

Analysing the Purchase Behavior of a Customer for Improving the Sales of a Product

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Abstract: Modern techniques such as predictive analytics have gained a lot of research attraction these days. In the competitive world, it is important for a business people to predict the pulse of customer to shine. With predictive analytics, it is possible to see what a customer will buy next. The goal is to increase the profit earned by a company. In this paper, various hypothesis tests have been conducted for analysing the purchases of a customer. Initially, the purchases have been analysed by grouping the purchases gender wise and by analysing what group of people buy more products. It also finds out which group prefers for promotion codes and discounts and for what type of products they preferred more. In which store, the sales of products are more and in which state, the sales are maximum. Based on this, techniques for improving the sales of a product is suggested.

Keywords- Data Analytics, Purchasing behaviour, product recommendation, Predictive Analytics, Data mining

I. INTRODUCTION

In the era of e-commerce, it is important to predict the pulse of the customer to survive in the market. In general, the customer purchasing behaviour can be classified based on factors like how many products have been purchased, in which location the purchasing is more, what type of people uses promocodes and how much sales have been improved by applying promocodes. All the e-commerce websites are providing offers through promocodes for improving the sales profit. But does all the people uses promocodes? No. The reason is people goes to shop for purchasing, purchase products and go on. They are not aware of the promocodes. Also, does all the products which uses promocodes are selling more? No. Even if we offer promocodes, people are not buying some products. This is the case if we consider online shopping too. Online shopping has one more thing to consider which area the product sales is more and from which shop the sales is more out of many available shops for the same product. By considering all these things, the data has to be analysed for improving the product sales by using classification algorithms [8], [9]. In this paper, various hypothesis testing have been conducted by considering the factors like which gender has purchased more, who have used promocodes, what kind of product is purchased more, in which location the sales are more and in which state, the sales profit is maximum.

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Based on this, promotional techniques for improving the sales profit has been suggested. The rest of the paper is as follows: Related Work section discusses about the works already done related to our problem statement. The proposed system section discusses the methodology and techniques used for analysing the data. Implementation Results section shows how the selected features affect the purchasing behaviour in the form of graphs. The last section deals with the conclusion part of our research and the future work which can be done.

II. RELATED WORK

A. Influence of Sales Promotion

Mahsa Familmaleki et al [1] in his work discussed about the influence of sales promotion on customer purchasing behaviour. There are many tools available to increase the product sales in the market. Marketing strategies has been followed to retain the existing customer, to make new customers buy etc. In this paper, various tools such as free samples, discounts, providing gift vouchers, coupon codes has been analysed and how it affects the customer buying behaviour has been studied. According to them, there are four major parameters affecting the customer buying behaviour. The factors are culture, social groups, gender and religion. The customer's buying behaviour is not predicted by a single parameter. The people are buying the products based on the needs only.

Aurangzeb et al [2] in their work discussed about the various promotional tools and the attitude of people towards the promotional tools. Buy-one-Get-one offer is one of the best marketing strategy to improve the sales. Gift coupons and the physical surrounding also play vital roles in the purchasing behaviour.

B. Purchasing Pattern

Sangvikor et al [3] in their work analysed the purchasing pattern of customer and found that the behaviour depends on the price discount and the quality of products. They have made 3 hypothesis testing such as which things are purchased in which order, which parameters affects the purchasing patterns and the preference of the retail stores by the customer. The researchers concluded their work by the buying behaviour changes positively with respect to the price discount and negatively with the poor quality of the products.

III. PROPOSED SYSTEM

The proposed system consists of 3 modules namely data preprocessing, data analysis and prediction.

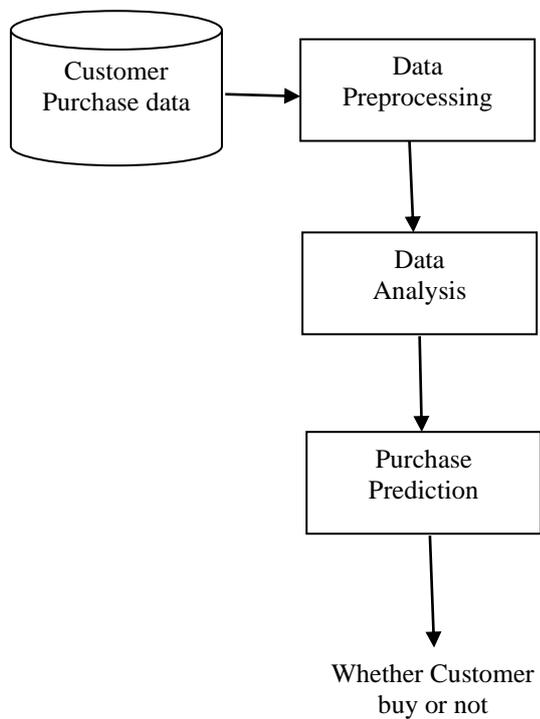


Figure 1. Proposed System

A. Data Preprocessing

The purpose of this module is clean the data. Most of the time, when we collect data from the customers, not all the people will be willing to fill the data. Some will do, some will hesitate and some others will fill the data partially. But while processing, we need to process the complete set of data. In this case, the partially filled data can be converted into complete one, by replacing the missing one with the most probable data.

B. Data Analysis

In this module, the attribute which contributes for the purchasing behaviour of the product has been identified. The analysis has been done on the following assumptions:

- a. Gender wise analysis of buying products
- b. Usage of promocodes among customers
- c. By combining the assumption 1 and 2, which gender prefers promocodes has been done
- d. In which store the sales is more
- e. Which store uses more promocodes for sales

C. Prediction

The last module in our paper is the prediction algorithm. In this module, we have planned to do prediction of which products will most likely be purchased by the customer. We think of applying random forest algorithm for the prediction. Why Random forest algorithm is preferred? The analysis can be done as a set of decision trees and random forest uses the average of decision trees. This is the reason for preferring the random forest method.

IV. IMPLEMENTATION RESULTS

The implementation has been done using tool R [4]. The dataset we have chosen is the Big Bazaar store dataset for the past 2 years from May 2015 to June 2017. The dataset consists of the following attributes: customer id, gender,

state, pin code, date of birth, store code, store description, promo code, promo description, product code, product description, discount used etc. Based on the attributes available, the following results have been achieved.

The data is pre-processed to replace the missing values such as gender, state and pin code values based on the other available values. After pre-processing, the data is subjected to various tests for identifying the purchasing behaviour.

The details of the attributes from the dataset is as follows:

- Total Number of Records: 1048575
- Total Number of Customers: 24513
- Total Number of Products: 23260
- Total Number of Transactions: 60059
- Total Number of Stores: 5
- Total Number of Promocodes: 28420

A. Gender wise Analysis

Initially the gender wise data analysis has been done and the result is shown in figure 2.

- Number of Male Customers: 15818
- Number of Female Customers: 7954
- Others: 741

The number of purchases has been done more by male category when compared with female. The analysis clearly describes that we need to promote more among the female customers.

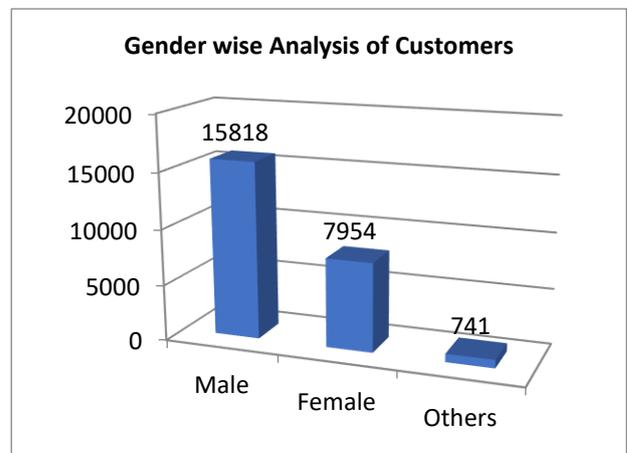


Figure 2. Gender wise Analysis

B. Usage of Promocodes among customers

Here, we have analysed is the number of customers who have applied promocodes. The result is shown in figure 3.

The number of customers who have applied promocodes is 20779. Out of that, the number of male customers who have applied promocodes is 13326, the number of female customers who have applied promocodes is 6829 and the rest is 624.

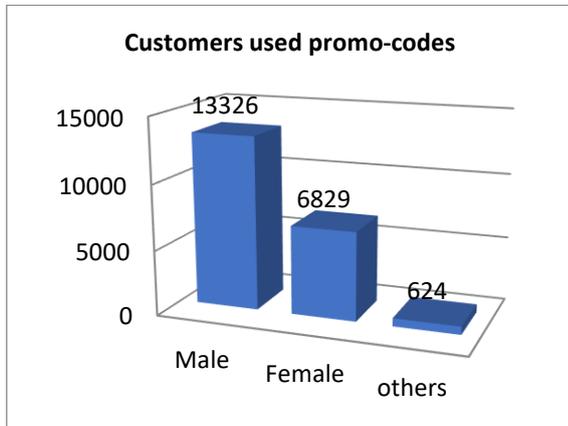


Figure 3. Use of Promocodes

C. Gender applied promocodes

Comparing the results obtained from A and B, eventhough the number of purchases is made more by the male category, the number of promocodes have been applied more by the female. The result is shown in figure 4. Out of the number of customers available, 84.24% of male customers have applied promocodes for atleast one product in their entire purchase history whereas the percentage of female customers is 85.85.

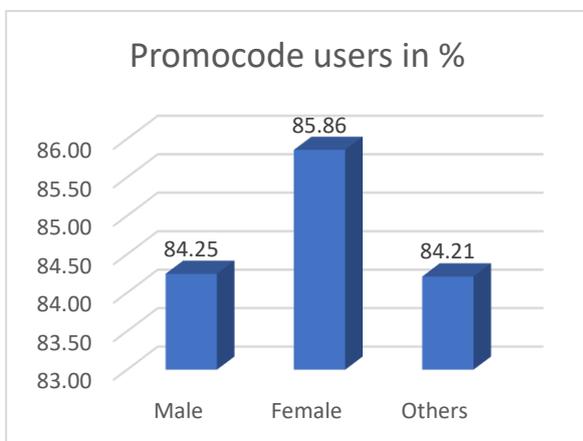


Figure 4. Promocode Users

D. Maximum Sales in a Store

The total sales in each store is shown in the figure 5. From the figure, it is clear that Indore-malhar store has shown maximum sales.



Figure 5. Total Sales in a Store

V. CONCLUSION AND FUTURE WORK

To conclude with the analysis, we have understood the online purchasing must be emphasized and improved more among female customers whereas the use of promo codes must be emphasized with both genders.

The future work of this paper can be suggesting promotional tools for improving the sales profit, predicting which products the customer buy most and providing marketing strategies for improving the sales.

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