Data Mining Applications in Marketing

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Abstract

The companies in their daily performance record and accumulate a large amount of information provided by real and potential customers, large investments are made in information technologies and the use of communication means in the implementation of marketing strategies, with the aim of meeting the requirements to gain greater positioning in the market, increase sales, achieve customer satisfaction and delight, always in search of success and profitability of the organization. However, the waste of resources is evident, as not all the decisions have the support of the stored information. This particular work reviews the data mining techniques applicable to the analysis of problems concerning organizations, deals with the discussion and analysis of the role of data mining in the analysis of consumer behaviour. It describes its usefulness to analyze the different aspects of business activities and how its implementation could help each sector involved to improve the quality and achieve customer loyalty.

Keywords: Data mining; organizations, marketing, customer

1. Introduction

Technological applications and the implementation of artificial intelligence techniques conform to the new generation of information and communication technology tools that organizations apply. These are intended to help decision making in scenarios where the amount of information complicates the analysis developed by experts. The analysis of consumer behavior is a fundamental problem for the formulation of marketing strategies, sales, customer service, loyalty, segmentation, cross-selling, optimization of the supply chain, detection and prevention of fraud and detection of anomalies (DA), among others These tools provide the marketing director with the opportunity to interpret the information contained in large databases and it is essential for the information to be stored, transformed, analyzed and visualized [1-2].

Leading companies worldwide are using new technologies to win the competition, which is why it is important to go deeper into the knowledge of how each tool works, and how to choose the most suitable one. Among these powerful techniques we can find: Cluster detection, memory-based reasoning, basket analysis, genetic algorithms, link analysis, decision trees and neural networks among others. For that reason it is important to prepare the sources of data and the way of evaluating and using the results that are obtained. "The data mining techniques will show us how to take advantage of the gold mine in a vertiginous and comfortable way for business solutions hidden in the databases and information systems"1.

2. Data mining techniques.

Data mining, also known as Knowledge Discovery in Databases (its acronym in English is "KDD – Knowledge Discovery in Databases"), is the field that allows us to discover new and potentially useful information from large numbers of data. It has been used in numerous fields, including from the already known cases of shopping

basket to bioinformatics or investigations against terrorism [3-4]. The data mining tools used in the KDD process can be classified into two major groups:

• Verification techniques, where the system is limited to verifying hypotheses provided by the user.

• Discovery methods, in which potentially interesting patrons are to be found automatically, including all prediction techniques in this group.

The result obtained with the application of data mining algorithms belonging to the second group, the discovery techniques, can be descriptive or predictive. The predictions serve to predict the future behavior of some type of entity through which a description can help its understanding [5-6], some of the most used techniques according to the aforementioned author:

	Objectives		
Classification:	It is about obtaining a model that allows assign	t allows assigning a case of unknown class to a	
	specific class (selected from a redefined set of classes),		
Regression:	The aim is to obtain a model that allows predicting the numerical value of some		
	variable (logistic regression models).		
Grouping	It makes each case correspond to a class, with the peculiarity that the classes are		
(clustering):	obtained directly from the input data using similarity measures. That is, they		
	group the data under different methods and criteria. Find data sets that clump		
	together naturally, separating the full set into a series of categories		
Summary:	Compact representations are obtained for subsets of the input data		
Modeling of	Descriptions of existing dependencies between variables are obtained.		
Dependencies:	Relationship analysis, in which existing relationships between elements of a		
	database are determined, could be considered a particular case of dependency		
	modelling.		
Sequence	An attempt is made to model the temporal evolution of some variable, for		
Analysis:	descriptive or predictive purposes.		

Below is a summary of the main data mining techniques applied to each type of problem:



Taxonomy of data mining techniques

3. Data mining applications in marketing

3.1 Data mining for sales and cross selling

The cross of data that affect the purchase decisions, allows identifying the tendency of potential customers for a good service. Crosselling or cross-selling seeks to extract the maximum amount of information from the databases of customers and their behavior in order to analyze the different variables and establish correlations that give us information on unthinkable conduct. It is important that the promotions or offers do not saturate the customer with unimportant bulla, but rather that they offer products and services tailored to their tastes and purchasing behavior. Proper management of customer records can be very effective, improving the results obtained, this contributes to a reduction in costs and an increase in sales, contributing in addition to achieving customer loyalty, since it is not just us I would buy a single product, but also several products related to the first one or to your tastes. Addressing the customer with the correct information is something that surprises and values him, this allows optimization of marketing and sales strategies.

3.2 Limit on Credit Purchases

The characteristics of negotiation of our times replace the cash with the so-called plastic and electronic money, which encourage people to make purchases on credit, in addition to the cash limitations, this encourages frequent demands for cards and credit programs, which positively motivates increase in sales. However, there is a maximum credit capacity that customers can honor.

The application of Data Mining techniques allows a suitable analysis of the customer's ability to pay, taking into account their economic characteristics, as well as their financial behavior and purchasing habits. Generating immediately at the same moment of negotiation if the customer profile is necessary.

3.3 Customer Retention

If he accepts that a customer can decide abruptly not to purchase our product or service, however, there are indications in the behavior of the customer that can let us know that he is about to abandon. Understanding that attracting new customers requires greater number of resources to retain, it is therefore important to establish intelligent strategies that allow customers to be recognized at the risk of losing themselves.

With the incorporation of Data Mining techniques, it is possible to anticipate which group of users has the greatest risk of being lost in the coming days, weeks or months. It is also possible to detect those who are cooling their purchasing relationship with the company, this will allow for the planning of specific and focused strategies for customer retention and motivation, understanding that when the company manages to get a potential customer to become a customer, it will be necessary to seek Your purchase levels are increasing more and more, contributing the maximum that fits the business while satisfying the needs of a good service (customer share)

Fraud Detection

The use of data mining techniques to analyze user profiles and detect patterns of fraudulent or suspicious transaction behavior is increasingly common. Within the techniques that have given the best classification performance are the neural networks given their high level of accuracy in the prediction and their robustness to the noise in the data [7-8].

The detection of outliers is considered crucial in many research areas and application domains. Its objective is to find a determined number of objects that are significantly different and inconsistent with respect to the majority recorded in an input database. Although these values are still considered as an error or noise, they can carry important information [9-10].

Product innovation

The implementation of Data Mining techniques to the information accumulated in the databases about the characteristics and behavior of the customers, can allow the company to have ideas not thought about the changes that can be made to the products or services offered, as well as the implementation of new products related to those acquired by the customer or totally innovative products.

Recommendations and Referrals

The company can significantly increase its sales with the implementation of intelligent systems that, based on the purchase history and the customer's registered data, recommend products or services related to its profile, a characteristic example could be the consumption of films, games or equipment technological. In addition, the system can suggest to the customer which of their contacts to refer the recommended product to strengthen the purchase decision with the implementation of promotions and prizes.

Segmentation

By selecting relevant customer attributes, segmentation can be established, there is a huge variety of attributes available, classifiable in demographic, socioeconomic, medical, etc. intelligent, they will allow you to establish strategies and promotions for those who respond to customers and avoid changing providers.

4. Conclusion

The growing use of artificial intelligence applications for decision-making in companies, seeks to improve customer satisfaction, allows answering questions, providing technical support, and providing assistance quickly and efficiently. These applications make it possible to automate the analysis of data that have been collected and among other options at the most appropriate moment to make offers, recommend and refer products or apply a variety of different strategies according to each customer and in this way optimize the management that allows capturing , customer loyalty or retention.

It is therefore important that companies can read all this information stored in the databases to translate it into their own benefit and that of customers, bearing in mind that the capacity to store data grows permanently and exponentially but the capacity to process them in general It is scarce, because of which the implementation of Data Mining techniques will allow the company to explore, analyze, understand and apply solutions through the obtained knowledge.

References

 [1] Chalotra, P., & Dutta, M. (December 2011). researchgate.net. Retrieved on February 18, 2016, from https://www.researchgate.net/publication/216700550_Performance_Analysis_of_ Clustering_Methods_for_Outlier_Detection

- [2] Cravero Leal, A., & Sepúlveda Cuevas, S. (2009). Application of Data Mining for the Detection of Anomalies: A Study Case. International Workshop, 8.
- [3] Jiménez Galindo, Á., & Álvarez García, H. (August 26, 2010). Minería de Data en la Educación.
 Retrieved on February 18, 2016, from http://ocw.uc3m.es: http://www.it.uc3m.es/jvillena/irc/practicas/10-11/08mem.pdf
- [4] Santamaría Ruíz, W. (2010). Fraud Detection Model Based on the Symbolic Discovery of Classification Rules Extracted from a Neuronal Network. Bogota: Universidad Nacional de Colombia.
- [5] Valcárcel Asentios, V. (December 2004). Data Mining and the Discovery of Knowledge. Revista de la Facultad de Ingeniería Industrial UNMSM, 4.
- [6] M S Chen, Han J W, Yu P S. Data Mining: An Overview from a Database Perspective. . IEEE Transaction on Knowledge and Data Engineering. 1996, 18 (6): 1-41.
- [7] Y.B.Qu,H.Zheng. Database Marketing Beijing: Management Press, 2009.
- [8] P.Zheng. Data Mining and Its Application in Marketing . The Journal of Beijing Institute of Light Industry, 2010, 3
- [9] W.W.Chen, W. The Course of Data Warehouse and Data Mining. Beijing Tsinghua Press 2006.
- [10] Eckhorn R,Reitboeck H J, Arndtm,et al. A neural network for feature linking via synchronous activity: results from cat visual cortex and from simula-tions[M] Cambridge: Cambridge University Press,1989, 255-272.