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Bike Part E-Tailer System Using Apriori Algorithm

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Abstract: *This is an online Bike and bike parts store that has listings of various bikes along with their features. It also consists of Bike service Registration. The system allows user to check various articles submitted by user and even comment on them. User can even rent bikes using our system feature dubbed 'Rent a bike' . This system allows user to buy a bike, bike parts and inventory online. The visitor who visits the system must register himself before making a purchase. After registration user can login to the system with his username and password in order to access the system. User can browse/search the whole bike inventory and can also check the features of a bike. Inventory parts and accessories for the same are also listed. User may select the product and can add the product to shopping cart. They can pay using various payment methods listed. This system is a combination of both sales and inventory management. They can easily purchase bike or bike parts by using this system without visiting a dealership. He/She can view the bike and bike parts in an effective GUI. User can compare the products in order to purchase a better product.*

Keywords: *Bike services, GUI, inventory management ,'Rent a bike', sales management.*

I. Introduction

As far as the present situation is concerned, there is no perfect place online where we get any sort of bike parts online for basic Indian model bikes. Even if these parts are found, we have to find a mechanic to assemble that spare parts. Online sites available are either common ecommerce websites like amazon, ebay etc. Any other available bike portals provide only sports bike parts and other premium bike accessories. We are building an ecommerce website that contains all sorts of common Indian bike parts along with the mechanics in a reasonable price so that there won't be any sort of difficulty in buying and assembling the required part.

The proposed system is an online Bike and bike parts store that has listings of various bike along with their features. It also consists of Bike service Registration. System allow user to check various articles submitted by user and even comment on them. Credit card payment facility is also available. "Rent a Bike" feature allows users to rent bikes on demand. It will provide suggestions according to your choices so as to easy for customer to choose among various parts. Each bike will be separated according to model, type, engine etc. and other sorting methods. Mechanics will be available at door step for any sort of mechanical failures. Customer will be able to compare, sort, comment, request online on websites. Average rating given by customer will be provided on one click. This system is an effective application of sales and inventory management. User can easily purchase bike or bike parts by using this system user does not have to come manually to shop to purchase the product. He can view the bike and bike parts in full view and have a clear representation of the product . User can view features of each product and can compare the products in order to purchase a better product. All sorts of features will be available on website like registration, buy, rent ,bike spare parts ,premium accessories etc. Mechanic will provide solutions with all sorts of assemblies and failures. Customer will be provided with bike ratings,features ,reviews, comments ,suggestions etc.

II. Literature Survey

The Internet and other new technologies have created a number of intriguing and imaginative ways to deliver value to the customer while increasing the income potential of the merchant .The Web, as a place for e-commerce, brings both advantages and challenges. While e-commerce has the same goal as any other form of commerce, that is to maximize the amount of sold goods and thus the generated income, it differs from it in many respects.[1]While it is relatively easy to gather information, its volume may lead to an information overload. It is only processed information that can be useful to the user (merchant).[2]

When considering the case of an e-store, we notice a small paradox, which needs to be appropriately addressed. On the one hand, it is easy to provide the potential customer with more information about product(s) and service(s) that we try to sell (and large amount of such information is also available in a multitude of additional, Internet based repositories). On the other hand, e-stores have to convince the customer to shop without the support of a human being (and without any physical contact with the product). Therefore, it is important to develop an environment such that when buyers make their purchasing decisions, they can feel like being in a traditional store. In response to these opportunities and challenges, the development of successful e-

commerce platform requires creation of an appropriate infrastructure that will support the required functionality.[2] We have 2 goals here. First ,to present an overall infrastructure of an e-commerce endeavor. Second, to discuss the required functionalities to satisfy the potential client and support the merchant. While pursuing this goal, we have to make it clear, that we are approaching this problem form the merchants' point of view (the ultimate goal of the system being profit maximization). Here, the increment of profits is achieved through the fulfillment of clients' needs, and in turn increasing the likelihood of the client purchasing the goods. The e-commerce system can be described in a number of ways. We have decided to proceed with the functional decomposition first, as it gives us a natural way of presenting the highest level of abstraction of the system design. At this level of detail we have combined some more specific functions into joint units, which will have to be put together during the system development process. [3] Economists have predicted that e-commerce will drive an escalated price competition, as consumers now have more information about products. Research by four economists at the University of Chicago has found that the growth of online shopping has also affected industry norm in two areas that have seen significant growth in e-commerce, bookshops and travel agencies. Generally, larger firms are able to use economies of scale and offer lower prices than local small shops .The lone exception to this pattern has been the very smallest category of bookseller, shops with between one and four employees, which seem to be an exception to the trend [4].Every business is different, even each business differs but the requirement of power is same for all and today it is important to live on the internet to stay competitive. In the long run the net operating cost of a website becomes insignificant compared to the return on the investment that advertisements deliver [5].E-commerce expands the marketplace to national and international markets. It reduces the cost of dealing with traditional paper based information by going digital which allows reduced inventories and overhead by facilitating "pull" type supply chain management. The pull type processing allows for customization of products and services which provides competitive advantage to its implementers and reduces the time between the outlay of capital and the receipt of products and services. The platform supports business processes reengineering (BPR) efforts and also reduces telecommunications cost as Internet is much cheaper and faster than other digital communication methods [6].

III. Equations

The Given System will be implemented using Apriori Algorithm for Data Mining. Apriori is an algorithm for frequent item set mining and association rule learning over transactional databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database.

Association rule learning is a method for finding relationships between data in all the big databases.

Let $I=\{i_1, i_2, i3\ldots.. i_n\}$ be a set of n attributes called items and $D=\{t_1,t_2,\ldots..t_n\}$ be the set of transactions. It is called database. Every transaction, t_i in D has a unique transaction ID, and it consists of a subset of itemsets in I.[7] A rule can be defined as an implication, $X \rightarrow Y$ where X and Y are subsets of I($X,Y \subseteq I$) and they have no element in common, i.e., $X \cap Y$. X and Y are the antecedent and the consequent of the rule, respectively.

Let's take an easy example from the supermarket sphere. The example that we are considering is quite small and in practical situations, datasets contain millions or billions of transactions. The set of itemsets, I ={Plywood, Tools, Laminate, Adhesive, Pillow/Cushion} and a database consisting of six transactions. Each transaction is a tuple of 0's and 1's where 0 represents the absence of an item and 1 the presence.

An example for a rule in this scenario would be {Plywood, Laminate} => {Tools}, which means that if plywood and laminate are bought, customers also buy tools.

Transaction ID	Plywood	Laminat e	Tools	Adhesi ve	Pillow/ Cusion
T_1	1	1	1	0	0
T_2	0	1	1	1	0
T_3	0	0	0	1	1
T_4	1	1	0	1	0
T_5	1	1	1	0	1
T_6	1	1	1	1	1

TABLE 1: Transactions of Items

There are multiple rules possible even from a very small database.constraints on various measures are used in order to select interesting objects according to user. We will look at some of these useful measures such as support, confidence, lift and conviction.

Support

The ratio of an itemset X, supp(X) gives transaction in the database in which the item X appears. Ratio gives a popularity of particular item in that domain.

$$\text{supp}(X) = \frac{\text{Number of transactions in which X appears}}{\text{Total number of transactions}} \quad (1)$$

From (1) we get , supp(Plywood)= 4/6 = 0.66667

Ratio of products which have meaningful effect on profit can be considered as the support threshold. Furthermore, we can identify itemsets that have support values beyond this threshold as significant itemsets.[7]

Confidence

Confidence of a rule is defined as follows:

$$\text{conf}(X \rightarrow Y) = \frac{\text{supp}(X \cup Y)}{\text{supp}(X)} \quad (2)$$

It signifies the likelihood of item Y being purchased when item X is purchased. So, for the rule {Plywood, Laminate} => {Tools},

This implies that for 75% of the transactions containing plywood and Laminates, the rule is correct. It can also be interpreted as the conditional probability P(Y|X), i.e, the probability of finding the itemset Y in transactions given the transaction already contains X.

It only takes into account the popularity of the itemset X and not the popularity of Y.Suppose Y is equally popular as X then if transaction with Y should contain X also. To overcome this drawback there is another measure called lift.[7]

Lift

The lift of a rule is defined as:

$$\text{lift}(X \rightarrow Y) = \frac{\text{supp}(X \cup Y)}{\text{supp}(X) * \text{supp}(Y)} \quad (3)$$

This signifies the likelihood of the itemset Y being purchased when item X is purchased while taking into account the popularity of Y.

In our example above,

If the value of lift is greater than 1, it means that the itemset Y is likely to be bought with itemset X, while a value less than 1 implies that itemset Y is unlikely to be bought if the itemset X is bought.[7]

Conviction

The conviction of a rule can be defined as:

$$\text{conv}(X \rightarrow Y) = \frac{1-\text{supp}(Y)}{1-\text{conf}(X \rightarrow Y)} \quad (4)$$

For the rule {plywood, Laminate}=>{Tools}

The conviction value of 1.32 means that the rule {plywood ,Laminate}=>{Tools} would be incorrect 32% more often if the association between X and Y was an accidental chance.[7]

IV. Proposed System

IV.I Context Level Diagram: The Given System is now represented on a context level. The system has a dministrator which has control over all the proceedings and sales of the product. The admin makes sure that

each user interaction is legitimate and non-fraudulent. The database is updated with each inventory change and purchase order.

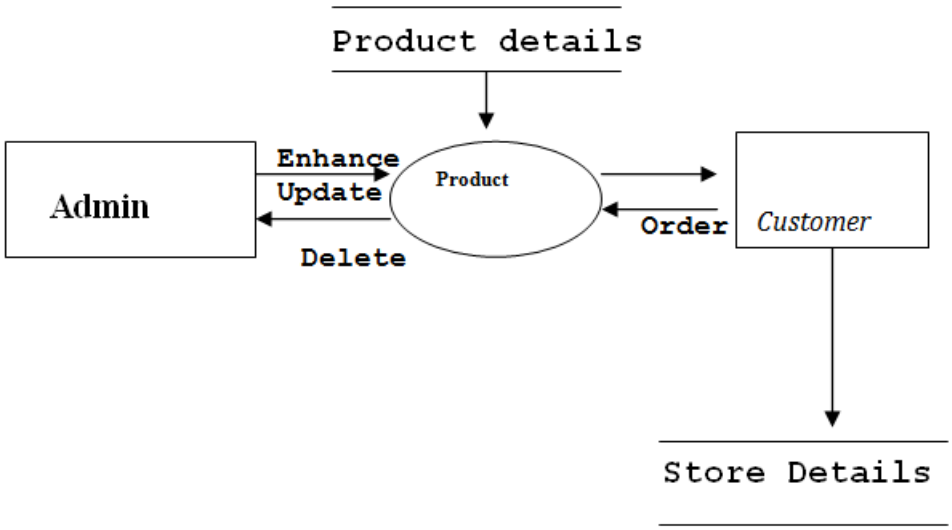

Figure 1.1 Context Diagram

VI.II DFD Diagram: Data Flow Diagram signifies the data flow for a certain action in the system. Fig 2.1 shows how the customer interacts with a product

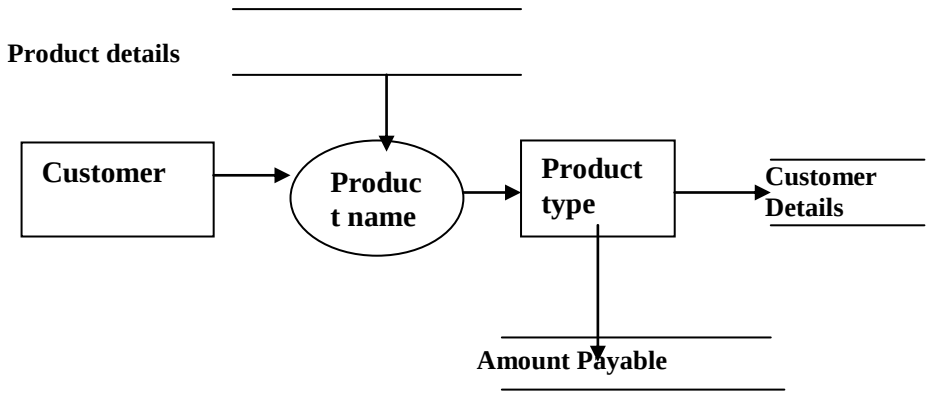

Figure 2.1 DFD Level 1

Fig 2.2 shows the data flow when a user is browsing the product catalogue to purchase a product.It even shows a shopping cart mechanism where all the items/products purchased by the user are stored which is then payed for and necessary shipping details are given by the user

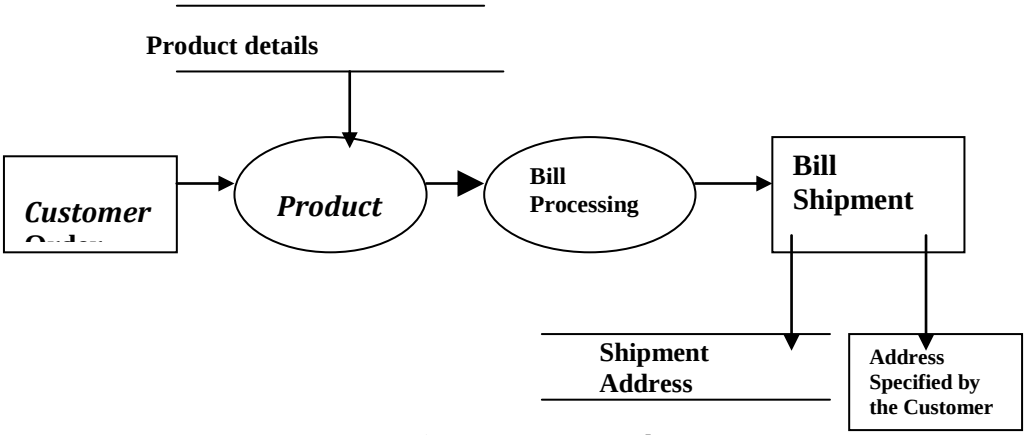

Figure 2.2 DFD Level

IV.III Website Preview: Fig3.1 show a product catalogue example for the system wherein various bikes are being displayed which when clicked present information about the same bike along with potential modifications and provided spare parts. The user can purchase/rent a bike once he/she is registered on the website and the authentications checks are done for the same. Fig 3.2 shows a login in/signup page for the website.

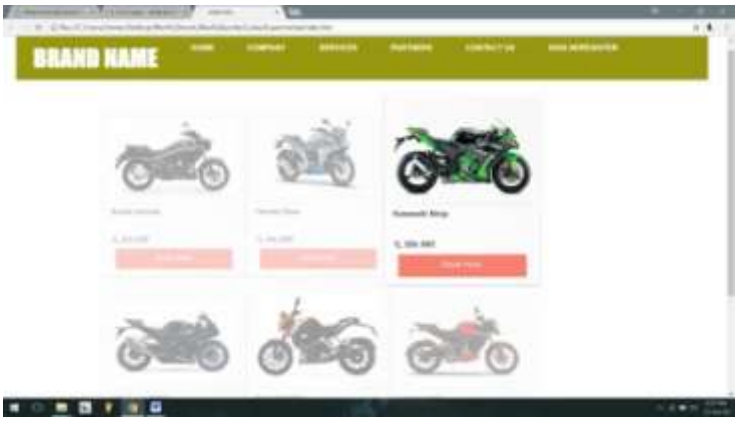

Figure 3.1 Home page

Figure 3.2 Sign in page

V. Future Scope

This system provides a good opportunity to the user/consumer which compare, buy or rent a bike at their convenience without stepping out their homes. The system will definitely provide customer satisfaction by recommending bikes and products based on similar searches and remove any redundant/unwanted results. This system will eventually be a stepping stone into already blooming e-commerce market which has seen exponential growth in the past few years. It will in course of time replace traditional dealerships and provide a doorstep solution to buying automobiles. Even automobile companies can save money by bypassing dealerships entirely and provide direct to customer.

The user has total freedom to modify his/her bike with our system. The 'Rent a Bike' feature will certainly appeal to a lot of users having temporary needs. The mechanic on call feature provides the user with nearby mechanic as well as non-negotiable and fair prices for the service provided.

VI. Conclusion

The trend of shopping has changed over the last few years in which a steep increase in online shopping has created a huge potential at home and convenience shopping which appeals to the people living a busy lifestyle. This market can be exploited and a new niche market for selling automobiles can bring a lot of customers. Inflated prices and agent fees/commission can be a huge put off in traditional dealership markets. This however can be totally eliminated in our system. However it is affected by the same drawbacks as a online system which may bring in unreliability when consider the significant amount of money involved.

The System is Easy to use with its effective GUI and is compatible with any mobile device or desktop. Added features such as rent a bike and endless customization options make the system a complete package.

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