International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 6 Issue: 4 204 - 206

Designing Combo Recharge Plans for Telecom Subscribers Using Itemset Mining Technique

Shrutik Patil, Ramchandra Karad, Mukesh Dhadse, Vaibhav Jawanjal, Pratvina Talele
Department of Information Technology,
MAEER's MIT College of Engineering,
Pune, Maharashtra, India.
e-mail: shrutik.v.patil@gmail.com

***Abstract*—** Now a days Machine Learning has become an integral part of human research. People are tending to select more automatic system rather than going with the manual handling. Data mining has the huge effect on business analysis as all business relies on their behaviour of customers. Mining the behaviour of customers can help the very existence of the company. This paper has proposed the way to satisfy customers in telecommunication market by knowing the customer's recharge pattern. It can enhance their will to use the same service provider. By mining the recharge pattern of individual customer, this system will help telecom service providers to prepare combo plans, which will indeed be less than the individual recharges. For mining such kind of data, we are using FP Growth algorithm, it allows frequent item set discovery without candidate item set generation. FP Growth is two step approach, first it builds a compact data structure called the FP-tree and then Extracts frequent item sets directly from the FP-tree.

Keywords- *customer retention, prepaid churn, FP Growth algorithm, association rule Mining, frequent item set.*

*****

I. INTRODUCTION

Now a days, telecom markets are facing huge competition when it comes to customer satisfaction. People are tending to change their service provider due to the dissatisfaction they feel. Loss of customer from their service provider is known as churn. Because of the competitive environment, churn rate is increasing day by day. Several companies are competing for customers, making it easy for people to transfer from one provider to another. Due to that it becomes very easy for the customers to switch from one service provider to another service provider. Root cause of increased churn rate is the offers provided by the service providers that match customers' requirements. Most of the customers switch service provider due to good promotional offers and lower monthly cost provided by other service providers. Even prepaid customers are not bind by any contract to the service providers so prepaid customers can easy discontinue the service and can switch to another service provider. With growing pressure from competitors and government mandates improving retention rates of profitable customers has become an increasingly urgent to telecom service providers. Indian customers are mostly prepaid customers, so there is always a very high chance of attrition. We see that churn reduction has become a survival strategy for the telecom service providers. The churn rates are constantly on the rise, mostly due to increasing competition and elimination of switching costs. In this Paper, we are going to focus on offering combo plans to minimize the customer dissatisfaction to reduce churn rate. Goal of this study is to identify such recharge combo offers that will bundle all important services (like talk value, data, SMS, Value Added Services (VAS) etc.) in such a way to make most of the customers happy (with the offer) as well as maximize revenue per user from all services.

II. BACKGROUND

Most of the work on customer retention focuses on churner prediction and offering some kind of promotional offerings and/or targeted marketing towards those probable churner customers so that they stay with the service provider. Authors in [1] uses CDR and analyses call volume, call frequency, calling time etc. to group customers and to identify potential churners and proposes targeted promotional offerings to retain them. Authors in [2] developed a Usage Risk and Usage Opportunity (UR/UO) model to capture all customer usage related behavior and applied that model on prepaid customer data to categorize them into different groups such as grower, decliner, flat, stopper, new user etc. They use this knowledge for the telecom service provider to leverage the opportunities to enhance revenue and mitigate the usage risk.

A different approach is based on social network analysis of the customer relationships with other customers. This model analyzes the features or attributes of the links or social ties among customers and uses the result obtained to predict churn. This model expects that all those customers connected by strong links will exhibit similar behavioral pattern, that is, if one of them churns then others will likely to follow [3]. In a recent study [4] researchers investigated the time-to-churn prediction.

A single customer normally makes more than one recharge for different recharge-types. Our aim is to identify those set of recharge types that are done very frequently and by a great percentage of customers within a fixed time period (may be for a month).

Our work mainly focuses on providing recharge offers in a way that fulfill the requirements of the customers As in India and other developing economies most of the telecom customers are highly price sensitive and always look for value-for-money, so we try to model proper recharge combos that will give them more value at lower price and at the same time make sure to preserve average revenue per user (ARPU) with growing customer base.

III. METHODS AND EQUATION

Data Preprocessing

We adapt the association rule mining using FP Growth algorithm [5]. We used this for mining association rules in a dataset.
Input: Properly transformed and aggregated historical Recharge data of telecom subscribers (of some telecom circle).
Output: Combo Plan.

The FP Growth Algorithm

Any association rule mining process consists of below two sub-processes:
1. In the initial stage finding itemsets with their support value.
2. Then Derive associate on rules from the itemsets in the earlier stage.

To perform above sub-processes FP growth Algorithm is used.

Input: **A transaction database DB and a minimum support threshold.**

Output: **FP-tree, the frequent-pattern tree of DB.**

Method: The FP-tree is constructed as follows:

1. Scan the transaction database DB once. Collect F, the set of frequent items, and the support of each frequent item. Sort F in support-descending order as FList, the list of frequent items.
2. Create the root of an FP-tree, T, and label it as "null". For each transaction Trans in DB do the following:

- Select the frequent items in Trans and sort them according to the order of FList. Let the sorted frequent-item list in Trans be [p | P], where p is the first element and P is the remaining list. Call insert tree([p | P], T).
- The function insert tree([p | P], T) is performed as follows. If T has a child N such that N.item-name = p.item-name, then increment N 's count by 1; else create a new node N , with its count initialized to 1, its parent link linked to T , and its node-link linked to the nodes with the same item-name via the node-link structure. If P is nonempty, call insert tree(P, N) recursively.

By using this algorithm, the FP-tree is constructed in two scans of the database. The first scan collects and sort the set of frequent items, and the second constructs the FP-Tree. In our project we have created database and it is named as comborecharge and stored previous recharge history of mobile users in rechargehistory table. rechargehistory table contains transation_id, RechargeType and recharge_Amount. We have to mine the frequent items on the rechargehistory to find the frequent recharge types of the users and offer them best combo plan. We have used FP growth algorithm for frequent item set mining.

Example of FP tree construction

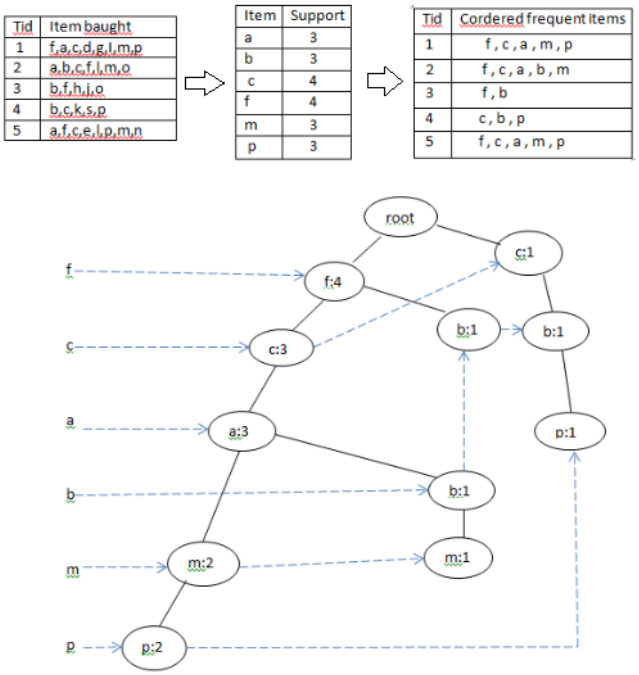


Figure 1: FP Growth Algorithm

FP Growth algorithm refers Transation_id and recharge_amount to finds the frequent set. Here we have assigned minimum support 3. So to mine the recharge amount it considers the values which has support 3 or more than three and generates the pattern. Then it compare the generated pattern with the values of recharge_Amount column to generates the final patterns. Then it sort the patterns in descending order i.e first it sorts the set of frequent items, and the second constructs the FP-Tree.

Eg. Recharge History of the user

Transation-id	Recharge Type	Amount
1	Talktime	30
2	Data	50
3	Talktime	20
4	Talktime	30
6	Data	50
7	Talktime	10
8	Data	10
9	Data	20
10	Talktime	30
11	SMS	10
12	Data	50
13	Data	50

Table 1: Recharge History of the user

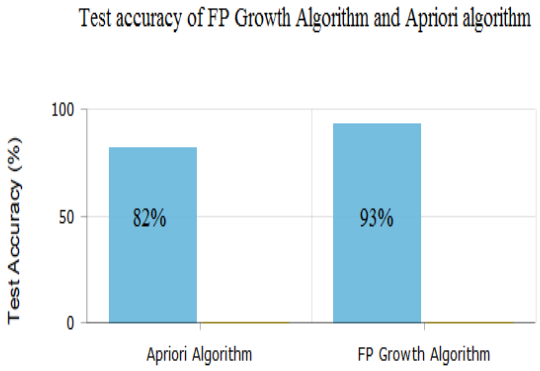
Here we have considered mean support as 3. On the basis of min support, FP growth algorithm find the support of each recharge amount and generate the series of values those have min support 3 or more than three .it generate the ordered list of values and constructs the FP-Tree. After mining above table

FP Growth algorithm will generate the following combo plan. To offer combo plan it will not consider the SMS because it is min support is less than 3. Talk-Time 30 Data - 50

PROPOSED SYSTEM

Many people have done research on different ways to predict churn. Most of the existing work is based on post-paid customers where lot more information is available about the customer and comparatively easy to predict churn. Some work on prepaid churn has been done with the help of call detail record analysis. Therefore This study focus to minimize the customers dissatisfaction by identifying such recharge combo offers that will bundle all important services (like talk value, data, SMS, Value Added Services (VAS) etc.) in such a way to make most of the customers happy (with the offer) as well as maximize revenue per user from all services.

Existing theory proposes to predict the customers who are likely to switch the service provider. This study focus on how to minimize the customer dissatisfaction, earn new customers and satisfying the existing ones to stay with them to reduce churn rate, to do that we used FP Growth algorithm to find the frequently done recharge type with values to offer a combo Plan to the Customers.



IV. FIGURE

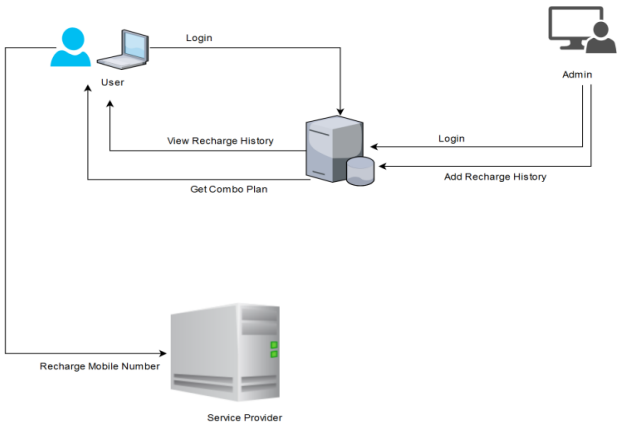


Figure 2 : System Framework

V. CONCLUSION

This paper has proposed FP Growth algorithm to provide combo offers that will bundle all important services (like talk value, data, SMS, Value Added Services (VAS) etc.) in such a way to make most of the customers happy and (with the offer) as well as maximize the customers dissatisfaction and reduce churn rate.

VI. FUTURE WORK

Future work will include: A customer may recharge same type of recharge multiple times in a month so aggregating them for the whole month needs to be done. Some of the existing recharge plans may have different validity period so proper modeling needs to be done to accommodate it before considering them for monthly analysis.

REFERENCES

[1] Owczarczuk, Marcin. "Churn models for prepaid customers in the cellulartelecommunication industry using large data marts." Expert Systems withApplications 37, no. 6 (2010): 4710-4712.

[2] Backiel, Aimée, Bart Baesens, and Gerda Claeskens. "Mining telecommunication networks to enhance customer lifetime predictions." In International Conference on Artificial Intelligence and Soft Computing, pp. 15-26. Springer International Publishing, 2014.

[3] Dairo, Adeolu O. "Customer base management in a prepaid mobile market: Usage risk and usage opportunity model." African Journal of Marketing Management 7, no. 3 (2015): 42-51.

[4] Backiel, Aimée, Bart Baesens, and Gerda Claeskens. "Predicting time-to churn of prepaid mobile telephone customers using social network analysis." Journal of the Operational Research Society (2016).

[5] Christian Borgelt. "An Implementation of the FP-growth Algorithm." Department of Knowledge Processing and Language Engineering School of Computer Science, Otto-von-Guericke-University of Magdeburg Universitatsplatz 2, 39106 Magdeburg.