Discount Based Prediction for Business Systems

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***Abstract*-E commerce refers to buying and selling of products or services over electronic systems such as interne. As E commerce is growing fast companies are willing to spend more on improving online experiences. Currently many systems are in existence which allow user to purchase products online. Various e commerce systems give discount on product and allow user to buy product online. The basic idea used here is to predict the product sale based on discount applied to the product. Our analysis concentrates on how customer behaves when discount is allotted to him. We wish to develop a model which will find out the customer behaviour when discount is applied to the product. In this project customers view regarding particular product will be examined.**

***Keywords*-Data Mining, e-commerce, click stream, customer behavior, product sale, discount.**

I. INTRODUCTION

There are different types of e commerce such as business to business, business to consumer, business to employee, consumer to consumer and consumer to business. Many businesses to consumer models exist today. Various ecommerce researches are done in analyzing the customer behavior related to product, browsing behavior etc. The idea basically is to create a system that learns the response provided by a customer to the stimulus giving to him as a discount. The system will help to understand the behavioral pattern of a customer so that the executive management can take expert right time steps to see that business continues in a straight forward manner without ups and downs.In the section following we have analysed the work done by others in similar domain. Data collection is then carried on through historical sources to set threshold points and online user data is used to generate the behaviour of the customer.

The methodology used is based on monitoring the user activities by creating user login and initializing the user session. While user is logged on to the system a user can select the product based on discount applied to the product. We need to save all details regarding a user and his purchase of product into the database. By analyzing these details we generate results.

The algorithm required for the this work is given in pseudo code

Step 1: Create User Login
Step 2: Initialize User session
Step 3: While user session is on

- Allow user to browse and purchase products
- Add products to customer shopping cart
- View final price
- Check Delivery Information
- Check Payment method
- Make Confirmation from User
- Store whole information into database

Done
Step 4: Analyze stored data.
Step 5: calculate number of products sold based on Discount
Step 6: display results

After analysing the results achived, we see that if discount increases number of product sold also increases but at some point when product sale increases too much, product sale automatically decreases as it creates doubt in the customer mind regarding the quality of product. This anaytical work will definately be useful to executives of supermarkets who can take decisions on the product retention.

II. RELATED WORK

Sungjoo Lee, Seunghoon Lee, Yongtae Park developed a prediction model using decision tree which showed superior prediction accuracy to conventional techniques. The results helped to predict online success judging from customer acceptance and afford a better understanding of how to facilitate future adoption of services in e-commerce [3].

Shuchih Ernest Chang, S. Wesley Changchien, Ru-Hui Huang proposed a knowledge level assessment system (KLAS). KLAS was designed to ameliorate the constrains of the log based and the agent based web usage mining techniques by using a server-side approach to track and record users' browsing behaviors on the website[4].

Blue Martini Software was developed by Suhail Ansari, Ron Kohavi, Llew Mason, and Zijian Zheng. They proposed an architecture that successfully integrates data mining with an e-commerce system. The proposed architecture consists of three main components: Business Data Definition, Customer Interaction, and Analysis, which are connected using data transfer bridges. This integration effectively solves several major problems associated with horizontal data mining tools including the enormous effort required in preprocessing of the data before it can be used for mining, and making the results of mining actionable[5].

Randolph E. Bucklin, and Caterina Sismerio, have explained clickstream data analysis in "Click Here for Internet Insight: Advances in ClickStream Data Analysis in Marketing". They have review major developments from the analysis of clickstream data, covering advances in understanding (1) browsing and site usage behaviour on the Internet, (2) the Internet's role and effectiveness as a new medium for advertising and persuasion, and (3) shopping behaviour on the Internet (i.e., electronic commerce)[6].

Alan L Montgomery, Shibo Li, Kannan Srinivasan, and John C. Liechty (2004) developed a statistical model that analyze

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the page by page viewing of visitor as they browse through a web site by using click stream technique. They show how path information can be categorized and modeled using a dynamic multinomial probit model of web browsing. Their results are helpful in predicting future movements of customer at a web site [7].

After going through related work we come to a state which shows data mining has been extensively used in the past for analyzing huge collections of data, and is currently being applied to a variety of domains. More recently, various data mining techniques have been proposed and used in the more specific context of e commerce. Different recommender systems are used on many web sites to help users find interesting items, then predict a user's preference and suggest items by analyzing the past preference information of users. We wish to develop a model which will find out the customer behaviour when discount is applied to the product. In this paper the customers view regarding a particular product will be examined. How a customer behaves when discount is applied to the product is our object of interest. None of the previous systems made such type of analysis. We have developed software which allows a user to purchase a product based on discount and then we analyze the behaviour of the customer.

III. DATA COLLECTION

The data collection is part of every customer login. Customer logs into the system and his behaviour is recorded by using click stream technique. Our software has two modules, a User/Customer module and an Admin module. Data is collected in user module, according to the data collection reports from online sources and historical data collected from super markets and media results are generated in the Admin module. The data collected from historical sources pinpoints the discount on various products and the online data is used to identify the customer behaviour.

IV. EMPIRICAL STUDY

Data mining, which is also referred to as knowledge discovery in databases, is a process of nontrivial extraction of implicit, previously unknown and potentially useful information (such as knowledge rules, constraints, and regularities) from data in databases [8]. Data mining draws on the results from various fields, such as database systems, machine learning, intelligent information systems, statistics, and expert systems [9]. The study focuses on behavioural model. It is part of business to consumer e commerce type. The software starts with login module. Only authorized user can login into the system. The login page for administrator and user is same. After login into the system they differ in only the privileges given to them.

A. User/Customer Module

In customer module, he/she has to login into the system. Then customer has to browse, select and purchase different products according to his/her choice. Based on the selection of products different kind of analysis is done. The login page for customer is shown in figure 1. New customer can click on "Click Here to Create an Account" link and sign up form will be displayed to the customer. User has to fill complete information in sign up form like first name, last name, date of birth, occupation, email address, residential address, city, state and password. If any wrong information is keyed, then system will give an error message and will not allow the user to submit the form. After filling all the information the customer can click on Submit button, so that the customer account will be created and congratulation message will be shown to the customer.

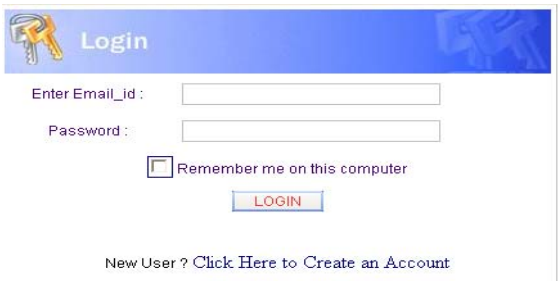

Fig. 1 Customer Login Module

Customer can login to the system by giving login information as email_id and password. After login customer can view his/her privileges as shown in figure 2.

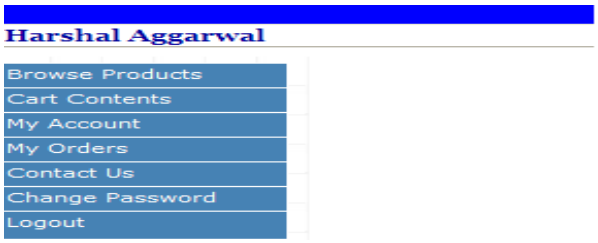

Fig. 2 Customer Privileges

Customer has different privileges, like Browse products, Cart contents, My Account, My Orders, Contact Us, Change Password and Logout.

1) Browse Products: Customer can browse the products by selecting category name and manufacturer name. Customer can click on the product image to see the description about product. The "Buy Now" option is also given on product description page. Customer can select a "Bye Now" option on product description page or browse products page. After selecting "Buy Now" option user can enter quantity of product to purchase and can click on "Checkout" button to add the product into shopping cart.

2) Cart Contents: As shown in figure 3, customers can select as many products as he wants by clicking on "Select another Product" and add it into the cart. After purchasing the entire products customer should select payment method either "Cash on Delivery" or "PayPal". Finally customer should confirm the order by clicking on "Confirm Order" button. Customer can confirm order by checking details of shipping address, cart contents, payment method and contact number. After final order confirmation message "Thank you! Your Order Has

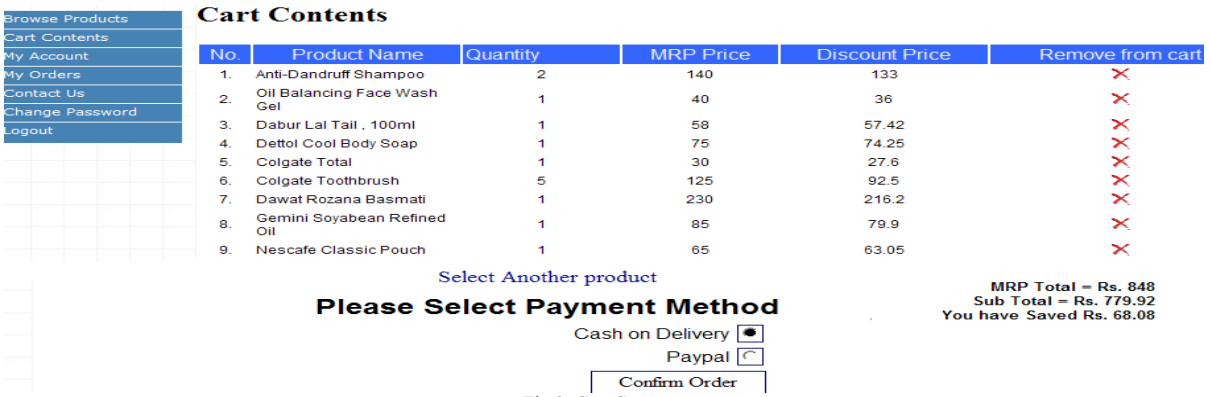

Fig 3. Cart Contents

Been Processed! You can see details of your order in My Orders privilege." will be display to customer.

3) My Orders: Customer can check the orders status information by clicking on "My orders". List of the orders can be shown to the customer along with status information that is whether order is delivered or in process. By clicking on particular order the complete information can be shown to customer related to the order.

4) My Account: If customer wants to change his/her own information then it is possible to access account information and modify it by clicking on "My Account" privilege.

5) Contact Us: Customer can write their own comments or problems to administrator by giving their name, email address and comment.

6) Change Password: Customer can change his/her password by giving old password and new password.

B. ADMIN MODULE

Login page for administrator and customer are same. Administrator has to give username and password and then he/she can enter into the system. Using click stream technique in customer module customer data is collected and stored into the database. After correct login, administrator logs into system and can get different privileges like, Category -> View All, Add Category, Modify/Delete, Manufacturer - > View All, Add, Modify/Delete, Product-> Add/ Modify/Delete, Apply Discount, Order Status, Reports, Change Password and logout.

1) View All Categories: Administrator can view all categories as shown in figure 4. All privileges are also shown in figure 4.

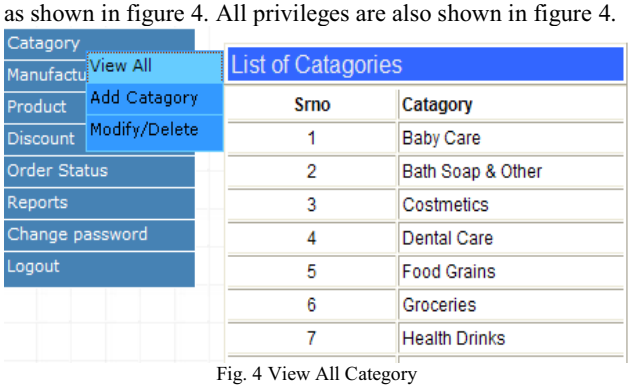

Fig. 4 View All Category

2) Add Category: To add new category administrator has to click on Add Category option and enter category name, after clicking on submit button category name will be saved into database.

3) Add Manufacturer: Based on category, manufacturer will be added into database. Administrator has to select category first and then has to enter manufacturer name.

4) Manufacturer -View All: Like category administrator can also view all manufacturer based on category selected. An administrator can select a category and respective manufacturer will be displayed to administrator.

5) Add Product: Products are classified according to category and manufacturer. So to add product it is necessary to select first category and then manufacturer. All product description like product name, description, image, quantity, mrp price, product date added, and discount has to enter by administrator. After clicking on submit button product will be added into database.

6) Apply Discount: As the study is based on discount, it is necessary to apply different discount on products. Administrator has these rights to do. The administrator can select a product and can apply various discounts to products.

7) Order Status: Order status can be shown to the administrator, like whether order is in "In Process" or it is "Delivered". Figure 9 shows that order has been "Delivered". Similar results are generated for order status "In process". Administrator has to select dates and result will be displayed to administrator with status "In Process". Both results contain customer name, order total amount, purchase date, delivered date, status (Delivered/In Process) and Payment Method.

8) Reports: In administrator module reports are generated based on customer shopping. Using these reports customer behaviour related to particular product is examined. Administrator has to select a particular product and result related to that product will be displayed as is shown in figure 5. This report is based on discount applied to the product. It shows number of product sold based on various discount. As shown in figure 5 graphical reports are generated based on discount applied to the product. As shown in figure customer behaviour is examined.

Select Product: Kohinoor Chaarminar

Submit Reset

Sr.No.	Discount Applied	No. of Product Sold
1	3 %	14
2	8 %	23
3	10 %	25
4	12 %	29
5	16 %	32
6	20 %	37
7	25 %	40
8	28 %	48
9	32 %	52
10	40 %	55
11	57 %	56
12	67 %	20

Graphical Representation

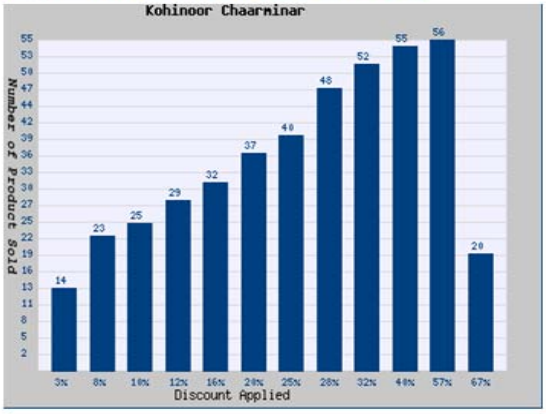

Fig.5 Reports

We see that if discount increases number of product sold also increases but at some point when product sale increases too much, product sale automatically decreases as it creates doubt in the customer mind regarding the product.

C.FUTURE SCOPE

This work is related to the prediction of product sale based on discount applied to the product. As discount increases product sale also increases but if product sale increases to large extent then automatically product sale goes down. This study can be extended to compare the product sale based on discount and without discount. We can analyze the product sale when discount is not applied to any product i.e. it's actual MRP price and also analyze the product sale when discount is applied to it. Thus we can compare the results of both and our prediction can be determined that if discount is applied then product sale automatically increases as compare to it without discount. Today there are different offers on different product i.e. one product can be sold free with another product. So the study can also be extended by analysis of product sale when it is sold alone and when another product is made to be sold free with this product.

D. CONCLUSION

This methodology aims at designing and developing software which will give an edge over present e-commerce existing systems. However, this data provides only the end result of the process, and that too decisions that ended up in product purchase. Click-stream data provides the opportunity for a detailed look at the decision making process itself, and knowledge extracted from it can be used for optimizing the process [10]. Our processing model is requiring in understanding users' behavior in traditional shops. We have created a system that learns the response provided by a customer to the incentive giving to him as a discount. Our primary purpose has been to show customer behavior when discount is applied to the product. Our narrow focus is on click stream data. Based on the click stream technique collect the information and store it into database and log files. By using this information we generate the result which shows customer behavior on the product purchase when discount is applied to it.

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