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Customers Clustering Based on RFM Model by Using Fuzzy C-means Algorithm
(Case Study: Zahedan City Refah Chain Store)

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Abstract

One of the major challenges of customer-centric organizations is the recognition of customers, the distinction between different groups of customers and their ranking. Clustering is one of the data mining techniques used to group customers into their various characteristics. The main purpose of the research is to customer clustering based on the Recency, Frequency and Monetary indicators using the fuzzy c-means algorithm. The study was conducted on 76379 registered transactions from customers of Zahedan City Refah Chain Store. The results of this research provide a framework for developing customer relationship management programs for each customer group.

Introduction

Today, the importance of customer relationship management is not hidden from anyone and all service and product companies are trying to understand more of their customers. Understanding the various groups of customers and building effective relationships with them in a way that guarantees the economic benefits of companies in the future is an important issue in today's businesses. Maintaining valuable customers and attracting profitable customers is both important and it is possible to accurately identify their features. Clustering is one way that helps companies recognize their profitable customers. In the clustering of the elements within each cluster, the most similarities are found, and there is

a significant difference between clusters. By introducing the fuzzy theory by Lotfi zadeh, the application of this idea in various sciences quickly expanded and the fuzzy clustering method was widely used by researchers in various fields (De Oliveira & Pedrycz, 2007). In fact, the main difference between the classic clustering and fuzzy clustering is that an instance can belong to more than one cluster (Khoshnazar, 2013). Companies with customer clustering and behavior analysis of each group will provide a platform for optimal allocation of resources and developing customer relationship management strategies. The customer lifetime value (CLV), reflects the value that can help companies in this field. Customer lifetime value is the value of the customer creates throughout his lifetime and is determined by using different models (Boroufar, Rezaeian & Shokohyar, 2017). The RFM model is one of the most popular and effective methods for analyzing customer life value. This model uses three variables Recency, Frequency, Monetary to express the difference between customers and the customer lifetime value is calculated from the sum of the values of the model's indexes. It is also assumed that customers who are worth a lot on any of the model's indicators are the most profitable customers. Of course, they will behave like they were in the future.

Case study

Rafah Chain Store Company is one of the most comprehensive distribution networks in Iran with the aim of supplying and distributing basic goods.

Materials and methods

In this research, transactions recorded in the database of the Zahedan Refah chain store have been used in a seven-month period. After receiving the data and performing the preparation process, 76,379 transactions were used as the final input. The preparation process consists of two steps. In the first step, the data was cleared, so some data with invalid values were identified and deleted. In the second stage, RFM model indices were calculated using SPSS Modeler 18 software. There is a difference in the RFM model index unit so these values should be normalized to the same unit. For this purpose, these values were normalized using the Min-Max method. To determine the number of clusters, the Xie and Beni index were used. After calculating the value of this index, 7 clusters were determined as the optimal number of clusters. Fuzzy C-means algorithm is used to cluster customers based on RFM model indicators. All stages of fuzzy clustering and determination of the

number of clusters were done using MATLAB software. After fuzzy clustering is done, we will determine the weights of RFM model indices. For this purpose, Fuzzy AHP method was used. Finally, Customer lifetime value for each cluster was calculated from customers and clusters were ranked.

Discussion and Conclusion

By calculating the lifetime value for each cluster, companies can use their limited resources for a group of customers who have the highest value. According to the results, the fifth cluster with 0.16624 is the most valuable group of store customers. The services provided to this group should not be limited to regular programs, but should be tailor made for them. In fact, the store should allocate more funds to these customers. On the other hand, the third cluster with 0.01482 is the least valuable group of store customers. In developing customer relationship management strategies for this group, there should be a proper balance between the costs associated with the revenue that these customers receive from the store. The results of this research can be used to develop customer relationship management strategies for each customer cluster.

Key Words: Fuzzy clustering, Fuzzy AHP, RFM model, Customer lifetime value (CLV)