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Supply Chain management and Recommendation System for iOS platform

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Abstract–Data mining is a process of analyzing data from different perspectives and summarizing it into useful information. The basic aim of Data Mining is to discover hidden value of the data warehouses. This paper covers an iOS Application on SCM (Supply Chain Management) and Recommendation System based on rating system for food processing industry by making the system mobile, which enables the user to access software application from a iPAD based on Apples iOS mobile operating system. The system will be based on recommendation and rating system for supplier on various parameters for the factory and feedback given by the management staff using data mining algorithms. The project provides report generation from the current and past data to find out the hidden patterns in the data to reduce the waste and find out the hidden costs in the existing system. It will help the management to monitor the sales, profits recommended suppliers via various graphical reports to help the company to take various decisions. It will help the management to choose the best supplier in various conditions. It will help the user to save time by monitoring the activities of the suppliers and reduce the efforts.

I. INTRODUCTION

The supply chain is a global network of suppliers, factories, warehouses, stockroom, and retailers through which raw materials are acquired and converted, for delivering them to customers. Supply-chain management is the strategic, tactical, and operational decision making. Itincreases supply-chain performance by coordinating comprising functions and events. The operational level executes plans. Tactical- and operational-level decision-making functions are used in the supply chain at various instances. The strategic level defines theselection of suppliers, transportation routes, manufacturing facilities, production levels, warehouses which are included in the supply chain network. [1].But the change of the industry and the market makes this difficult as Materials do notarrive on time, production facilities falter, workers are on leave, customer preferences change, order cancellation,etc causing diversion from the prepared plan.

Data Mining is a dynamic & a new technology today withgreat potential to help enterprises. Data Mining is also known as KnowledgeDiscovery in Databases. The basic aim of Data Mining isto discover hidden value of the data warehouses. Data Mining can be described as the non-trivial extraction of certain,potentially useful information which is previously unknownfrom data. Ituses machine learning, statistical & visualization techniques toanalysis&presents it to humans in a form which can easily and clearly be interpreted.

II. Literature Survey

Analysts estimate that such efforts can improve working Capital levels, streamline accounts receivable processes, and eliminate excess costs linked to payments. Analysts estimate that such efforts can improve working capital levels by 25% [2]. Today, the best companies in a broad range of industries are implementing supply chain management solutions to improve business performance and free cash resources for growth and innovation. Supply Chain Management is about managing the physical flow of product and related flows of information from purchasing through production, distribution and Delivery of the finished product to the customer.

Best supply chains use strategic supply chain management in an attempt to be efficient in terms of speed, quality, cost, and flexibility. [3]. Business competition exists among companies as supply chains tryto gain advantage over competitors supply chains. These levels of competition require a much greater level of coordination among chains or networks of suppliers, distributors, producers, and customers. Despite the value of this concept to modern companies, not much is known about how these well known theories can help make them exceptionally successful [4]. Also there is a problem to keep the supply chains sustainable. The task of integrating sustainability in supply chain management is complex and tends to result in conflicts.

A) By Mark S. Fox, Mihai Barbuceanu, and RuneTeigen[1] **"Agent-Oriented Supply-Chain Management".** It gives the contribution in several ways to the goal of constructing models and tools enabling multiagent systems to carry out coordinated work in real-world applications. We have contributed a model of the new type of coordination knowledge as complex, coordinationenhanced plans involving interactions by communicative action. The execution by agents of these plans results in multiple structured conversations taking place among agents. These ideas have been substantiated into a practical, application-independent coordinationlanguage that provides constructs for specifying the coordination-enhanced plans as well as the interpreter supporting their execution. Our interpreter supports multiple conversation management, a diverse rule typology that, among others, provides for handling exceptional or unexpected situations, conversation synchronization, and optimization of plan executionby decision-theoretic mechanisms.In cooperation with industry partners, we applied these models and tools to industriallyrelevant problems to keep our work in touch with reality and "falsify" our solutions as earlyas possible based on feedback from reality.

B) By Aziz Muysinaliyev, SherzodAktamov[5]**"Supply chain management concepts: literature review".** The main source for using these papers was Science Direct internet portal for research papers and other Internet journals on Operations Management. In order to have broader view on SCM we reviewed papers which have different objects, were we can divide them into such groups: Papers which research SCM in context of its improvement and quality, Papers which focus on sustainability of SC and logistics, Papers which based on comparison of SCs or comparison of implementing methods on different locations, Papers which look towards SCM through different industry, and finally the most important number of researches are about methods of supply and efficiency of SCs, which in our opinion make greater contribution for understanding of SCM. A literature review reveals a considerable spurt in research in theory and practice of SCM. Combining and informing on features of Supply Management and distribution Management. This integration has resulted in the concept of extended enterprise and the supply chain is now manifest as the collaborative supply chain across intercompany borders to maximize the value across the entire supply chain.

C) By Smita, PritiSharma[6]**"Use of Data Mining in Various Field: A Survey Paper"**. In this paper we studied, Data mining extracts the knowledge/ information from a large amount of data which stores in multiple heterogeneous data base. Knowledge /information are conveying the message through direct or indirect. This paper provides a survey of various data mining techniques. These techniques include association, correlation, clustering and neural network. This research paper also conducts a formal review of the application of data mining such as the education sector, marketing, fraud detection, manufacturing and telecommunication. This paper discusses the topic based on past research paper and also studies the data mining techniques.

D) By Peng PengQianli Ma Chaoxiong Li [7] **"The Research and Implementation of Data Mining Component Library System"** With the wide application of business intelligence in corporate, the demand for data mining software increases daily. To improve the efficiency and quality of the reusing data mining software and reduce the period and cost of developing data mining application system, this paper proposes a new component library system of data mining. Through componentization of data mining algorithm, this system implements varied core algorithms of data mining in the form of components. In this way, the efficiency and quality of developing data mining software are improved significantly to meet various application demands.

E) S.HanumanthSastry and Prof.M.S.PrasadaBabu [8] **"Analysis and prediction of sales data using clustering algorithm".**Clustering is an important data mining technique where we will be interested in maximizing intracluster distance and also minimizing intercluster distance. We have utilized clustering techniques for detecting deviation in product sales and also to identify and compare sales over a particular period of time. Clustering is suited to group items that seem to fall naturally together, when there is no specified class for any new item. We have utilizedannual sales data of a steel major to analyze Sales Volume & Value with respect to dependent attributes like products, customers and quantities sold.

III. Proposed Systems

The system will enable the industry to work in a more efficient way and make them use the latest technology and empower them with the latest hardware. There will be a shift in the functioning and usage of technology in the industrial sector. The system will improve cost efficiency and improve the working of the industry. Our paper will be based on recommendation and rating system for suppliers on various parameters for the factory and feedback given by the management staff. The goal of the system is to provide good recommendation system to management of the industry. The system will help industry in making further decisions and then into actions after analyzing their cash, product flow information via various graphical reports. Reports will be generated from the past and current data as this will help a person to reduce the waste and cost of material by going through the reports of the system. By various graphical reports generated by the system it will help in monitoring the sales, suppliers which will yield profits more than the

other suppliers, which will help management staff to take furthermost decisions to choose supplier. By optimizing the supply management the system can cater the industry requirements in terms of profit, inventory, delivery, costing via data mining algorithms.

As nowadays many systems are desktop based, we are proposing this system as mobile based so that user can access the application whenever it is needed whether he/she is travelling or sitting at a place. Our motive for this paper is that an iOS application for supply chain management and recommendation system based on rating system for food processing industry by making the system mobile, which enables the user to access from an iPad which is specifically based on Apple's iOS mobile operating system. User can access the application from any part of world with an ease.

In this system the algorithm used for recommending the suppliers is Naïve Bayes Classifier. The Naive Bayesian classifier is based on Bayes' theorem with independence assumptions between predictors.This classification is named after Thomas Bayes (1702-1761), who proposed the Bayes Theorem. A Naive Bayesian model is easy to build, with no complicated iterative parameter estimation which makes it particularly useful for very large database. It is simple to use andit often does surprisingly and is widely used because it often outperforms more sophisticated classification methods. It represents a supervised learning method as well as a statistical method for classification. It assumes an underlying probabilistic model and it allows us to capture uncertainty about the model in a principled way by determining probabilities of the outcomes. It can solve diagnostic and predictive problems. It provides prior knowledge and observed data can be combined. It also provides a useful perspective for understanding and evaluating many learning algorithms.

IV. Probabilistic Model

Abstractly, naive Bayes is a conditional probability model: given a problem instance to be classified, represented by a vector $\mathbf{x} = (x_1, \ldots, x_n)$ representing some *n* features (independent variables), it assigns to this instance probabilities

$$p(C_k|x_1, \ldots, x_n)$$

for each of *K* possible outcomes or classes.

The problem with the above formulation is that if the number of features *n* is large or if a feature can take on a large number of values, then basing such a model on probability tables is infeasible. We therefore reformulate the model to make it more tractable. Using Bayes' theorem, the conditional probability can be decomposed as

$$p(C_k|\mathbf{x}) = \frac{p(C_k)\ p(\mathbf{x}|C_k)}{p(\mathbf{x})}$$

In plain English, using Bayesian probability terminology, the above equation can be written as

$$\text{posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}}$$

In practice, there is interest only in the numerator of that fraction, because the denominator does not depend on C and the values of the features F_i are given, so that the denominator is effectively constant. The numerator is equivalent to the joint probability model

$$p(C_k, x_1, \ldots, x_n)$$

which can be rewritten as follows, using the chain rule for repeated applications of the definition of conditional probability:

$$\begin{aligned} p(C_k, x_1, \ldots, x_n) &= p(x_1, \ldots, x_n, C_k) \\ &= p(x_1|x_2, \ldots, x_n, C_k)p(x_2, \ldots, x_n, C_k) \\ &= p(x_1|x_2, \ldots, x_n, C_k)p(x_2|x_3, \ldots, x_n, C_k)p(x_3, \ldots, x_n, C_k) \\ &= \ldots \\ &= p(x_1|x_2, \ldots, x_n, C_k)p(x_2|x_3, \ldots, x_n, C_k)\ldots p(x_{n-1}|x_n, C_k)p(x_n|C_k)p(C_k) \end{aligned}$$

Now the "naive" conditional independence assumptions come into play: assume that each feature F_i is conditionally independent of every other feature F_j for $j \neq i$, given the category C. This means that

$$p(x_i|x_{i+1}, \ldots, x_n, C_k) = p(x_i|C_k),$$

for $i = 1, \ldots, n-1$. Thus, the joint model can be expressed as

$$\begin{aligned} p(C_k|x_1, \ldots, x_n) &\propto p(C_k, x_1, \ldots, x_n) \\ &\propto p(C_k)\ p(x_1|C_k)\ p(x_2|C_k)\ p(x_2|C_k)\ \cdots \\ &\propto p(C_k) \prod_{i=1}^{n} p(x_i|C_k)\,. \end{aligned}$$

This means that under the above independence assumptions, the conditional distribution over the class variable C is:

$$p(C_k|x_1, \ldots, x_n) = \frac{1}{Z} p(C_k) \prod_{i=1}^{n} p(x_i|C_k)$$

where the evidence $Z = p(\mathbf{x})$ is a scaling factor dependent only on $x_1, \ldots, x_n$, that is, a constant if the values of the feature variables are known.

Constructing a classifier from the probability model.

The discussion so far has derived the independent feature model, that is, the naive Bayes probability model. The naive Bayes classifier combines this model with

a decision rule. One common rule is to pick the hypothesis that is most probable; this is known as the maximum a posteriori or MAP decision rule. The corresponding classifier, a Bayes classifier, is the function that assigns a class label $\hat{y} = C_k$ for some *k* as follows:

$$\hat{y} = \underset{k \in \{1,\dots,K\}}{\operatorname{argmax}} \; p(C_k) \prod_{i=1}^{n} p(x_i | C_k).$$

V. CONCLUSION

In this paper the attempt has been made to review the literature on Supply Chain Management and Data mining. We have presented a literature review for 5 research papers. This paper proposes the application of data mining techniques in supply chain management of a company. We use data mining concept in the form of components, to achieve the organization, management and retrieval of the components. Through data mining componentization, the efficiency is improved significantly to meet various application demands of the individual business. We tried to use the discussion method in analysis of these papers and had no attempt to make any quantitative analysis, which can be used in future researches.

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