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Study of matching model between tariff package and user behavior

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Abstract

As the telecommunication market in China becomes increasingly mature, operators have begun to focus their primary effort on user management; within this focus, determining the proper tariff package for users and offering them relevant recommendations are key issues to resolve. This paper introduces a matching model that links tariff packages and users' usage behavior (e.g., the total minutes used, data usage, etc.) based on the market segmenting theory. Microsoft Visual Fox Pro 9.0 is selected as the development tool to implement the matching model, while the tariff packages and user behavior data for a city branch of China Mobile are used to validate the model.

Keywords matching model, tariff packages, user behavior

1 Introduction

The telecommunication market is becoming mature in China. According to the statistics for province-based telecommunication consumption for the third quarter 2016, published by the Ministry of Industry and Information Technology of the People's Republic of China (MIIT), the penetration rate of mobile phones in China is 95.8 mobile phones per 100 capita: 114 per 100 capita in the eastern part of China, 79.4 per 100 capita in central China and 87.7 per 100 capita. As growth in new users is slowing down, operators have begun to focus on user management. Unlike the earlier shoddy forms of competition, e.g., price-based or pre-paid awards, operators now attract users by providing various tariff packages that provide rich services.

Currently, China's telecommunication market is a buyer's market. Operators thus must segment the market based on market analysis and predictions and develop appropriate sales policies for each market segment. To segment a market is to divide it into subdivisions based on particular consumer characteristics; the most common segments are based on usage behavior, operating habits, and so on. Normally, operators select all segmented markets as their target and develop relevant tariff packages for each.

Tariff packages are developed by mobile operators according to various user requirements. They combine service types and consumption levels in a bundle so that users can maximize their benefits from the selected tariff package. In other words, a tariff package is a combination of service types and prices. For instance, the 4th generation (4G) Business Travel Tariff Package provided by Beijing Mobile includes 9 tariff packages, which cost from RMB 58 yuan per month to RMB 888 yuan per month (as illustrated in Table 1). As an example, for the RMB 58 yuan Business Travel Tariff Package, the user can make 150 min of domestic calls and consume 150 MB of data within a one month interval for a payment of RMB 58 yuan. A three-part module [1] is referred as a charging module, i.e., in a given consumption arrangement, the user prepays a monthly base, which includes a certain monthly rental fee and a certain basic consumption cost. If the user's monthly consumption overshoots the monthly base, the excess consumption will be charged according to the extended charging standard.

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Table 1 4G Business Travel Tariff Package of Beijing Mobile

Total cost (RMB)/yuan	Domestic phone call duration/min	Domestic dataflow limit/MB
58	150	150
88	350	300
128	650	600
158	900	600
188	1 200	600
288	1 900	2 048
388	2 600	2 048
588	4 000	6 144
888	6 000	6 144

Currently, operators continually adjust and optimize their segmented markets based on their technical mastery and owned resources. In other words, operators adjust and optimize their current tariff packages and assume there must be one tariff package to fit a user's requirements. However, the user may not know which market segment he is in or which tariff package is the most suitable for him. Sometimes users are confused when selecting tariff packages, since they might not be familiar with many of them. When consumers make a tariff package selection, it can be quite difficult to determine which tariff package is the most suitable, and thus the final selection might not be the optimal one. To improve the quality of service, operators now help users to determine the optimal tariff package according to their usage behavior and inform them through relevant suggestions.

2 Literature review

Some scholars have researched the factors that affect users' tariff package selection possibilities.

Iyenger et al. [2] researched the impact of tariff choices. Fang et al. [3] researched the selection factors, considering impact when university students select their mobile service tariff package, based on a discrete choice model.

By combining the properties of users and mobile service tariff packages, Miao et al. [4] developed a multiple properties logit model to calculate tariff package selection possibilities based on a regression analysis. The model is evaluated based on data collected via questionnaire survey. Miao et al. also further researched this problem using the improved multinomial logit model [5].

Although the above research can help with tariff package design and optimization, these studies cannot help when a user is asked to select the appropriate tariff package.

Another research direction is to design the tariff packages by comprehensively applying user behavior theory, marketing study and data mining to develop a more reasonable tariff package. As an example, Xu et al. [6] performed a cluster analysis of users of China Telecom Co. Ltd., described the characteristics of the customer base, and designed a tariff package.

Pan et al. [7] proposed a data mining-based segmenting model, which provides insights into the characteristics of customer needs and behavior, to enable research into designing a precise tariff package.

Zhang et al. [8] proposed an optimization model for tariff package design under non-uniform package attribute levels. Zhang et al. also proposed a framework model for designing a mobile tariff package based on customer lifetime value and established a set of quantitative mobile tariff package design methods [9].

Some scholars assessed the rationality of operator tariff packages by applying hierarchical analysis. For example, Lü [10] created an evaluation index system for tariff packages considering four dimensions: the user, the enterprise, the relationship and the product. These studies seek to consistently improve the tariff package design method, so that the packages are subdivided more appropriately and rationally [10]. Su [11] used the analytic hierarchy process to build an evaluation model for mobile business packages to support the marketing management of a telecom enterprise. Still, these efforts cannot solve the problem of how to select the most suitable tariff package.

Long et al. [12] researched tariff package selection by applying a cost-volume-profit analysis that allow users to make a rough judgment.

In general, the above studies are mainly designing and evaluating of tariff package based on the choice behavior of customer and the influencing factors on the choice behavior, rather than on the use behavior of customer. In the 4G era，data traffic, instead of voice traffic, has become the most important source of revenue. Thus, non-data traffic services, such as voice traffic volume, short messaging service (SMS) traffic volume needed to be converted into data traffic volume for purpose of 'total data traffic volume billing'. This new billing mode is also in line with the general policies on facilitating faster and more affordable internet connection. In the forseeable future, the 5th generation (5G) network will be put into service. Telecom operators should lay emphasis on the difference in designing of tariff packages and billing mode method.

This paper proposes a tariff package matching method,