

Chapter 44

A Fuzzy ANP Based Weighted RFM Model for Customer Segmentation in Auto Insurance Sector

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ABSTRACT

Data mining has a tremendous contribution for researchers to extract the hidden knowledge and information which have been inherited in the raw data. This study has proposed a brand new and practical fuzzy analytic network process (FANP) based weighted RFM (Recency, Frequency, Monetary value) model for application in K-means algorithm for auto insurance customers' segmentation. The developed methodology has been implemented for a private auto insurance company in Iran which classified customers into four "best", "new", "risky", and "uncertain" patterns. Then, association rules among auto insurance services in two most valuable customer segments including "best" and "risky" patterns are discovered and proposed. Finally, some marketing strategies based on the research results are proposed. The authors believe the result of this paper can provide a noticeable capability to the insurer company in order to assess its customers' loyalty in marketing strategy.

INTRODUCTION

Due to the complication and diversification of business operation, information of company is essential and vital forces for gaining competitive advantage. Particularly, the growing of information technology in current rapid changing and competitive environment, motivates the activity of transaction, which increasingly facilitates the market competition. Based on this relationship, information serves as central to face the opportunities and challenges of day-to-day business operation. It is very difficult for com-

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panies that enhance competitive advantage if information only becomes to support the functions within company when facing to the heavy challenges coming from outsides (Cheng & Chen, 2009). Thus, how to enhance the market competitive power for companies is an interesting issue, because of the more the competitive power, the more the probability for going concern. The key point gaining profit is to integrate the upstream members of supply chain via an effective IT in order to reduce cost, and reinforce the downstream customer relationships by means of a superb Customer Relationship Management (CRM).

Undoubtedly, the fulfillment of customer requirements is one of the key factors for the success of business operation. CRM helps to fulfill the customers' needs and to build and strengthen the relationships with customers (Thompson & Sims, 2002). A large number of companies apply different tools such as computer software packages and statistical techniques to enhance a more efficient CRM, in order to let companies understand more about their customers. Nowadays, by utilizing data mining tools for assisting CRM, some techniques (i.e., decision trees, artificial neural networks, genetic algorithms, association rules) are usually used in such fields as engineering, science, finance, and business (Witten & Frank, 2005).

For an insurance company, a customer can be defined as a person, firm, or any other organization having one or more insurance policies in the same or different lines of insurance cover. The insurance provider collects a great deal of statistical information about the customers, such as features of insurance coverage, new policies, claims, renewals, cancellations, and so forth. This information could be utilized by the provider to develop marketing strategies. Usually insurance companies are largely interested in those customers who pay expensive premium and have less number of claims. The main issue is to acquire, develop and retain core customer relationships (Rao & Jonnalagedda, 2012). Insurance companies, face major challenges in their core business such as increased competition among insurers, mergers, divestments of entire lines of business, increasing dependence among insurers on investment gains, increased capital flows from external sources to reinsurance markets, lowering margins (and profitability), and so on (Sumathi & Sivanandam, 2006). In the process of facing these challenges, the insurance companies consider such key issues as fraud detection (Artís, Ayuso, & Guillén, 2002; Bermúdez, Pérez, Ayuso, Gómez, & Vázquez, 2008; Derrig, 2002; Ngai, Hu, Wong, Chen, & Sun, 2011), reduction of high-risk members (Yeo, Smith, Willis, & Brooks, 2001), customer segmentation (Allahyari Soeini & Fathalizade, 2012; Barone & Bella, 2004), predicting customer value (Verhoef & Donkers, 2001), and decision rules extraction (C. H. Wu, Kao, Su, & Wu, 2005) to survive in the market. Among all of these concerns, the present paper essentially deals with the issue of customer segmentation. There are several types of insurance policies that deal with automobiles, health, life, property, and so forth. Then, we limit the scope of this article to address the question of customer segmentation in the auto insurance sector.

Reviewing related literature, there are just two studies that addressed customer segmentation in auto insurance sector. Verhoef and Donkers (2001) introduced a model for predicting the potential value of a current customer. They discussed and applied different modeling strategies for predicting this potential value. Also, Barone and Bella (2004) focused on a segmentation based on customer-estimated price elasticities. Their parameters epitomized both objective (socio-demographics) and subjective (behavioral) characteristics of each (cluster of) customers in Italy. With respect to the Italian compulsory automotive insurance market, they proved that customer demand curves and related price elasticities are quite heterogeneous.

We consider weighted RFM (Recency, Frequency, Monetary value) model to segment auto insurance customers in this paper. To this end, at first, key RFM variables are identified through interviews with experts. Then, fuzzy Delphi method is followed in order to find out the important factors to be embed-

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