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Customer Distinctiveness using Multi-Layer Clustering Approach

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Abstract: ***Customer segmentation is the method of isolating customers into groups based on common characteristics so companies can market to each group effectively and properly. Customer segmentation provides a well-organized manner to get insights into customer distinctiveness and behavioral preferences. Market segmentation is the activity of dividing a wide consumer or business market, normally consisting of existing and potential customers, into sub-groups of consumers (known as segments) based on some type of shared characteristics. Two-layer clustering model for mobile telecommunication client analysis enhances customer relationship management and focuses on a dynamical marketplace. With the raise of massive data and also the growth of data mining technology, the mass storage of internal enterprise data will be analyzed, effectively for hidden customer worth. Data clustering and clustering algorithms allow us to cluster tremendously reliable individuals and assign different people to the acceptable segments. Trade and world have several samples of clustering analysis getting used to ascertain cluster characteristics: customer grouping analysis could be a well-liked application. By analyzing client attributes, behaviors, and preferences, we will confirm the high homogeneity of individual clusters, and also the high degree of non correspondence among individuals, given the appropriate segments.***

Keywords: Customer Segmentation, Market, Data Analysis, Mining Technology, clusters

1. Introduction

Why segment customer? And the answer is: Segmentation allows marketers to better tailor their marketing efforts to various audience subsets. Those efforts can relate to both communications and product development. Specifically, segmentation helps a company:

- Produce and communicate targeted marketing messages.
- Select the best message channel for the segment, which might be email, social media posts, radio advertising, or another approach, depending on the segment.
- Identify ways to improve products or new product or service opportunities.
- Establish better customer relationships.
- Test pricing options.
- Focus on the most profitable customers.
- Progress customer service.
- Up sell and cross-sell other products and services.

By analyzing customer attributes, behaviors, and preferences, we can establish the high homogeneity of individual clusters, and the high degree of dissimilarity between individuals, specified the appropriate segments. Typical information-gathering methods include:

- Face-to-face or telephone interviews
- Surveys
- General research using published information about market categories
- Focus groups

In addition to effectively controlling the homogeneity of characteristics among the mass customer base, this analysis can also be used for limited customers—for example, to develop management strategies and market-in principles to assist in customer relationship management (CRM) a two-layer clustering model based on the study of customer attributes, customer contributions, and cluster segmentation. We cluster the value of mobile customers and execute customers' characteristics on a regular basis in a systematic way. Our model can also be useful to other business areas that track consumer behavior, such as membership cards used in retail sales or bank-issued credit cards. Through such cards, organizations can record and categorize customer consumption and use our planned clustering model for business analysis. Preference analysis can help a company view changes in customer value and behavior and, at any time, regulate its product strategy to retain high-quality customers. Our model provides a way for companies to plan for long-term CRM and retain high-quality customers. In addition, short-term marketers can use this modeling approach to promote products or services correctly.

2. Literature Survey

Customer Clustering

We can divide clustering algorithms into the following common categories:

- Hierarchical: The data points are combined or split to form the goal clusters.
- Partitioned: The number of clusters to be shaped is particular in advance, and the data points are assigned iteratively to the respective clusters.
- Density-oriented: Clusters are created by concatenating the data space distribution density thresholds in line with the data points.
- Grid-oriented: The data space is quantized into a grid (network) structure in accordance with grid-based units for clustering.
- Model-based: Existing models are used to cluster data points individually.[1]

Cluster analysis is widely used for multivariate data analysis in fields such as medicine, economics, text mining, and

commercial applications. There have been many studies on cluster analysis for separating data characteristics and detecting data-clustering phenomena. Business applications consist of targeted or direct marketing based on customer grouping and clustering, customization services, good CRM, and customer behavior, attributes, and preferences. According to the 80/20 rule (or the Pareto principle),5 80 percent of a company's profits come from the most important 20 percent of its customers, with the remaining 20 percent of profits coming from the ordinary 80 percent of customers. If a company can fully comprehend its key 20 percent of customers, those customers can bring a substantial profit. The related research com-bines the concepts of customer lifetime value (CLV) and customer segmentation. In this study, customers form appropriate segments, which help the company focus on its target customers and then develop CRM, marketing strategies, and promotional activities. CLV refers to the total revenue that each customer can bring to the enterprise. It can be divided into the customer's historical value, current value, and potential value. Academic research on customer grouping has been conducted based on CLV, and three different models have been put forward according to customer contribution, basic attributes (such as age and gender), and preferred customer behavior. [3]

The results show that customer groups formed through multiple dimensions can differentiate customer attributes effectively. Dividing the majority of customer groups into several special behavioral subgroups helps a company gain an in-depth understanding of its customer base. [5]

However, most customers grouping to date has either been based on rules of thumb or has used only the average revenue per user (ARPU) as a benchmark for customer segmentation. Only a few approaches have included other factors, such as customer lifecycle or overall customer contri-bution.8, 9 Vodafone, a British telecom operator, segments mobile users into many homogeneous clusters through customer segmentation and customer profiling to identify common features. It uses the analysis and description of user attributes to help management with decision-making and operational guidelines. [7]

3. Proposed Work

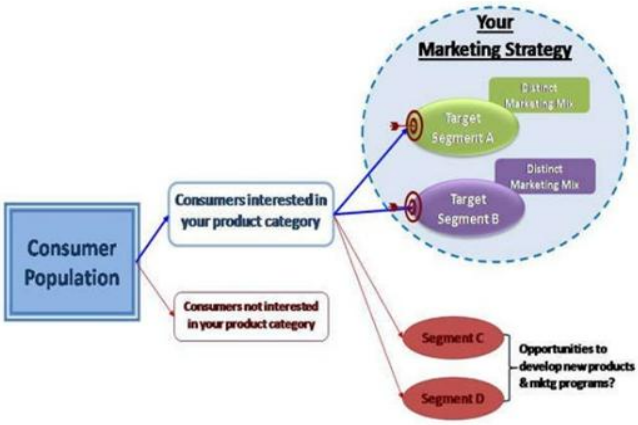

Figure Customer Data study using Multi-Layer Clustering Model

A mobile telecom can have as numerous as 10 million customers. Without customer segmentation in harmony with the business's nature, industry characteristics, and other factors, it is not only hard to grasp dynamic changes in customer management, but customer preservation will also have enormous maintenance costs. Therefore, this study will provide telecom companies with an approach based on customers' operational wants including voice, data etc. the multi-layer clustering model for customer segmentation.

The proposed approach begins by collecting and segmenting individual customers' contributions, personal preferences, overall customer profile, and other factors. Customer segmentation is for a huge number of customer's uses. These clusters are then used to develop a general strategy for CRM, which forms the first layer of clusters.

After the first layer of the target has been clustered, the characteristics of the subgroups are described and interpreted by the subdivision of the second-layer clustering algorithm. The big data platform cross-analysis function maintains each group of customers and, along with effective marketing programs, forms the second layer of customer clustering analysis.

The aims of the proposed multi-layer clustering model are as follows:

- Provide real-time, diverse, and rich customer information through preplanned pre-analysis to make stronger the target customer base and decrease the workload of marketing staff
- Estimate the customer segmentation strategy for each group to improve the effectiveness of action preparation and the crm strategy and
- Use data mining technology to tap probable target customers, raise the probability of marketing products and services, and improve the accuracy of precision marketing.

In proposed model, the first layer examines customer value i.e. customer interested in product category or not, and the second layer uses consumer-behavior features for further grouping. In practice, the description of customer value varies by industry. Even the same industry can have different priorities, such as the amount of consumption, the number of consumers, the number of stores, and so on. So, when implementing this model, each industry must first define the customer value of each variable. In addition, because customer behavior can change, to make the marketing strategy more accurate, we must dynamically monitor the changes in these acts and cooperate with automatic mechanisms for observing customer-behavior trends and providing before time warnings.

4. Tables

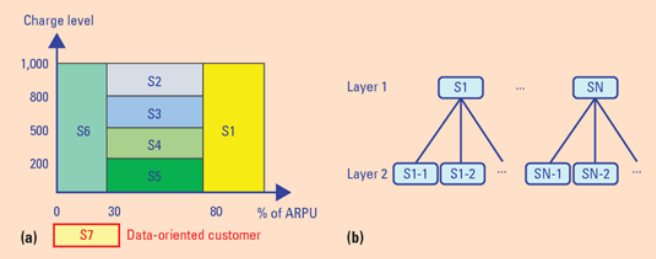

Table 1. Cluster-center transformation and description for L2 mobile clusters.

Variable name	S1-1		S1-2		S1-3		S1-4		S1-5	
Monthly charge/amount (%)	376.65	ML	427.98	ML	431.85	ML	539.35	M	599.65	M
International bill/amount (%)	1.20	M	27.35	M	**84.76**	H	1.04	M	0.80	M
Data bill/amount (%)	516.71	H	518.73	H	162.93	M	36.45	M	13.07	M
VAS bill	23.18	M	1,192.66	H	45.32	M	10.06	M	6.04	M
Ranking of amount charge	902.00	H	829.00	H	910.00	H	868.00	H	694.00	MH
Proportion of international network calls	434.37	M	446.58	M	431.87	M	438.84	M	526.51	M
Total no. of calling objects	22.12	M	29.38	MH	42.23	H	47.95	H	19.83	M
Ranking of local call minutes	580.00	M	645.00	MH	778.00	H	853.00	H	404.00	M
Ranking of international call minutes	0.00	N	64.00	M	967.00	H	0.00	N	2.00	M

H = high, M = middle, L = low, N = null

5. Conclusion

The multi-layer customer clustering model provides a worldwide and micro viewpoint to help mobile CRM. Marketers can use pre-analysis and data mining to target their customers and sell the company's products and services with accurate marketing. In addition, the expert-rule subgroup can facilitate companies to develop a universal CRM direction and improve customer service. After establishing the clustering model and associated strategies, we can track changes in the group construction frequently and methodically. This allows us to supervise trends in group progress, monitor size changes in each cluster, and adjust the group marketing policy and managing strategy to increase the effectiveness of the early warning mechanism. At present, customer clustering is only included in cluster modeling through mobile voice, data habit behavior, customer contributions, and customer base data. In future work, technique intends to increase the grouping of the customer-variables selection function. For different marketing or business needs, a customer-clustering model will be established to increase the flexibility of customer-clustering applications. In addition, in accordance with changing customer group structures to achieve a set threshold value, we aim to establish restart of the cluster modeling process or modify the marketing strategy of the warning mechanism to improve the dynamic feedback model grouping benefits.

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