proposed a structure for finding group based versatile successive examples. The clients whose moving ways and exchanges are comparative will be gathered into similar bunches. By this structure, the found examples might be nearer to the client practices, all things considered. In the above explores, the benefits of things are not considered yet. In exchange databases, things have diverse benefits. Utility mining [3, 4, 7, 8, 12, 13] is proposed to overcome this issue. Among these examines, Liu et al. [8] proposed Two-Phase calculation which uses the exchange weighted descending conclusion property to keep up the descending conclusion property in the procedures of utility mining. Then again, Ahmed et al. [3] utilized a tree structure, named IHUP-Tree, to keep up fundamental data about utility mining. Not quite the same as Two-Phase, it abstains from filtering database different circumstances and producing hopeful examples. In spite of the fact that IHUPTree accomplishes a superior execution than Two-Phase, despite everything it delivers an excessive number of high exchange weighted usage itemsets. In this manner, Tseng et al. proposed UP-Growth [12], which applies four techniques for diminishing the assessed utilities amid the mining forms. By these methodologies, the quantity of conceivable high utility itemsets is adequately lessened and the

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

execution of utility mining is additionally made strides.

By the above writing surveys, in spite of the fact that there are numerous explores about portability design mining and utility mining, there is no exploration about the mix of the two points. This paper is the main work which incorporates the two subjects to discover high utility examples with visit moving ways in versatile conditions.

3 Problem Definition

In this area, we characterize fundamental documentations for mining high utility versatile successive examples in portable conditions in detail.

Table 1. Mobile transaction sequence database *DB*

SID	Mobile transaction sequence	SU
S_1	<(A; {[i_1, 2]}), (B; null), (C; {[i_2, 1]}), (D; {[i_4, 1]}), (E; null), (F; {[i_5, 2]})>	54
S_2	<(A; {[i_1, 3]}), (B; null), (C; {[i_2, 2], [i_3, 5]}), (K; null), (E; {[i_6, 10]}), (F; {[i_5, 4]}), (G; {[i_8, 2]}), (L; null), (H; {[i_7, 2]})>	132
S_3	<(A; {[i_1, 3]}), (B; null), (C; {[i_2, 1], [i_3, 5]}), (D; {[i_4, 2]}), (E; null), (F; {[i_5, 1], [i_6, 2]}), (G; null), (H; {[i_7, 1]})>	72
S_4	<(A; {[i_1, 1]}), (W; null), (C; {[i_3, 10]}), (E; null), (F; {[i_5, 1]}), (G; {[i_8, 2]}), (L; null), (H; {[i_7, 1]}), (E; {[i_9, 1]})>	59
S_5	<(A; {[i_1, 4]}), (B; null), (C; {[i_3, 10]}), (D; {[i_4, 1]}), (E; null), (F; {[i_5, 1]}), (G; null), (H; {[i_7, 2]})>	73
S_6	<(C; {[i_2, 2]}), (D; null), (E; {[i_9, 1]}), (F; {[i_5, 1]})>	31

Table 2. Utility table

Item	i_1	i_2	i_3	i_4	i_5	i_6	i_7	i_8	i_9
Utility	1	5	3	11	18	2	5	1	3

Problem Statement. Given a portable exchange succession database, a pre-characterized utility table, a base utility edge and a base help limit, the issue of mining high utility versatile consecutive examples from the versatile exchange grouping database is to find all high utility portable successive examples whose backings and utilities are bigger than or equivalent to the two edges in this database.

4 Proposed Methods

4.1 Algorithm UMSPDFG

The work process of the proposed calculation UMSPDFG (high Utility Mobile Sequential Pattern mining with a tree-based Depth First Generation system) is appeared in Figure 1. In stage 1, WULIs and a mapping table are created. At that point a MTS-Tree (Mobile Transaction Sequence Tree) is built in stage 2. In stage 3, WUMSPs are created by mining the MTS-Tree with the profundity original procedure. At long last in stage 4, UMSPs are produced by checking the real utility of WUMSPs. In this area, we depict the development of MTS-tree first and after that address the age of WUMSP. We first address the way toward producing WULIs by a case. Take the versatile exchange succession database in Table 1 and the utility table in Table 2 for instance. Accept the base help limit is 2 and the base utility edge is 100. In the initial step, WULIs whose backings and SWUs are bigger than or equivalent to the two edges are produced by the procedures like [8]. For this situation, eight WULIs appeared in Table 3 are created. Note that they are likewise 1-WULPs. At that point the 1-WULPs are mapped consecutively into a mapping table as appeared in Table 3.

4.1.1 The construction of MTS-Tree

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

The methodology of MTS-Tree development are appeared in Figure 2. The development of MTS-Tree is finished after one sweep of the first database. Without loss of simplification, we give a formal definition for MTS-Tree first.

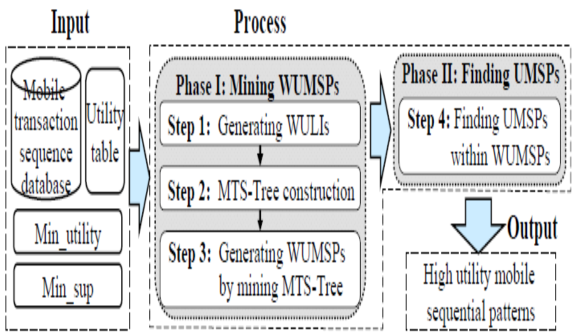

Fig. 1. The framework of the proposed algorithm UMSPDFG.

4.1.2 Generating WUMSPs from MTS-Tree

In the wake of developing MTS-Tree, now we demonstrate the stage 3 of UMSPDFG. The motivation behind this progression is creating WUMSPs from MTS-Tree by the profundity original system. The strategies are appeared in Figure 4. To start with, WULPs and their restrictive MTS-Trees are produced by following the connections of the passages in the header table of the MTS-Tree. At that point the WULPs are embedded into a WUMSP-Tree (high grouping Weighted Utilization Mobile Sequential Pattern Tree), which is utilized for putting away the WUMSPs. At that point the ways of the WULPs in the WUMSP-Tree are followed in the first MTSTree and the WUMSPs are produced.

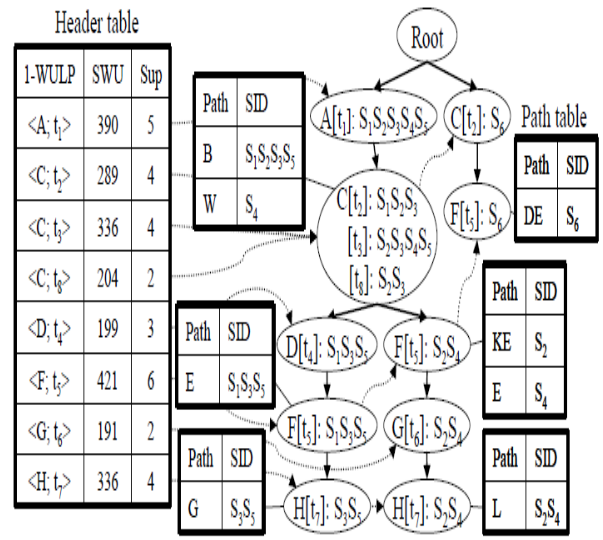

Fig. 3. An Example of MTS-Tree.

4.1.3 Finding high utility mobile sequential patterns

After generating all WUMSPs, an additional database scan will be performed to findUMSPs from the set of WUMSPs. The WUMSPs whose utilities are larger than orequal to the minimum utility threshold will be regarded as UMSPs. Moreover, sincethe WUMSPs in WUMSP-Tree include SIDs, instead of checking all mobiletransaction sequences, they will just check the specified sequences. By applying thisprocess, the mining performance will become better.

4.2 An Improved Tree-based Method: UMSPBFG

In UMSPDFG, since the quantity of blends of 2-WULPs is very huge, numerous restrictive MTS-Trees will be produced. Managing these restrictive MTS-Trees is a diligent work in the mining forms. Besides, following the ways of WULPs in the procedures of creating WUMSPs likewise expends much time. On the off chance that we can diminish the quantity of WULPs requiring confirmation, particularly the expansive number of 2-WULPs, the execution can be more made strides. Subsequently, how to accelerate the procedures around 2-WUMSPs is an essential issue. To overcome this issue, we propose an enhanced tree-based calculation UMSPBFG (high Utility Mobile Sequential Pattern mining with a tree-based Breadth First Generation system). The contrast between the two calculations is that UMSPBFG utilize an expansiveness original system for creating 2-WUMSPs. Inside the procedure, a conceivable succeeding hub checking method is connected. By this method, the span of the restrictive MTS-Trees will be littler, and the 2-moving examples which can't be 2-WUMSPs will be pruned ahead of time. Rather than creating a 2-WULP by consolidating the last passage with the 1-WULP of a restrictive MTS-Tree, in the expansiveness original system, 2-WULPs are produced by joining every one of the 1-WULPs in the header table with the 1-WULP of the contingent MTS-Tree. Subsequent to creating the 2-WULPs, their ways, backings and SWUs are checked ahead of time. The legitimate ways will be put away in the relating hubs of WUMSP-Tree. While creating 2-WULPs, UMSPBFG applies a conceivable succeeding hub checking procedure for pruning pointless 2-WULPs, which is tended to as takes after.

IV. RESULTS AND DISCUSSION

This section deals with the cluster based results in each stage and how mining is performed in each stagefor online shopping application dataset. Initially clusters are formed based on location, then mining is donebased on service feature and finally results are produced based on given service request by the user. Once theuser purchases the product then count will be automatically updated. The results generated from segmentation ofGA are given in Fig. 4.

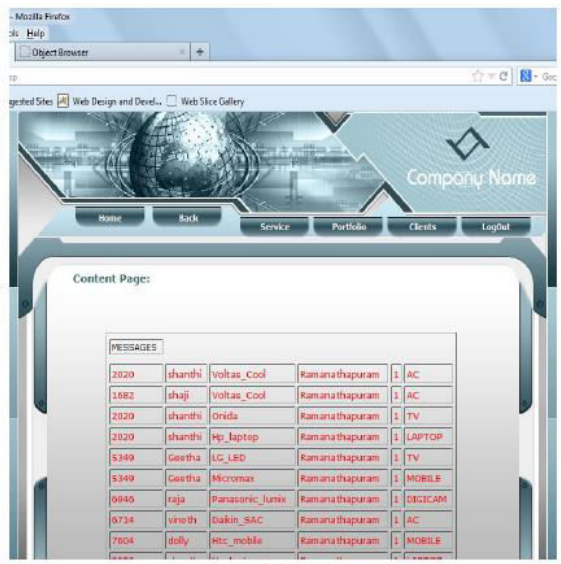

Fig 4: Mining Result based on Location

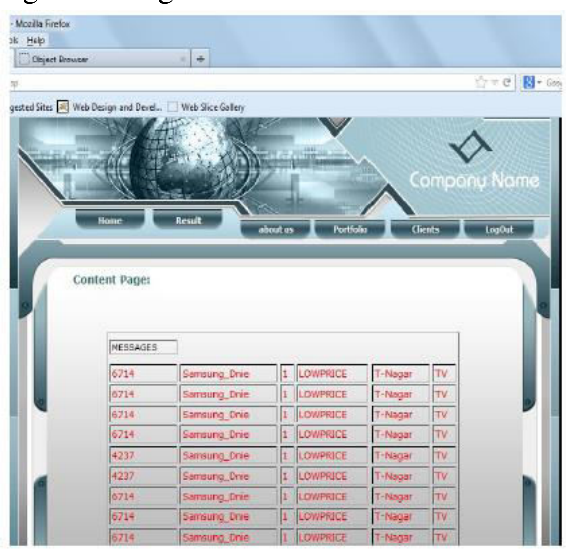

Fig 5: Mining Result based on Product

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

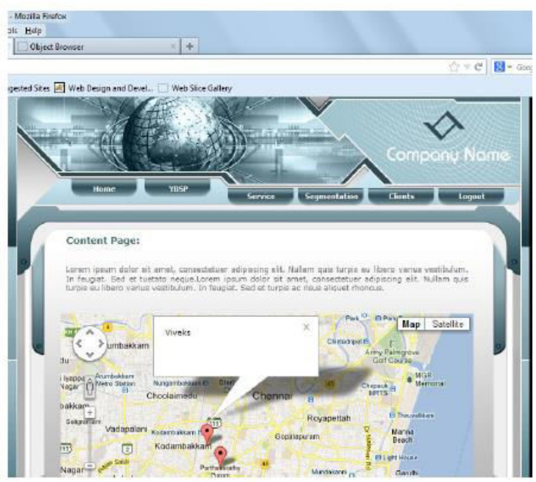

Fig 6: Nearest Shop Information

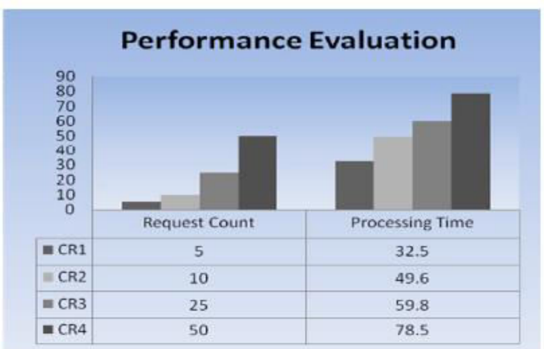

Fig 7: Performance Evaluation based on request count

Conclusions

In this examination, we proposed a novel information mining issue about mining high utility versatile consecutive examples in portable business situations. This paper is the main research work about the blend of versatility design mining and utility mining. Two calculations created by various techniques, i.e., profundity original and broadness original, are proposed for productively mining high utility versatile consecutive examples. The exploratory outcomes demonstrate that the proposed calculations beat the cutting edge portable successive example calculation. For future work, extra analyses under more states of portable business conditions will be directed for additionally assessing the calculations. Also, new calculations which enhance the mining execution will be planned.

References

1. R. Agrawal and R. Srikant, “Fast Algorithms for Mining Association Rules,” Proc. of the20th Int'l. Conf. on Very Large Data Bases, pp. 487-499, 1994.

2. R. Agrawal and R. Srikant, “Mining Sequential Patterns,” Proc. of 11th Int'l. Conf. on DataMining, pp. 3-14, 1995.

3. C. F. Ahmed, S. K. Tanbeer, B.-S. Jeong, Y.-K. Lee, “Efficient Tree Structures for HighUtility Pattern Mining in Incremental Databases,” IEEE Trans. on Knowledge and DataEngineering, vol. 21, issue 12, pp. 1708-1721, 2009.

4. R. Chan, Q. Yang, and Y. Shen, “Mining High Utility Itemsets,” Proc. of Third IEEE Int'lConf. on Data Mining, pp. 19-26, Nov., 2003.

5. J. Han, J. Pei, and Y. Yin, “Mining Frequent Patterns without Candidate Generation,” Proc.of the ACM-SIGMOD International Conference on Management of Data, pp. 1-12, 2000.

6. S. C. Lee, J. Paik, J. Ok, I. Song and U. M. Kim, “Efficient Mining of User Behaviors byTemporal Mobile Access Patterns,” Int'l. Journal of Computer Science Security, vol. 7, no.2, pp. 285-291, 2007.

7. Y.-C. Li, J.-S. Yeh, and C.-C. Chang, “Isolated Items Discarding Strategy for DiscoveringHigh Utility Itemsets,” Data &

Knowledge Engineering, vol.64, issue 1, pp.198-217, 2008.

8. Y. Liu, W.-K. Liao and A. Choudhary, "A Fast High Utility Itemsets Mining Algorithm,"Proc. of Utility-Based Data Mining, 2005.

9. E. H.-C. Lu, and V. S. Tseng, "Mining Cluster-based Mobile Sequential Patterns inLocation-based Service Environments," Proc. of IEEE Int'l. Conf. on Mobile DataManagement, 2009.

10. J. Pei, J. Han, B. Mortazavi-Asl, H. Pinto, Q. Chen, U. Dayal, M. C. Hsu, "MiningSequential Patterns by Pattern-Growth: The PrefixSpan Approach," IEEE Transactions onKnowledge and Data Engineering, vol. 16, no. 10, Oct. 2004.

11. V. S. Tseng and W. C. Lin, "Mining Sequential Mobile Access Patterns Efficiently inMobile Web Systems," Proc. of the 19th Int'l. Conf. on Advanced Information Networkingand Applications, pp. 867-871, Taipei, Taiwan, 2005.

12. V. S. Tseng, C. W. Wu, B.-E. Shie, and P. S. Yu, "UP-Growth: An Efficient Algorithm forHigh Utility Itemsets Mining," Proc. of the 16th ACM SIGKDD Conference on KnowledgeDiscovery and Data Mining (KDD 2010), Washington, DC, USA, Jul. 2010.

13. S.-J. Yen and Y.-S. Lee, "Mining High Utility Quantitative Association Rules," Proc. of 9thInt'l Conf. on Data Warehousing and Knowledge Discovery, Lecture Notes in ComputerScience 4654, pp. 283-292, Sep. 2007.

14. C.-H. Yun and M.-S. Chen, "Mining Mobile Sequential Patterns in a Mobile CommerceEnvironment," IEEE Transactions on Systems, Man, and Cybernetics-Part C: Applicationsand Reviews, vol. 37, no. 2, 2007.

B.PrasadBabu 1, Assistant Professor, Department in Computer Science and Engineering, Rama Chandra College of Engineering, Eluru.
prasaddb98@gmail.com

AggalaChiranjeevi2 , Assistant Professor, Department in Computer Science and Engineering, Rama Chandra College of Engineering, Eluru.
aggala.chiranjeevi@gmail.com