Significance and Importance of Data Mining for Marketing analysis in Finance, Banking Sectors

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***Abstract*—Significance of the Data mining tool for providing valuable information by evaluating the large databases and enabling the top management and business executives to make hard core decisions in a much easier and effective manner. It is a process of analyzing the data from various perspectives and summarizing it into valuable information. This paper defines what data mining is and how does it works. It then focuses on some broad area of application, like market segmentation, direct mail marketing, customer churn, fraud detection, portfolio management trading and risk management where data mining techniques can be used in banks and other financial institutions to enhance their business performance.**

Keywords: Data Mining, Banks, Financial Institutions, Risk Management, Portfolio Management, Market segmentation and analysis, direct mail marketing, customer churn, fraud detection.

I. INTRODUCTION

SINCE the inception of information system and detailing about its characteristics to provide the right information to the right person at the right time and place. It leads to the development and huge database and its analysis .. The right information will be converted in to knowledge and this acquired knowledge will help the bank to survive, grow and capture the new markets and they can provide better customer oriented services and hence can retain their existing customers. Almost every organization today is recognizing the importance of utilizing data mining in their business. Not only data mining helps to extract useful knowledge from large amount of data but it is also helping in declining various costs like cost of computation power and also reduces time for decision making and knowledge discovery and to achieve the best results and output.

Data mining is primarily used Now a days by organizations with a strong consumer focus - retail, financial, communication, and marketing organizations. It enables these organizations to determine relationships among "internal" factors such as price, product positioning, or staff skills, and "external" factors such as economic indicators, competition, and customer demographics [13]. Today many banks are employing data mining for their proper functioning, the list includes: Bank of America, First USA Bank, Headlands Mortgage Company, FCC National Bank, Federal Home Loan Mortgage Corporation, Wells Fargo Bank, Nations-Banc Services, Mellon Bank N.A., Advantage Mortgage Corporation, Chemical Bank, Chevy Chase Bank, U.S. Bancorp, and USAA Federal Savings Bank. [11]

II. LITERATURE STUDY ABOUT DATA MINING.

Data mining has been defined as "the nontrivial extraction of implicit, previously unknown, and potentially useful information from data [1]. It is "the science of extracting useful information from large databases"[6]. Data mining is one of the tasks in the process of knowledge discovery from the database [10]. Generally, data mining (sometimes called data or knowledge discovery) is the process of analyzing data from different perspectives and summarizing it into useful information - information that can be used to increase revenue, cuts costs, or both. Data mining software is one of a number of analytical tools for analyzing data. It allows users to analyze data from many different dimensions or angles, categorize it, and summarize the relationships identified.

Data mining technology can generate new business opportunities by:

2.1 Automated prediction of trends and behaviors: Data mining automates the process of finding predictive information in a large database. Questions that traditionally required extensive hands-on analysis can now be directly answered from the data. A typical example of a predictive problem is targeted marketing. Data mining uses data on past promotional mailings to identify the targets most likely to maximize return on investment in future mailings. Other predictive problems include forecasting bankruptcy and other forms of default, and identifying segments of a population likely to respond similarly to given events.

2.2 Automated discovery of previously unknown patterns: Data mining tools sweep through databases and identify previously hidden patterns. An example of pattern discovery is the analysis of retail sales data to identify seemingly unrelated products that are often purchased together. Other pattern discovery problems include detecting fraudulent credit card transactions and identifying anomalous data that could represent data entry keying errors.4]

III. TECHNIQUES IN DATA MINING :

The various techniques used in data mine are listed below with their characterstics and the applications uses , are:

3.1 . Clustering

Clustering can be said as identification of similar classes of objects. This is the technique of combining the transactions with similar behavior into one group, or the customers with same set of queries or transactions into one group. Classification approaches can also be used as effective mean of distinguishing groups. So clustering can be used as preprocessing approach for attribute subset selection and classification [1]. For Example: The customer of a given geographic location and of a particular job profile demand a particular set of services, like in banking sector the customers from the service class always demand for the policy which ensures more security as they are not intending to take risks, like wise the same set of service class people in rural areas have a the preferences for some particular brands which may differ from their counterparts in urban areas.

3.2 . Association

Association and correlation is usually to find frequently used data items in the large data sets. It is the technique of finding patterns where one event is connected to another event. This type of findings help businesses to make certain decisions regarding pricing, selling and to design the strategies for marketing, such as catalogue design, cross marketing and customer shopping behavior analysis [8]. However the number of possible Association Rules for a given dataset is generally very large and a high proportion of the rules are usually of little value.

3.3. Forecasting

Regression technique can be adapted for predication. Regression analysis can be used to model the relationship between one or more independent variables and dependent variables. In data mining independent variables are attributes already known and response variables are what we want to predict [8]. Unfortunately, many real-world problems are not simply prediction. For instance, sales volumes, stock prices, and product failure rates are all very difficult to predict because they may depend on complex interactions of multiple predictor variables [1, 8]. Therefore, more complex techniques (e.g., logistic regression, decision trees) may be necessary to forecast future values. This technique of data mining will help in discovering patterns from which one can make reasonable predictions.

3.4 Classification.

Classification is the most commonly applied data mining technique, which employs a set of pre-classified examples to develop a model that can classify the population of records at large. Fraud detection and credit risk applications are particularly well suited to this type of analysis. This approach frequently employs decision tree or neural network-based classification algorithms. The data classification process involves learning and classification.

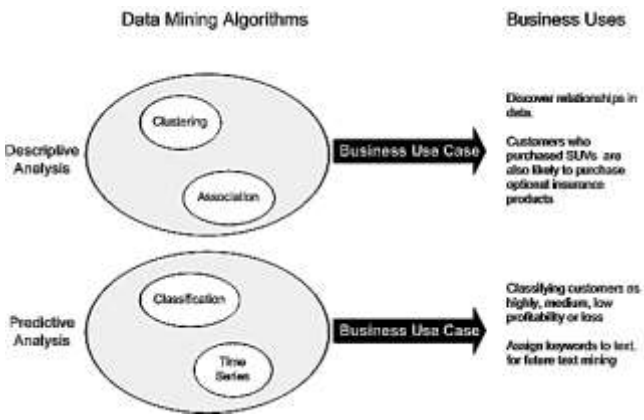

Fig 1.: Usage of Data Mining Algorithms in Analysis

IV. DATA MINING AND MARKET RESEARCH

As per American Marketing Association marketing research as the "systematic and objective approach to gathering marketing information which -- when processed, analyzed and interpreted -- will help identify problems and opportunities that allow for better-informed, lower-risk decisions."

In business, Market Research is typically focused on learning more about consumers, customers, competitors and market trends at large. Market Research is classified as either primary or secondary . Primary research uses information from original sources; that is, a Market Researcher collects data that have not been previously collected or published. Secondary research refers to collecting data from published sources such as information released by government agencies, and reports and publications available in a public library.

Primary research is classified as either qualitative or quantitative. Examples of qualitative research are focus groups and in-depth personal interviews. The most common form of quantitative research is a survey that uses a questionnaire to collect data. The name qualitative research implies that its findings are not quantifiable. The research process is quite often a discussion in which the researcher poses open-ended questions to participants. .

Qualitative research defines issues, substantiates perception and identifies behavior. For instance, results of focus groups involving the users of a consumer product can clarify issues surrounding brand loyalty, and reveal users' likes and dislikes..

V. CUSTOMER INTELLIGENCE V/S DATA MINING AND MARKET RESEARCH

A corporate Customer Intelligence environment includes a wide range of technology-enabled processes for data

collection, data storage, analysis and deployment. Typically, the customer intelligence environment is enabled by a large number of technology vendors, services providers and internal efforts. All of these efforts are brought together for the singular purpose of gaining a deeper understanding of the customer.

5.1 Customer Data

Customers and Consumers alike provide information in the form of behaviors and attitudes. Consumer behaviors may be captured internally by sales patterns, channel usage, and campaign responses. Consumer behavior may also be collected externally through syndicated research, behavior assessment such as Nielsen, or attitudinal/lifestyle profiles such as Acxiom or Experian. In addition, consumer attitudes may be captured through either qualitative or quantitative Market Research.

5.2 Data Collection

Customer behaviors are directly collected through the major touch-points of the organization. These touch-points include call centers, point-of-sale systems, Web sites and other operational systems managed by the organization. Customer attitudes are being collected through commissioned Market Research studies as well as corporate web surveys, customer panels and emerging technologies for text analysis and customer voice analysis.

5.3 Data Storage

Whether from customers, consumers or both, there are a growing number of data sources available that provide organizations with a myriad of behavioral and attitudinal information. In order to derive insights from the data, the data must be combined, managed and centrally accessible.

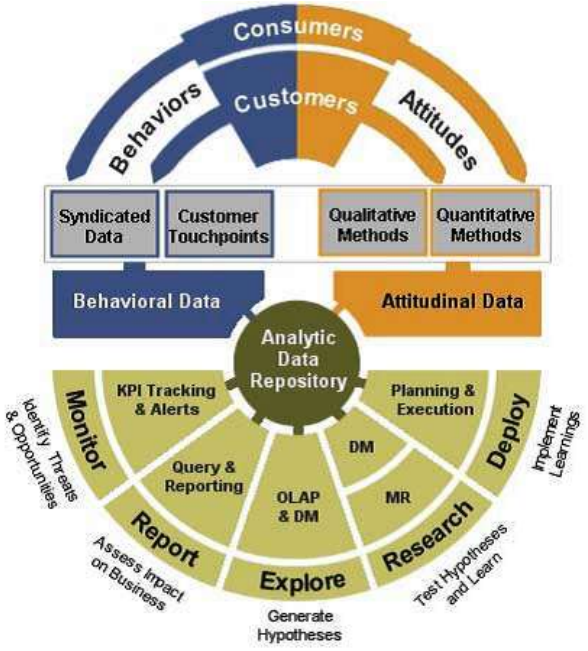

Fig 2 : Customer Intelligence with Data Mining Environment

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5.5 Monitor

Monitoring is the process of identifying key indicators of business performance at various levels across the organization. These key performance indicators (KPIs) are typically accessed through executive dashboards. Critical KPIs may also be monitored by alerting agents that can send emails or calls when a defined threshold is crossed. Whether by human or machine,

5.6 Report

Upon identifying a potential threat or opportunity, enterprise reports are typically available to quickly determine the impact of the trend on business performance. Reports are useful for rapidly accessing business information. However, they are not well suited for exploration due to their static nature.

5.7 Explore

By facts , threat or opportunity has been shown to be relevant and substantial, exploration can begin in order to identify possible drivers of the trend. On-line Analytical Processing (OLAP) technology is a valuable tool for examining issues from several dimensions. With OLAP one can narrow the problem or focus the opportunity down to a manageable space. For example, if treadmill sales are on the decline, OLAP can help identify which regions and customer segments are most accountable for the trend. This exploration of the data can be classified as 'data mining' using the broadest definition of the term. However, manually finding important patterns in OLAP ‘universes’ may be like finding a needle in a haystack as the number of business dimensions grows. In such situations, automated Data Mining techniques may be employed to find hidden patterns.

5.8 Research

The origin of customer intelligence is Consumer research. Many hypotheses are generated daily within an active customer intelligence environment. These must be properly tested, especially those with strategic implications or costly tactical programs.

5.9 Deploy

These conclusions are the new findings that expand one’s customer intelligence. They provide the confidence to plan and execute new programs to avoid the threats or capitalize on the opportunities at hand. Done properly, these programs are tested and evaluated prior to being deployed broadly into the operations of the organization.

VI. Proposed Research Methodology: Data Mining and Market Research

The convergence of Data Mining and Market Research can best be illustrated by examining the underlying research stages common to both disciplines. To this end, we define

the underlying research processes as consisting of six distinct stages. These stages include:

- Define where the customer is articulated
- Capture where information is collected
- Store where information is managed and maintained
- Analyze where information is examined
- Understand where insights and conclusions are drawn
- Deploy where insights are operationalized throughout the organization

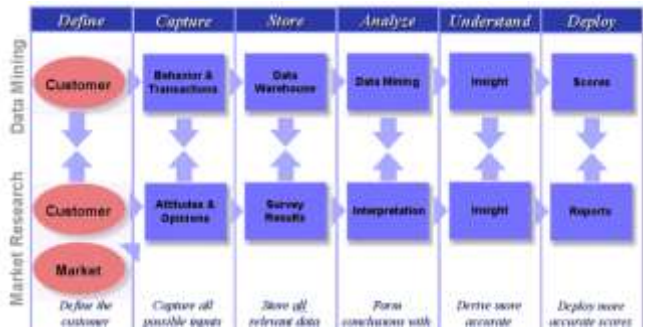

Fig 3 : Relationship of data mining and market Research

VII. Conclusion

It is pertinent to know that data mining can be a very powerful and helpful tool to extract important and useful information for banking sector from the historical as well as from the current data. Data mining can be used in various fields of banking like Market segmentation by which banks can segment their customers into different groups, direct mail marketing can help the banks to improve their marketing strategy and to increase their business, customer churn to increase the rate of retention of the customers, risk management to reduce the various risks like credit worthiness and fraud detection to reduce the number of fraudulent.

Further, Data mining has wide application domain in almost every industry where bulky data is generated and that is why it is consider as one of the most important and promising developments in Information Technology. Data mining techniques help companies particularly banking, telecommunication, insurance and retail marketing to build accurate customer profile based on customer behavior. Thus; it is becoming a necessity in this competitive environment to analyze the data from data warehouse containing hundreds of gigabytes or terabytes of data.

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