Consumer product preference prediction towards online shopping

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Abstract—Nowadays E-commerce plays a major role in a business organization. People prefer online shopping rather than offline shopping which helps them to purchase their product from anywhere around the world through mobile phones and laptop. Online shopping websites help people by saving time and product order can be done easily by clicking the product. Online shopping websites are built using the Single Page Application (SPA) framework and the objective of this research is to find the customer preference product prediction by tracking the frequent clicks of the product by the customer. By tracking the clicks of customer we can find their product choice and helps retailer to add the products according to user preference.

Keywords—E-commerce, SPA, Frequent time click, Bcrypt hash, Middleware

1. Introduction

Online shopping website with customer preference prediction is an e-commerce website where customers buy the product from anywhere around the world. Online shopping is quite trending now due to development of generation. Anyone can search them with the help of search icon and can order the product by a single click. Instead moving from one to store to another we can switch multiple tab for comparing the product. The objective of this site is to track customer product preference prediction by using a SPA framework. Single Page Application framework is a web application which interacts with web browser dynamically and redirects to every page of the site easily. Concept of this work towards online shopping is to track the product click by the user and product search by categories, brands, and price. For example, the customer clicks the product, views the product detail and due to some reasons they won’t buy the product. But they view the product often. In this case, we have frequent time clicking (FTC) concept that will monitor the number of clicks given to the product by each customer. Custom search will record the customer search list details. Automatic pricing will automatically set the offer/discount to the website for a particular customer based on FTC and will push notification through Mail/SMS.

Cart revisiting is used to track the cart details of the customer. Trust is the main issues in online shopping. To increase the trust we can display the manufacturer name and authorized certificate given by the government along with quality certificate of the product. It increases the online shopping rate. We can give complete catalogue of the product. For example if the customer adds the product to the cart but didn’t buy the product, admin will monitor the time the customer adds their product and how long they are not ordering the process. By analysing these activities admin will remind them and push the product in main page every time from that we can predict the emotional appeal of the user which makes them buy the product. Apart from this, we have to maintain the data of customer securely using B-crypt hashing, middleware these are important aspects of website which will avoid hacking the site and customer account. Customer who buys product again and again from the site will
be sent a surprise gift and this will increase loyal customers to the site. And there is the possibility that they will recommend our site to their friends and family so there is a chance for increasing the visitors to the site. By these researches, we can improve the marketing strategy of the e-commerce site.

Content of the web has evolved from a single document to the rich document rather than using normal program language. The framework will be fast and easier while comparing to a normal programming language. SPA framework will interact with applications and it is fully loaded with business logic and transferred to the server. By using this SPA developer need not build code for all device. By using a framework we can easily embed single code into multiple devices that’s why web technology always have scope [1]. “Clickstream” activity can record all the activity logs of the employee which will help organisations to improve the efficiency of employees and abnormal tracks of the employee will be tracked. From that average performance of the employee will be analysed [2]. Referring this paper we included the concept of user log which tracks the user’s login activity and can find their interaction with website. This concept is used under the user preference tracking after the process of creating account and to know about the number of visitor to our site.

Online shopping website mostly used by the young generation are moving towards the technologies so that author tested the difference between two age group. According to their research youth are using online shopping above 30 years are not using they are still preferring offline shopping. The analysis shows the older people rate is significantly low. So the author motivates the people by bringing around-the-clock availability of loyalty program that may improve the growth of online purchasing [3]. Many people feel difficult to search the product in m-commerce due to screen size, browsing efficiency will be poor. So the author overcomes the problem constraints of screen size by the novel approach. Catalogue browsing makes users interact with product catalogue and recommended system helps the user to locate their relevant product so they implemented interactive catalogue browsing makes m-commerce to customize the process of users [4].

2. Survey on Comparison of Offline Shopping Versus Online Shopping
In our survey we collected samples of data towards online shopping vs. offline shopping. Analysis is done through multiple choice questions with reasoning. In offline shopping, the price of the products are high enough also the owner cannot predict product likes and dislikes of users. From that we got an idea of improving the sales of online shopping. As a result of this survey online shopping stands higher while comparing to offline and 15-30 age groups prefer them due to the reason that all the goods irrespective of usage is available in a single platform, user can return the product when they didn’t like, reduction of travel expenses, price and availability. Based on the product rating they prefer to buy the things. This is almost like superstitious belief for the people they decide according to product rate and review given by others.

Most of the users prefers Online Shopping as it have features like live picture without photo shoot, quality assurance, better UX for product accessibility, fast delivery, more offers can be given, and portal can suggest choice based on search and rating, cash on delivery for all the materials [8]. At a certain cases where few people accidentally get defective product and rarely some of them get another product instead of what they have ordered. So, this criterion can be improved, replacement warranty of the products is difficult to claim. Too much of advertisement should be reduced. From our survey many issues are categorised. In existing system they cannot find the product preference of individual customer and many person abandons cart process in-between because of these admin lost few customers and sales. In order to overcome some of these issues we have done a paper based on customer product prediction.
3. Methodology
In the customer product preference prediction system we are going to implement methods to predict the customer product prediction by using the SPA framework. SPA framework is a web application which interacts with users dynamically rather than loading entire pages from the server [1].

Figure 1 MVC architecture pattern.

SPA framework that follows MVC (Model View Controller) pattern is a software design which interacts with the user interface and it will integrate data, views and business logic. Figure 1 shows the MVC architecture pattern.

Model is nothing but a database where we store all data in a repository (MYSQL). The view is nothing but user action or layout of the model or website example (HTML, CSS). The controller performs business logic with the help of UI and data. Main motive of this research is to increase sales of the website and to get more customer. Seller will get more profit by tracking the customer product prediction by frequent time clicking, custom search, selective search, cart revisiting and automatic pricing. Figure 2 describes the flow of user preference tracking and we will describe the process one by one.

Figure 2 Flow diagram for User preference tracking.
3.1. Customer preference tracking
User interfaces plays a major role in every website and it will attract the user’s attention to buy the product. In this page, the product will be designed and displayed using a front end framework. Front end framework helps to design website and give responsiveness to the site. A responsive website means it will create a good look on any device screen. One of advantage of this is developer need not build a new site for all devices of varying screen sizes.

By using front end frameworks we can bring UI attractively that will give good look on all the devices and will interact with user behaviour [3]. The problem in UX was solved by using media query that will modify the changes according to screen size or resolution [4, 9].We made some improvement by implementing our techniques like UX for product accessibility and live picture without photo-shoot can be done by front end tool, portal suggestion will be given by search and click. Offer and low pricing is done by automatic pricing, product rating, brands suggestion are implement in cart revisit and pre order booking also included. Photoshop is the best thing to improve the image quality of product and it is very important feature in shopping site. Catchy content and detailed description of the product can attract the customer to buy the product.

Customer will login into the site to buy or view the complete details of the product and they need to fill the details like user name, address, mobile number, address, password to create an account. Security plays a major role in this world. Customer account is secured by applying Bcrypt hash function which changes plain text into non-plain text format like $2y$10$bzhtvszk0zs. Middleware will secure the website by hiding routes used by admin. For example, when customer changes the URL by some content, all the routes of URL will be displayed so the customer can view all pages of the site. Thereto avoid hack or misuse, we use middleware concept. These details will be maintained by the administrator.

User log is a technique that tracks the customer behaviour inside the site. When they login into the site, session will automatically record their activities inside the site [2]. Using the session-id we will track unique activities of the user. It will record many activities like when the user logged in, what is the IP address he/she is using, in which devices they are visiting like in mobiles, desktop, tablet, which version they are using, how much time they spend in particular page and when he/she leaves the page. These data helps the admin to monitor the activity of the user.

3.2. Frequent Time clicking
Click tracking measures the reports of customer tapping the traffics in the website. By tracking the click of the product we can analyse the customer preference towards which product they like and dislike. This click will only measure the product click inside the website and so there will be no security issues. To track the product traffics we introduce frequent time clicking technique.

By applying this technique traffic of each customer will be analysed and will set business logic that if the customer clicks the product more than 5 times we guess that customer likes the product. Let us consider a person X visiting the website to buy the product which they like but they are not buying that product. Instead they are searching and viewing the product frequently. In that situation admin monitor these activities and decides to give offer/discount to the particular user. Next time, when the user visit the product on the website, discount for the product will be given. So the user may get happier to buy the product at that time.

Let us assume N as the number of clicks’ as the product, where N (P) is greater than click limit of P.
In the above formula, we can predict the customer choice of prediction by calculating the clicks of the product. From this, there is the possibility of finding the customer interest. This technique will show us who are interacting with the site and what are the products they like mostly. These data will help the admin to add the products in the stock and improve the sales.

3.3. Search techniques
Searching helps the customer to search the product according to their choice whenever they wish. Selective search will work according to the previous search list of the customer. Sometimes the customer might search the product and due to some work at that time, they might leave the search page. When they again enter the page after some times or some days customer might like to search the same product searched but left previously. Here, selective search technique will help. It will direct the customer to same page with the same product where they left and it gives flexibility to the customer for shopping in the site.

A custom search will track customers search through the search icon and it will automatically record into the database in the backend. Product tag will help the users to group the product under a particular category which will give scalability for the user to search. Admin will filter the search with attributes like product name, product category, product colour and price based on the customer preference. By fetching these activities admin will push the product into recent search in the front page.

Figure 3 shows comparison of existing and proposed system sales growth by using selective search, custom search 5% improvement has occurred. The portal suggestion of the product may attract the customer attraction.

![Sales improvement after using this technique](image)

**Figure 3 Sales Improvement.**

3.4. Automatic pricing
Pricing is important aspect of online shopping which decides the future of the site. Admin set the prices according to the product, brands, size, etc. In pricing there will be three categories like high, average, low. According to this, customer will search the product. In this automatic pricing, we can study the customer choice and can give emotional appeal by giving offers /discounts for them. By using this technique we will make the customer to buy the product of their choices with satisfaction. When customer search or filter the specific product by price, similar product will be grouped and the product price will be reduced as per the discounts available.
For example, when the customer searches the product under Rs.100, the relevant product under that price will be displayed and if the price is Rs.120, it will be reduced to Rs.100. The site admin pushes the surprise gift to the customer for the customer who buys the product repeatedly. By this, we can get more customers to the site. For example customer A will tell to customer B about this. So the customer to our site will increase and admin will get more profit in future [11]. In this table, we have two attributes that is customer level name and amount. Admin can set the name and amount according to the customer level. From this only they are finding the loyal and regular customer to the site and these people will recommend other people like friends, family etc. This communication will improve the visitors to the site.

3.5. Cart revisit
Shopping cart stores the information of the product as a backup. This process will work based on the cart history where the customer adds their product to the cart. From the cart details, the customer’s likes and dislikes can be learnt. Mainly, customers focus on the brand of the product without bothering about the cost. Instead they look for the quality as a major thing so that the product will not get damaged soon. If it happens, then there will warranty for the branded product and so the customer concentrate mostly on the product brand.

By tracking the product in the cart, admin can learn the brand preferences of the customer. Hence the more preferred brand products can be displayed to them. The major problem in cart is cart abandons [12]. According to a research, 70% people left the buying process in half away. The main reason behind this may be high price. In this scenario surely there will be big loss to the admin. To avoid this, cart revisit technique is used which will recommend cart product with free shipping [5, 6, 7]. This will work by observing the customer who all are abandoning the process in between and how long their product is in the cart. In that case, admin can remind them by pushing the product in the notification of their site by indicating buy soon stock of the product is getting reduced.

3.6. Pre order booking
When the customer wants to buy a product but due to their personal reason they can buy that product only after this months or 2 weeks later. We don’t know whether that product will be available after 1 month. In such cases the customer can prebook by paying 20% to 30% amount and can buy the product on next month and product won’t be sold since the order is freezed. If the person didn’t want that product after month, admin will return amount of what they paid. This added feature will also show a good improvement in sales ratio. Customer satisfaction can also be increased by this concept and so the number of regular customer also increases.

4. Performance Analysis
By comparing frequent time clicking technique with the traditional marketing strategy [3], the online shopping increases by 5%. In Figure 4, the X-axis refers to product numbers and Y-axis refers to frequent time clicking. Each product has its product number which helps the admin to track the details of the product. Using FTC we will calculate click rate for the product from the above chart, we have grouped the product click given by the customer. Depending on the product number, customer click is tracked and if the product clicks reaches more than five then we will predict that customer likes the product. This FTC is also included as a criteria to provide the offers. It helps the admin to decide on the discount/offer to the particular customer.
By tracking the click traffics in the website, we learnt that the sales strategy vary slightly. Online shopping website may get increased profit while comparing with the old sales rate. Performance of product click rate shows that the people started moving from offline shopping to online shopping. In this chart, we have analysed customer behaviour of online shopping with the product behaviour. In 2020 Online shopping will improve definitely. After 2020 marketing strategy, the online shopping will reach topmost level [10].

![Frequent click rate](image)

**Figure 4 Product click rate.**

![Stock details of the product](image)

**Figure 5 Stock details of the product.**

Fig 5 refers to stock details of the product in the site. X-axis refer to stock rate and Y-axis refers to product variant. Admin should maintain the stock rate and need to check the availability of the product variant according to product categories. By using FTC, Automatic pricing, Custom search and Cart tracking we find out which product is to be added and which is to be removed from the stock. According to the research, many people prefer product brand and availability of size is highly maintained. By analysing this we can guess which product category the admin should add in the site. By viewing the click rate and order rate, the highly demandable product by the customer can be found.

In the Figure 6, we can see the customer search list in the website. Every people give first preference to the brand after that they look into price. X-axis refers to customer search list by category, price, colour and brand. Y-axis measures the search rate of customer. Customer browses the
product according to their wishes but many people will prefer brands and price rate. The brand is an important thing in every shopping site. According to the search history, most of the people searches brand of the product.

![Custom search rate](image)

**Figure 6 Custom search rate.**

In Figure 7, we analyse the prices and discount that helps in improving the marketing strategy in near future. According to the search, many people prefer online shopping mainly for pricing and discounts. This promotes them to buy online and varieties of the product can be viewed easily by a single click or tapping.

![Sales strategy](image)

**Figure 7 Sales strategy.**

Many people prefer a high brand product which has long-lifetime. Most of the people like shopping when offer/discount are often given to them. So most of the sites attract people by giving offers as buy 1 get 2 offers and 10% discount. This will be emotionally attractive for the people to purchase via online.
5. Conclusion
Customer product preference prediction will help to improve the sales growth of the online shopping website. By tracking the clicks of the customer we can find which product has a high trend and can know the customer choices. By knowing the customer choices we can make them to buy the product. According to online shopping getting regular /loyal customer is very rare because people mind changes so they will move to multiple online shopping. To avoid this we can use above techniques and get regular customer to improve the marketing strategy of online shopping.

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