

Shopping Spree: A Location Based Shopping Application



Priyadarsini S, Junie Mariam Varghese, Aparna Mahesh, Talit Sara George

Abstract: Clients, for the most part, look for an item depend on its class and go to related kind of shop to get it. Nowadays shops sell various categories of goods at the same time. Thus the customers often have to spend more time to find out the most suitable products and shops before making any purchase. Sometimes the customers may not be able to achieve this, especially if they are in a hurry or unaccustomed with the nearby shops. Shopping Spree is a Geo-location based Progressive Web App which helps the customers to find the nearest stores availing a product. The detailed information of searched product along with details of the shops is displayed. A navigation map is incorporated for ease of finding and reaching the shop. The app also has a smart prediction system which would predict the future sales of a product. Many features like call option, rating, and wish list are added to improve the user experience.

Keywords: Progressive Web App, Geo-location, Random Forest Model

I. INTRODUCTION

The development of the smartphone technology has made today's the world into a highly connected place, and this has forced marketers to search on unheard opportunities and provide it to their customers. The smartphones have also helped in creating an even more opportunities as the speed and relevance of marketing have become increasingly important. People are taking their smartphones to all places they go. Because of this the companies make it a reason to use this platform for their marketing. This growing number of smartphone users and the increasing number of reasons for using them have significant effects on marketing. This shift towards increasing smartphone usage means that marketers will have to shift their strategies and campaigns in a more mobile-centric direction. Customers are increasingly consulting their smartphones to help them make everyday decisions. Companies use this highly advantageous platform for deploying their business. Thus, the brands were forced to create a mobile version of their website that loads fast on tablets and smartphones. They need to create designs following the minimal principle so that there are no

unnecessary slowness to website loading. The customers need to have simple navigation and also the icons and hyperlinks are easily accessible and congestion-free so that users can tap it correctly with finger. It is always possible to locate the position of a customer at any given time in GPS-enabled phones. This provides many openings for the marketers for real-time marketing and advertising. If right choices are given at right time, the customers will tend to buy a product. After considering this fact, the location of the user can be used to send push notifications and alerts in real-time so that the user will view it and may buy the product. People liked to take closer shops or malls for their purchase even though the products price is not much reasonable. Also, they prefer to buy the products which are comparatively from the closest shopping mall. Therefore, people have to search for two information : the location of shops , products availability at each shop. We developed a geo-location progressive web app called 'Shopping Spree' that helps the customers to identify nearby shops which sell the desired product along with the product availability. 88% of customers trust online ratings. Customers share their experiences by rating the products on this platform. Later by using these ratings, other users can get an idea about the quality and condition of the product and can decide whether to purchase it. The price for any service or product which is acceptable to both seller and customer can be called as a right price. From the buyer's point of view, the right price is a function of the purchase value and other similar choices in the market place. And for sellers' price of the products they need sell has to maximize both profits and sales. Shopping Spree's smart sales predictor analyzes the previous views of the product and predicts the demand for the product.

II. RELATED WORKS

Chan et al. [1] developed a shopbot app system on smartphone that can be used to filter and search the nearby shops which sell the desired products. The system allows users to search by voice or text. Fuzzy matching is used to extend the possibility of searching. The system considered the "easy-to-buy" criteria for searching which provides distance-based shops searching in the system. A navigation map is used here to help users to find the favorable shop. If the desired product is not available in nearby shops, similar products in the same category will be recommended for the users. The vendors or administrators can manage the smartphone interface, get the list of products easily through a web based administration tool.

By using this web-based interface, any products can be added or removed. Also the user, and shop information can be managed easily.

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Gultekin et al. [2] proposed a Smart Location-Based Mobile Shopping Android Application. The Geolocation of the users' device is used to produce location information in shopping application (SAGO). In this application, the users can search for a product, and then the application will identify the location and searches for a product in closest electronic local stores. The prices from each local store along with stock information are smartly listed. The product list is also displayed. With a smart filtering algorithm, this mobile shopping application minimizes the error in searching and in listing of results. The performance is satisfactory when compared to the goals of this shopping application.

Zuo et al. [3] suggested a predicting customer purchase behavior in a grocery shop using machine learning techniques. They attempted to measure purchase behaviour varies according to the factors such as customers' age, gender against income, product price and sale promotion. They employed two machine learning methods: support vector machine (SVM) and Bayes classifier and thus explore the performance of them with the real time data.

Maheswari et al. [4] proposed a system which used SVM Classifier for predicting customer behavior in online shopping. Joshi et al. [5] proposed a random forest method for predicting the online buying behavior of Indian customers. They attempted to map various factors which influenced the online buying behavior of Indian customers. They tested different product categories, across diverse geographic locations in India. For each product category, they developed and validated the Random Forest prediction model. The result was that they could understand whether the Indian online shopping market is useful or the conventional channel is preferred by the buyer for each product category. Jayawilal et al. [6] proposed a smart shopping list which was a mobile software solution. It enabled the users to shop grocery avoiding the usual shopping complications. A Shop Locator is there to suggest the user a best supermarket to go to, after checking the grocery list such that most of the items can be bought from there. Also an item recommendation provision is implemented with help of Apriori algorithm. This helps the user to remind of any missing items or items that can be interesting to him.

Borkar et al. [7] proposed an android based shopping application. Most of the people prefer shopping offline because of concern in money security. This paper presents a new method which collaborated ease in online shopping as well as the sense of security money for customer satisfaction. The user can scan the bar code of the item to be purchased with camera feature in their smartphone and then directly add it into the cart. Thus the long queue in shops just for scanning the item is avoided. Also the chances for the fakes that happen in online shopping can be reduced. The purchase history of a customer is maintained in the app which can be used by the customer at the time of next purchase.

Tandel et al. [8] studied the impact of Progressive Web Apps on Web App Development. In 2014, the number of global users accessing the web on mobile devices exceeded those accessing it on a desktop. This indicates that making web applications mobile-friendly is very important. Companies often comprehend the need to develop native applications or hybrid applications to overcome the limitations that the web as a platform enforces on mobile devices. In most of the cases, they must develop their application for web, iOS, and Android. A native application is generally coded in a device-dependent programming language such as Java with

the Android Studio as IDE. These applications are generally installed through app stores which are generally provided in mobile phones and also have rich access to device hardware through APIs.

Khawas et al. [9] considered an application of Firebase in Android App Development. Firebase is well-thought-out as web application platform. It can help developers to build high-quality mobile apps. It stores the data in JavaScript Object Notation (JSON) format. The insertion, updation and deletion of data don't use queries in this format. It is the backend of a system that is used as a database for storing data. Faster and efficient android apps can be build because PHP is not required to communicate with the database. The communication with the database is directly from JAVA which provides a secure channel. Firebase is being updated by Google on regular basis. It can be used in Android as well as to connect cross platform. The work can be extended further after exploring new possibilities in Android applications.

III. PROPOSED WORK

The customer behavior continues to change over time. So the marketers need to find a strategy such that they become available where their customers are. As a result, companies are moving rapidly toward making mobile apps as a common place for business. The leading companies in industry strongly depend on the personal nature of mobile for creating a satisfying customer. A mobile app can provide a better shopping experience. The app-specific features such as geo-location, brands are able to produce relevant mobile-moments. More specifically, connecting user location to personalize notifications helps to make the app more attractive and relevant to users. This will not only creates a better user experience but also gives a great boost for business [10].

The proposed system Shopping Spree is a Geo-location based Progressive Web App in which buyers can search and filter the nearby shops where the desired products are sold. The information of related shops and product are displayed in the result. Also the app is provided with a navigation map showing the best route to the target shops. The Shopping Spree app also has a smart prediction system which would predict the future sales of a product which can be helpful to the sellers while planning to take new stock of products [11]. The prediction system works on Random Forest Algorithm.

A. Technologies Used

Shopping Spree application uses the following technologies-

- PWA(Progressive Web App)
- Google Cloud Platform(Firebase)
- Geolocation
- SPA(Single Page Application)
- Machine Learning model
- React JS
- Web Services

B. Implementation details

The Shopping Spree App consists of two modules-

- Customer
- Merchant

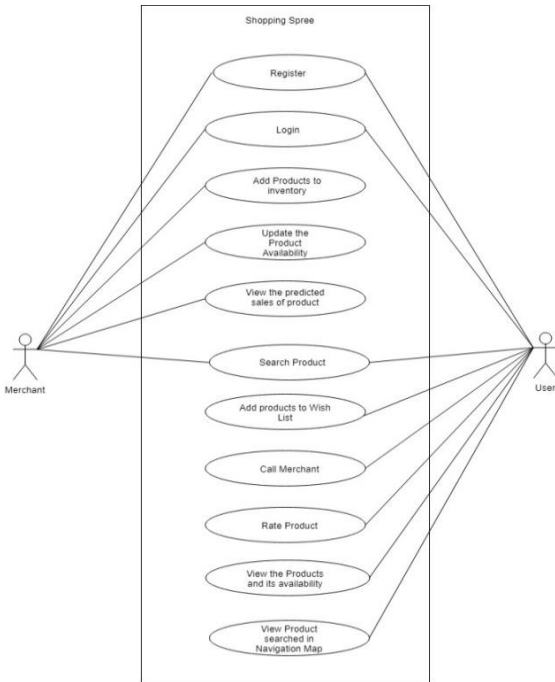


Figure 1: Use-case diagram [12] of Shopping Spree

The customer module can perform-

- User Authentication
- Product Search and Availability
- Wish List
- Calling Store Manager
- Navigation Map

Upon entry into app, users will be presented with a pop over asking for the access to their location. Home Page is embedded with a navigation drawer as shown in fig 2 where the user can sign up by providing their personal information and individual account is set up. After login, the user can see their profile and search for products that are required to buy readily. The user gets push notifications while logging into the system. It also helps the users to opt-in to timely updates and allows effective re-engaging users with required content.

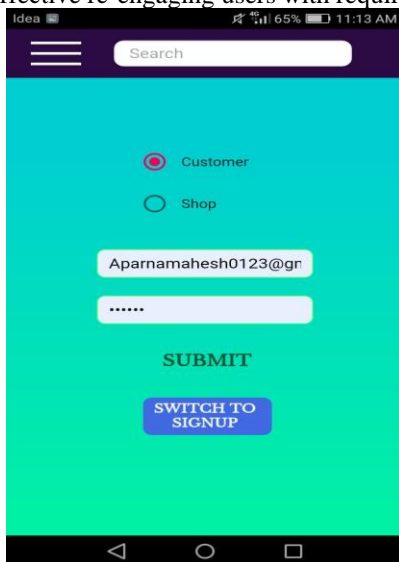


Figure 2: Customer login

The product wise search helps the user to view the products with its availability, which the user needs to buy readily. It also provides other options that escalate the customer experience and app engagement.

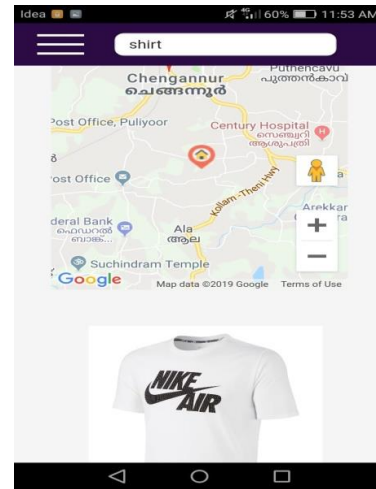


Figure 3: Search product

The customer searches the product. Then the nearest stores with searched product are shown on the navigation map. The geo-location feature of the app turns GPS navigation to guide the users to a specific location as shown in fig 3. The location data isn't always precise, so the fused locations are used by Google API which allows setting the time and distance at which the location data is updated. The navigation map along with searched product is shown in fig 4. The customer can add or remove the favorite or the most regularly purchased product into a wish list as shown in fig 5. Each registered user can review products and call the store.

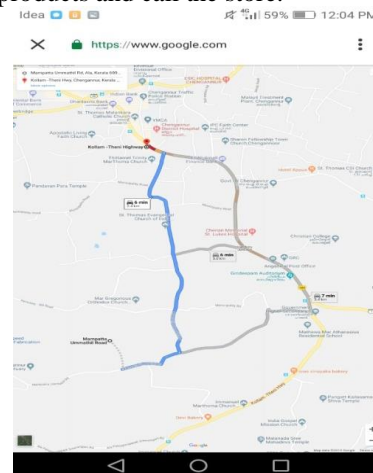


Figure 4: Navigation Map

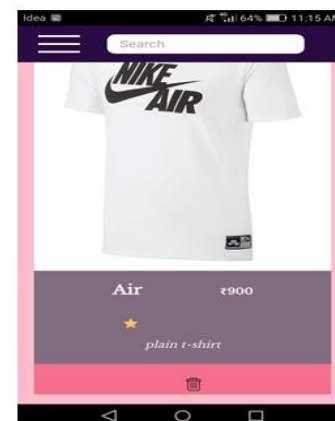


Figure 5: Wish list

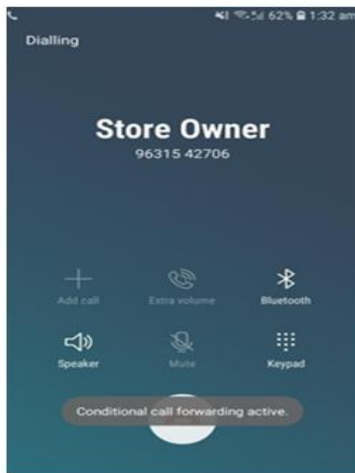


Figure 6: Calling Merchant option (right)

The merchant module can perform-

- Merchant Authentication
- Manage products
- Predict Sales
- Add products

This module defines the functionalities of the Store Manager. It helps the store managers to use the smart phone interface to manage the product of their shop easily. First, the Store Manager needs to register to add his store and products are shown in figure 7.

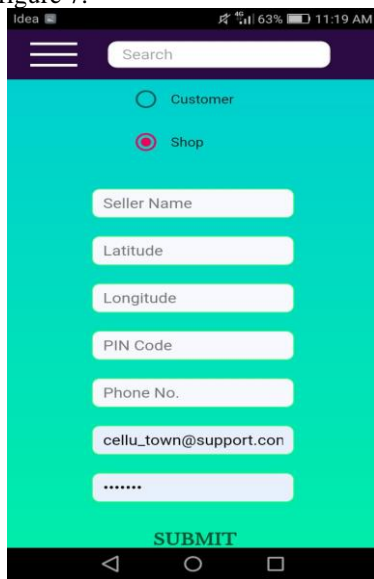


Figure 7: Shop registration

Then after logging in to their account, a list of products that are currently available in their stores is displayed. A search feature is provided for quick searching of items. The Store Manager can update the inventory, and also notify if any item is out of stock. Store Managers can add the product information in Firestore which is a cloud database.

Additionally, the app provides a smart prediction system which would predict the future sales of a product in all categories. This is done after analyzing the sales of the previous month and the views that product. This helps the store managers to smartly provide offers to the products depending on their view sales relationship. The prediction model is being trained using Random Forest which is a learning method for regression, classification and many more tasks that operate by constructing a number of decision trees.

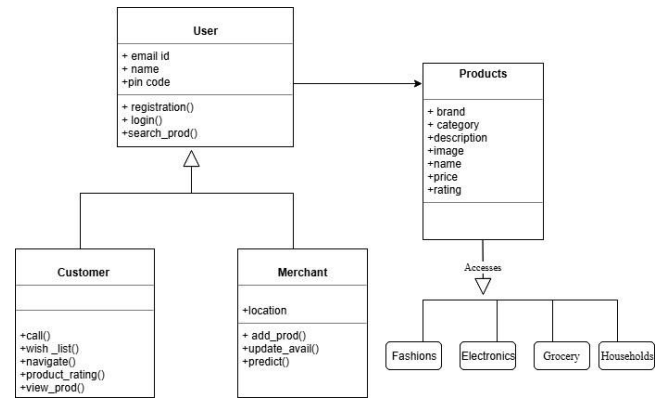


Figure 8: Class diagram

IV. RESULTS & DISCUSSIONS

An efficient e-commerce platform that connects the retail owners to the customers is created. The customers are now able to browse and search for their desired products and connect to the respective shop owners. The new groundbreaking feature is even able to list all the concerned shops on a map screen. The customers can rate the products to improve user experience and add their favorite products in the Wish list. Shopping Spree also helps shop owners to add, delete and manage products. The shop owners can see individual product views and their predicted sales. To achieve this prediction system, we created a custom API and deployed it to the cloud to ensure high availability.

We made a model that predicts the sales of the product which could help the retailers to smartly plan and make a profit. It also could help the customers to get valued products at a cheaper rate. So to make the model we made test data set having the views and sales of each product. On a given predictive modeling problem, a model is said to be best if it performs ideally when making predictions on newly given data. Therefore, we created a train and test split in our data set, which is a method which can be used to evaluate the performance of an algorithm on the problem, quickly. This training data set is used to build a model, to train it. The test data set appears to be new data and thus the output values are inoperative from the algorithm. The predictions are gathered from the trained model on the inputs from the test data set [13] and it is compared to the withheld output values of the test set. Comparing the withheld outputs and predictions on the test data set allows us to find predicted sales measure by using the test data set for the model [14].

A model for predicting sale prediction, the random forest regression model is chosen [15]. Since the model is built on a test data set our model the output will likely be better if training is done on an available data set. We used the scikit-learn library which is a machine learning library that features various regression, classification and clustering algorithms [16]. By using the libraries we modeled the predictions of sales.

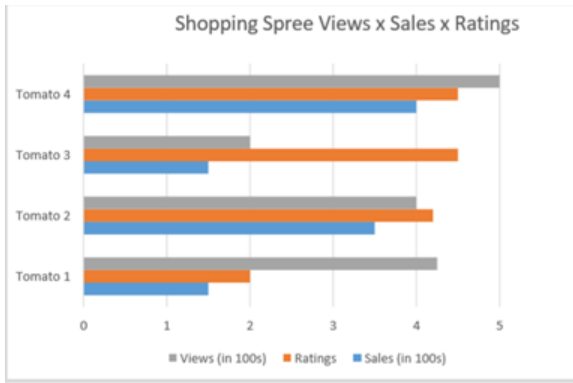


Figure 9: Prediction of tomatoes in nearby stores

V. CONCLUSION

Shopping Spree creates a platform for shop owners to effectively connect with the customers. The customers are now able to browse and search for their desired products and access them with ease. The new spearheading feature is able to list all the shops selling the required product on the map screen. The customers can rate the products to improve user experience and add their favorite products into the Wish list. Shopping Spree also helps shop owners to add, delete and manage products. The shop owners can see individual product views and its predicted sales. To achieve this prediction system, -we created a custom API and deployed it to the cloud to ensure high availability It gives further exposure to the shops and their products [17].

The customers are now presented with a larger collection of production choices and great product variety. The location based system helps the customers to discover new shops and further improve the local economic domain. All this functionality is presented as a PWA which provides high performance, less storage consumed and great user experience. The additional functionality of the app as an SPA saves the users time and helps customer acquisition.

For managing product availability, the shop owners need to update the stock information. This can be done as an improvement in future by collecting real time billing information. The accuracy of the predictions can be improved when a standard data set is available.

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