DA-RFR Model for Measuring Prospective Customer Value

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ABSTRACT*:* Data analysis has grown by leaps and bounds. Large – scale companies have billions of megabytes of data storage. Analysing this historical data to gain customer satisfaction, to promote decision-making process, to identify prospective customers and various other data analysis like profit, investment, gave rise to data warehouse concept. In RFM model, neglection of past and infrequent customers is a major hindrance for companies and applications in today's world. Such customers are to be nurtured. This paper suggests implementing a new model for measuring past customer's prospective value. This model consists of three factors- recency, frequency and regularity. It introduces a new parameter called regularity in the traditional RFM analysis model. Regularity is now and then is indicative of customer loyalty. This 3-D model helps in classification and targeting of prospective customers for lucrative offers and discounts by companies. It also solves one of the data analysis challenges of targeting customers who are inactive yet have potential customer value due to their past regular interactions.

KEYWORDS: RFM model, Customer loyalty, frequency, recency.

I. INTRODUCTION

Facing with more complexity and competition in today's business, firms need to develop innovation activities to capture customer needs and improve customer satisfaction and retention [1, 2]. Bhatnaga and Ghose (2004) provide a new transaction model based on service and customer satisfaction and showed that price is not the only measure that affects customer purchasing decisions, but also it is important that customer and company agree on product value and good customer services [3]. The main objective of CRM is to make long-lasting and profitable relationships with customers [2, 6].

On the other hand, the goal of most companies is profitability growth. In order to reach this goal, companies should provide an analysis of how to manage relationship with their customers and offer appropriate corresponding marketing strategies [5]. Current methods of customer value analysis based on past customer behaviour patterns or demographic variables, are limited for predicting future customer behaviour [5].

II. RELATED WORK

A. RFM analysis:

Nowadays, RFM method is the most primitive methods for segmenting and calculating customer value in the company. RFM model is identified for discovering customer value of direct sales [7, 8]. The most important characteristic of RFM is simplicity and speed of its implementation [9, 10]. This method use three variables to extract the behavioural characteristics of customers and segment customers based on three variables: Recency, Frequency and Monetary [4]. This model identifies customer behavior and represents customer behavior characteristics by three variables:

- Recency of the last purchase which refers to the interval between latest customer purchase and time analysis of customer data.
- Frequency of the purchases refers to the number of interactions in a particular time period.
- Monetary value of the purchase which refers to money amount spent in a particular period.

III.   PROPOSED DA-RFR MODEL ANALYSIS

A.   RFR (Recency-Frequency-Regularity):

Ranking and classifying persons according to frequency can be easily done. But main challenge lies in identifying persons who are less frequent yet are prospective customers to target. This gave rise to regularity parameter. The main principle behind this parameter is:

A person who has consecutively or periodically visited the company and made interactions is highly likely to visit again or was one with high customer value at some point.

A person who regularly interacted but stopped his transactions for some period of time because of following reasons:

- Trust issues.
- Less offers (gets more offers from other competitive markets).
- Unavailability of desired product.

Company should utilise its resources to enhance customer satisfaction and give lucrative offers to such customers because at some time they were quite valuable and frequent customers.

Our prospective customer value depends on three main factors:

1. Inversely proportional to frequency

P.C.V α 1/f

Such customers are identified as less frequent. As we need a classification of less frequent people, lesser the frequency, more appropriately they fall in this category.

Exception: If the frequency of customer is less than 20% of total days, then such customers should be ranked last as they are not potential customers even though their recency and frequency are less.

2. Inversely proportional to recency

P.C.V α 1/rec

Such customers have gone inactive and not made recent interactions. As we need a classification of less recent people, lesser the recency, more the customer appropriately fits in the classification.

3. Directly proportional to regularity

P.C.V α reg

P.C.V's most important parameter is its regularity. The company remains more assured of customer's future interaction if he was more regular.

According to the length of time period, 0-N (consecutive), 1-N (1-day gap), 2-N...patterns are defined for regularity.

B.   Formula for prospective customer value (P.C.V):

P.C.V=K*1/f*1/rec*reg

As we use these parameters only for ranking and comparing purpose, K=1.

P.C.V=1/f*1/rec*reg

IV.   CASE STUDY

A.   Problem Statement:

For a Case Study, We are taking over 10 customers and analysing their pattern of interactions for a period of 2 weeks. In this example we assume any number of interactions as one interaction. The primary reason behind this assumption is that we are not taking into account the monetary parameter for our analysis. Different patterns of interactions have been shown here. A ranking based approach is used and values are assigned according to their proportionality.

1.The most recent interaction starting from the last day is given the highest value from the range 0-1.

2. Regularity is taken as 0-N and 1-N in this example. All the consecutive or 1-day gap interactions after the recent interaction are taken as regular values. The default value of regularity is 1.

The tick mark sign indicates interaction of customer with company.

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Customer ID\Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14
11	√	√	√	√	√	√	√	√	√	√	√	√	√	√
12		√		√	√	√	√							√
13	√		√		√		√		√		√		√	
14	√	√										√		√
15	√													
16				√	√	√				√	√	√		
17		√	√	√	√	√								
18			√	√		√	√		√	√		√	√	
19		√	√	√		√								
20	√	√	√	√	√	√							√	

Table 1: Analysis Table

The above Table 1 shows a case study of 10 customers and their pattern of interactions for a period of 14 days.

B. Approach:

A Rank based approach is implemented to ensure consistency among all three parameters. The steps are as follows:

Step 1: Sort the recency and frequency in ascending order and regularity in descending order. The reason is their proportionality to P.C.V.

Step 2: Assign ranks according to their values. Example: Customer Id "11" will have the lower rank=6 with highest frequency.

Step 3: Compute normalised rank values for all customers to ensure consistency. Example: Recency has rank between 1 and 4. So lowest Rank gets 1.25 value and highest rank gets 10 value.
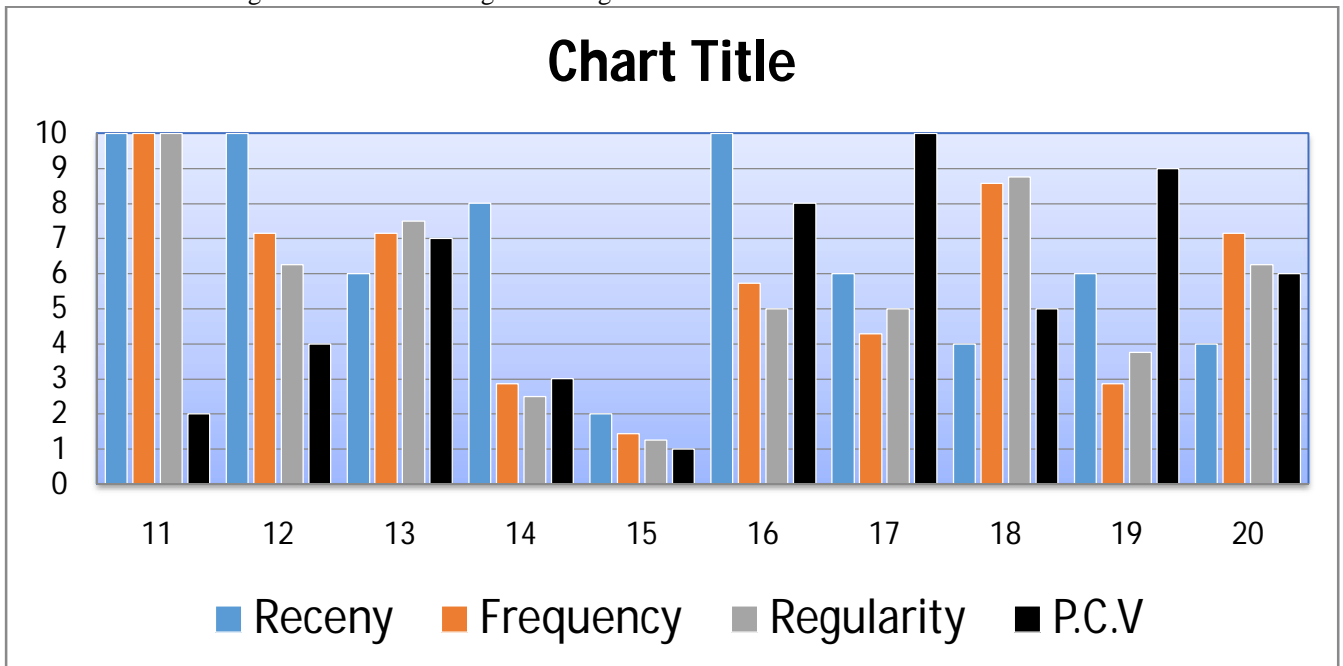

Figure 1: Graph depicting rank based values

The above Figure 1 depicts the rank based values in the form of graphs for case study in Table 1.

C.   Explanation:

The top five prospective customers are 13, 16,17,19,20 as highlighted. If we observe their patterns, their regularity is good, they have not made recent interactions and have less frequency. So the persons with good or decent past history have the highest prospective value and thus fall appropriately in our classification. There is also an exception of customer 15 who even though have less frequency and recency has the lowest value, as its frequency is less than 20% of total interactions, so resources should not be wasted on such customers. Customer 11 even though he has good frequency and recency has lower value because company already takes care of him based on RFM analysis and is not needed in this classification.

V.   SIMULATION RESULTS
VI.

A dataset of 1000 customers were created along with their random interactions/transactions over 365 days. The Experiment is implemented with the help of JAVA programming and postgres SQL. The results are shown using 100% stacked columns. There are four patterns of parameters namely Regularity, Recency, Frequency and Prospective Customer Value of 1000 customers. We took 15-N pattern of regularity.

Figure 2: Graph depicting Analysis of Case Study

The above Figure 2 depicts the analysis of case study. It shows the variation of prospective customer value based on the three parameters namely Regularity, Recency and Frequency.

A detailed study of figure 2 shows the following:
1. The P.C.V is more when recency and frequency are less
2. The P.C.V is comparatively more when regularity is more.
3. Recency is comparatively more than other parameters because value is assigned based on its recent   transaction (example: highest value 1 is assigned to the most recent transaction from 365th day and various normalised values to others).

VII.   FUTURE WORK

RFM analysis is the most used and primitive model for measuring customer loyalty value based on frequency, recency and monetary parameters.

There are various more parameters to strengthen the customer segmentation and calculation of their true value or loyalty:

1. The customer reviews ratings for company's products and complaints matters a lot and should be included in the customer loyalty analysis.

2. Social media has grown by leaps and bounds in today's world. The impact of company's products on customers via social media should be taken into consideration.

3. Humanising the customer service experience is a major step in enhancing customer retention loyalty. The feedback received from a customer through human interface should be of prime importance in the analysis.

Inclusion of all the above parameters in calculation of customer value and segmentation is precisely our future work.

VIII.   CONCLUSION

The major purpose behind this paper is customer segmentation and measuring their value based on past history. The major two disadvantages of RFM analysis are continually targeting high RFM-scoring customers who are frequent and recent which may annoy or alienate them. The other disadvantage is neglecting lower scoring or less recent customer who should be nurtured to increase market share. Regularity is introduced as an important parameter to measure loyalty or prospective customer value. This may also increase company's reputation as the one which does not forget its past loyal customers. The DA-RFR model is intended to complement the traditional RFM model and not replace it. It appropriately targets past and infrequent but regular customers.

REFERENCES

[1] H.M. Chuang and C.C. Shen, A study on the application of data mining techniques to enhance customer lifetime value based on the department store industry, *the seventh international conference on machine learning and cybernetics*, PP.168-173.

[2] M. Khajvand, K. Zolfaghar, S. Ashoori, S. Alizadeh."Estimating customer lifetime value based on RFM analysis of customer purchase behavior: case study,) 2011) *Procedia Computer Science,* Vol.3, pp.57–63.

[3] A. Bhatnagar, and S. Ghose, A latent class segmentation analysis of e-shoppers, (2004). *Journal of Business Research*, Vol.57 (7), pp.758–767.

[4] C. H.Cheng, & Y. S. Chen, Classifying the segmentation of customer value via RFM model and RS theory, (2009), *Expert Systems with Applications*, Vol.36(3), pp.4176–4184

[5] Raziehqiasi*1, Malihe baqeri-Dehnavi2, Behrooz Minaei-Bidgoli3, Golriz Amooee4, Developing a model for measuring customer's loyalty and value with RFM technique and clustering algorithms *The Journal of Mathematics and Computer Science Vol. 4 No.2 (2012) 172 – 181.*

[6] V. Ravi, *Advances in Banking Technology and Management: Impacts of ICT and CRM*, (2008), Information science reference, Hershey, New York, Yurchak Printing Inc.

[7] M. L. Roberts, Expanding the role of the direct marketing database, (1992), *Journal of Direct Marketing*, Vol.6 (2), pp.51–60.

[8] W.Y. Chiang, To mine association rules of customer values via a data mining procedure with improved model: An empirical case study, (2011) *Expert Systems with Applications*, Vol.38, pp.1716–1722.

[9] J.A. McCarty, M. Hastak. Segmentation approaches in data-mining: A comparison of RFM, CHAID, and logistic regression, (2007), *Journal of Business Research,* Vol.60, pp. 656–662.

[10] R. Kahan, Using database marketing techniques to enhance your one-to-one marketing initiatives, (1998), *Journal of Consumer Marketing*, Vol.15 , pp.491–493.

BIOGRAPHY

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