

Intelligent profitable customers segmentation system based on business intelligence tools

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Abstract

For the success of CRM, it is important to target the most profitable customers of a company. Many CRM researches have been performed to calculate customer profitability and develop a comprehensive model of it. Most of them, however, had some limitations and accordingly the customer segmentation based on the customer profitability model is still underutilized. This paper aims at providing an easy, efficient and more practical alternative approach based on the customer satisfaction survey for the profitable customers segmentation. We present a multi-agent-based system, called the survey-based profitable customers segmentation system that executes the customer satisfaction survey and conducts the mining of customer satisfaction survey, socio-demographic and accounting database through the integrated uses of business intelligence tools such as DEA (Data Envelopment Analysis), Self-Organizing Map (SOM) neural network and C4.5 for the profitable customers segmentation. A case study on a Motor company's profitable customer segmentation is illustrated.

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1. Introduction

In today's competitive business environment, the ability to identify profitable customers, build their long-term loyalty and steadily expand existing relationships is key competitive factors to a company. To meet these factors, companies across a wide range of industries have made Customer Relationship Management (CRM) one of the leading business strategies, integrating sales, marketing and service across multiple business units and customer contact points.

CRM helps companies understand the value of customers, target their most profitable customers, cultivate and maintain high-quality relationships that increase loyalty and profits. Precise evaluation of customer profitability and targeting the most profitable customers are crucial elements for the success of CRM.

Many CRM researches have been performed to calculate customer profitability based on customer lifetime value and develop a comprehensive model of it. Most of them, however, had some limitations by not considering such as the change of profit contribution resulted from the customer defection (Berger & Nasr, 1998; Gupta & Lehmann, 2003). They need further extensions considering additional factors such as customer reactivation possibility, attracting/service cost and causes of customer defection.

On the other hand, the customer segmentation based on their profitability to a company is still an underutilized approach. This study aims at providing an easy, efficient and more practical alternative approach based on the customer satisfaction survey for the profitable customers segmentation instead of using a customer profitability model, which is an important tool for marketing and managing customer relationships by providing the information of overall satisfaction level, repurchase intentions, word-of-mouth intentions, etc.

In our approach, we use intelligent tools such as Data Envelopment Analysis (DEA), Self-Organizing Map (SOM)

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neural network and C4.5 to segment profitable customers. DEA evaluates efficiency through the relation analysis between the company's input costs for a customer (e.g. marketing cost, production cost, inventory cost, delivery cost, service cost and relationship management cost) and the output (e.g. his/her satisfaction level, repurchase intentions and word-of-mouth intentions in the customer satisfaction survey and his/her profit contribution to it).

Through the successive mining of customer satisfaction survey and socio-demographic data by SOM and C4.5, we segment profitable customers among all the surveyed customers.

We present a survey-based profitable customers segmentation system (SPCSS) that designs, executes (on-line, e-mail, etc.) the customer satisfaction survey for all customers in customer database of a company and conducts those mining works for the profitable customers segmentation. SPCSS has an architecture based on intelligent agent technology and also the integration of those mining process into decision support system framework by means of applying that technology.

This paper is organized as follows. Section 2 presents a review of literature in the profitable customer segmentation and customer satisfaction survey. In Section 3, we introduce our research methodology for profitable customer segmentation based on customer satisfaction survey and the basic structure of proposed system incorporated that methodology is presented. A case study on a Motor company's profitable customer segmentation in South Korea is illustrated in Section 4 and the concluding remarks are presented in Section 5.

2. Profitable customer segmentation and customer satisfaction survey

Traditional customer segmentation models were based on demographic, attitudinal, and psychographic attributes of a customer (Griffin, 2003). They gave too simple results and poor accuracy for today's complicated business environment. Recently, the customer segmentation based on customer transactional and behavioral data (e.g. purchases type, volume and history, call center complaints, claims, web activity data, etc.) collected by various information systems is commonly used. However, the customer segmentation based on his/her profitability to a company is still underutilized.

Customer profitability is a customer-level measure that refers to the revenues less the costs which one particular customer generates over a given period of time and has been studied the name of Customer value, Customer Lifetime Value, LTV and Customer Equity. Many customer profitability researches focused on the future cash flow derived from the past profit contribution and did not considered the change of profit contribution resulted from the customer defection (Berger & Nasr, 1998; Gupta & Lehmann, 2003).

Hwang, Jung, and Suh (2004) suggested a new customer profitability model considering past profit contribution, potential benefit indicated cross-selling and up-selling opportunity, and defection probability of a customer measured customer loyalty and segmented customers based on their model. However, they said that it had some limitations such as not considering the reactivation possibility of customers, attracting/servicing cost and causes of customer defection.

It is difficult and complicated to develop an effective and exact customer profitability model and segment profitable customers based on that model. In this study, we provide an easy, efficient and more practical alternative approach through the customer satisfaction survey for the profitable customers segmentation instead of using that model.

The typical customer satisfaction survey collects data on the causal context of satisfaction, i.e. antecedents (e.g. perceived performance of various product attributes/service) and consequences (e.g. overall satisfaction level, repurchase intentions and word-of-mouth intentions). According to the Satisfaction-Profit Chain principle (Anderson & Mittal, 2000), improving product and service attributes causes increased customer satisfaction, increased customer satisfaction leads to greater customer retention and improving customer retention greater profitability.

Empirical Researches have shown that increasing overall satisfaction leads to greater repurchase intentions, as well as to actual repurchase behavior and companies with high customer satisfaction and retention can expect higher profits (Reichheld & Frederick, 1996).

In this study, we use the customer's overall satisfaction level, repurchase intentions, word-of-mouth intentions obtained from the customer satisfaction survey and his/her profit/loss to a company derived from the accounting database of it for the first step of profitable customers segmentation.

3. Profitable customers segmentation based on customer satisfaction survey

We propose a survey-based profitable customers segmentation system (SPCSS) based on data mining and agent technology that designs, executes (on-line, e-mail, etc.) customer satisfaction survey and conducts predefined mining processes for the profitable customers segmentation. SPCSS has a multi-agent based architecture and the integration of predefined mining processes into decision support system framework (Fig. 1).

There are three types of intelligent agents within the SPCSS architecture: Survey management (SM) agent with survey knowledge base that provides system co-ordination, facilitates (mined) knowledge communication, and takes the charge of design and execution of customer satisfaction survey, profitable customers segmentation (PCS) agent that segments profitable customers among all the surveyed

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