A Smart Online Grocery Shop System

[1]Tanmay R. Wagh, [2]Shubham G. Chopdekar, [3]Vidhya R. Vasekar

[1]Student, [2]Student, [3]Assistant Professor
[1]Computer Engineering Department,
[1]ZCOER, Pune, India

Abstract: Now a day's customer faces problems, to check availability of product in nearest supermarkets. And Retailers also cannot interact with multiple customers at a time or they don't entertain each and every customer quickly. And it is also difficult for the retailer, to collect the customer's requirements and making accurate products available in supermarket. In case, any customer requires any goods immediately, they cannot go for online shopping, because it takes time in delivery of that particular product. At that time, they can search the product in his nearby location. The overall structure is to help know the customer which is the products he intends to search. By having a searching mechanism the user can easily have his/her products by just standing outside the shops. He can also check the various commodities and its price tag on it, whether he goes for the product is according to his needs. The availability must be checked by having certain steps to the application which makes it easy for searching. A person can check the shops in full detail by using set of algorithms and software stages. This makes it easy to find the detailed product where user wants to buy. An application is done for this by using a set of specific algorithms of machine flows. Online shopping is done easily and due to product searching in nearest shops, product delivery becomes quick

Index Terms - : Online supermarket system, Artificial Intelligence, Optimal Character recognition (OCR), K nearest Neighbor (KNN), Convolution neural network (CNN), Google map, Image recognition.

I. INTRODUCTION

Now-a-days, the world is very much attached by mobile phones or we can say Android Operating systems. Before, the things which were done by computer systems, now a day's done by mobile phones in very less time span with the help of Android Applications. From finding information till finding road ways and from chatting online till tracing a number, all things can be done using Android Application. Due to these applications, world which was quite big or wide for us comes much closer and closer.

In recent days due to busy life of each and everyone we try to save our time and efforts in one or other way. If a person wants some product, mostly visit to the super markets. Then product needs to be searched and if we didn't got the product, it'll be difficult to ask dealer about it due to the huge crowd at store.

This effort of visiting and searching products is difficult and time consuming. So to overcome this problem we are making this Application where you can do these things online using your mobile phones. The OCR algorithm will easily recognize the product. And the detail of the super market with which product is available is shown to customer [4]. Using AI technology as well as machine learning, which shows the modern problems of waiting in the queue for shopping, is making a modern application. Such combinations can make an application that leads to growth. By using AI technology and machine learning, which shows the real world problems of waiting in the queue for shopping, is making a true modern application [1] [3].

OCR is used for recognizing the particular product, it scans the text which is on product and convert that image file in text file and these text is used for the searching purpose but there is one disadvantage of OCR that is , the accuracy of scanning the image or text is not 100% so to improve the accuracy of OCR, KNN(K Nearest Neighbor) algorithm is used. By using KNN the accuracy will increased at 100% [4] [5].

Online shopping of any products from any grocery shop is also available for users. In this we will provide online payment gateway, so by using these users can pay the bills online using credit or debit cards, online banking, Paytm, PhonePay, etc or cash on delivery. The application will also provide feature of providing instant or quick delivery of products to the customer from its nearest grocery shop. So it becomes very easy for customers to search the products and buy it online and it is also easy for retailers to interact with multiple customers.

Sometimes customer doesn't have enough time to visit each and every shop and checking the product which is required immediately or in emergency. In such cases this application is very useful. It will find the product which is nearest to user's location and will provide route to shop by map otherwise another option which is order online and get home delivery. By using these features customer will get products immediately as compare to other online shopping applications.

But according to survey many people prefers physical shopping for experiencing the better quality product by touching and seeing it. So these application will help the all the customers to search the nearest shop and after searching customer will guided through the map, these is very helpful to buy any product physically in very less time. Using this feature customer will get the exact and better quality product very easily. To provide this feature, K Nearest Neighbor is used for getting the nearest shop in the customers location by calculating the distance between customers's and shop's location. After getting or reaching at shop customer can buy the product physically [2].

II. RELATED WORK

2.1 Product Identification using CNN

In 2016, Jingsong Lin and Xiaochao Wang [1], discussed their system of supermarket commodity identification in which CNN(convolution neural network) is used for identification. By using small dataset of supermarket's goods, system is trained and used for identification of goods with image recognition. CNN has neurons to calculate some value from given input which are image pixels and outputs are used for different categories. CNN consist of various layers, where convolution layer used for filtering method and pooling layer reduces parameters and control over fitting. In this way, the functions of these layers are used for categorizing data from layer to layer.

For experimental validation, small dataset is used which includes 3500 images which contain 35 categories. Each category contains 100 images, in which 80 images for training model and 20 images for validation. By using this dataset for different CNN network framework for training model and get good result in super market commodity recognition. This system is better for identification of any product. But system needs dataset for training model for identification and limited for super market only.

2.2 Optical Character Recognition

In 2016, Vanita Jain and Arun Dubey [4], discussed different machine learning algorithms implemented and compared to know which is better for optical recognition. OCR is used for converting hand written or type written data into digital data. Different classifiers like naïve bayes, complement naïve bayes, sequential minimum optimization, decision tree and naïve bayes with laplace smoothing are implemented and compared.

In this, 4000 training examples are taken of handwritten digits. Where each example is of 20*20 grayscale image and multiple one vs. all logistic regression models are build for comparison. Prediction is done from trained data parameter and for accuracy mean percent of no. of instances matching predicted labels. Comparatively logistic regression gives best results for OCR. But linear regression doesn't gives 100% accuracy in result.

2.3 Product Identification Methods using Panoramic Images & CNN

In 2018, Siqiang Pan and Kazuki Shibata [13], used in-store panoramic images for web shopping system and realistic shopping experience is given through web browser. CNN is also used for identifying products through images. Identification method is improved by using multiple low resolution panoramic images with CNN. User chooses a product by drawing rectangle around it in one frame, system tracks the chosen product by cropping image.

In general identification, products are divide into groups by pixels in image is determined by RGB pixel set. Training images are proposed from high resolution photos of products from high resolution photos of products from sales promotion on internet. Comparison done between conventional and proposed method & training and RGB method respectively.

2.4 Google Map

In 2017, RB. Wahyu and Cikarang Baru [2] , introduces Google map in android shop alliance because, nowadays many people does online shopping but according to PWR survey 60% customer prefer physical shopping to buy better quality and less price product. But there are many problems occurred in physical shopping like customer need to find proper location of any shop in which required product are available or not.

So to guide the customer through Google map, this technique was introduced. Google map AI is used in this to guide the customer with map facility. After searching any product, the result shows many shops in which product is available. Then customer can visit that particular shop physically. If customer doesn't know the shop address then he/she will get the location of that particular shop through map. In this GPS (Global positioning system) is most accurate location provider sensor which is used to get proper location of user as well as shop.

III. PROPOSED METHODOLOGY

The basic flow of the system depends upon the scenarios present and items which work accordingly to build upon greater tasks. The section gets divided to derive out all the information from the work flows. When building upon such data sets a proper generation of categories must be done to solve problems. The first case scenario comes of the customer as he is using the application made by the developer and then uses its full potential for his benefit. The second part is of shop where customer intends to know the product available in its use is present there. The customer can always check the product and this cycle can go on and on. The application can be the mediator between the two protocols.
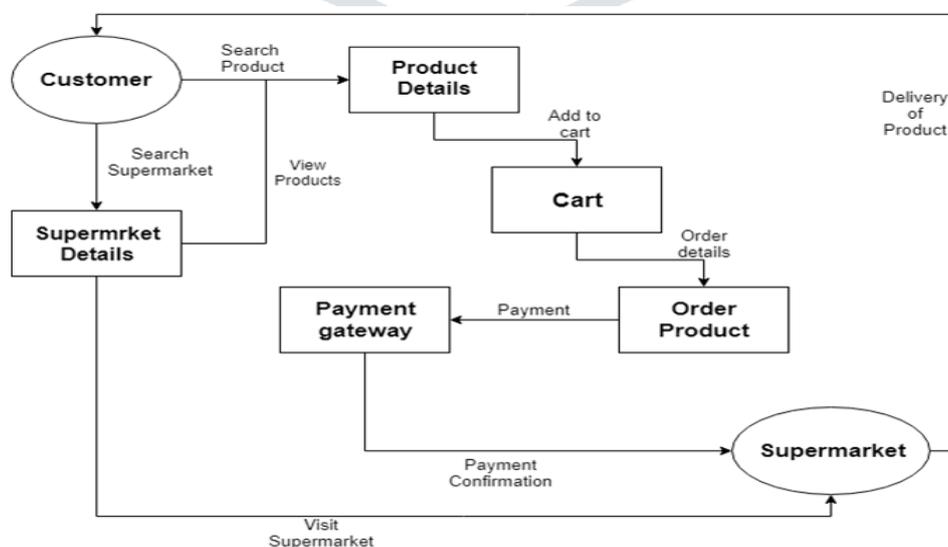

Figure 1 System Architecture

Artificial Intelligence is a boom in today's modern world, it's a head start for people looking for a development in this field. It can be a glory for AI to work on the development of substance machine learning. While using machine learning algorithms, developmental access is easy. To eliminate the daily problems of purchasing products, an Artificial smart device that helps customers to keep knowing that the right product is available in the shop or not. This not only helps to know whether or not the goods are present, but it also has the factor to detect how much value the product has.
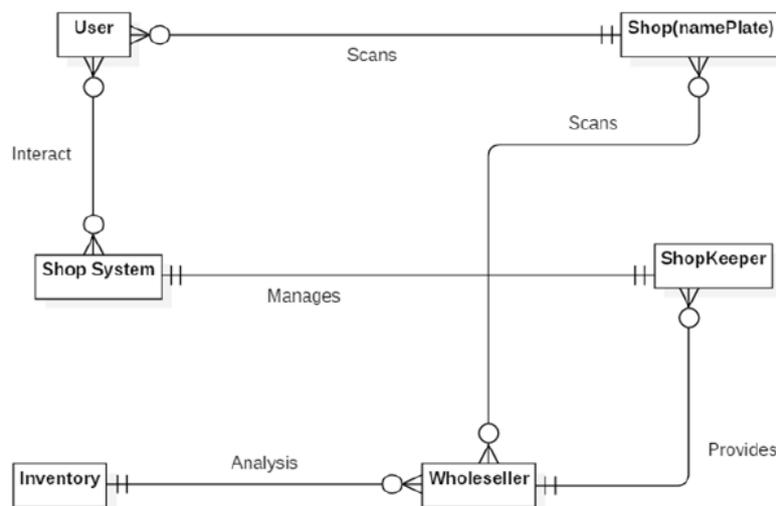

Figure 2 Entity Relationship Diagram of proposed System

The customers will search products using image or the textual data. User demand is to search the supermarkets which will include that product. We are searching shop by scanning the nameplate of the shop. So the user gets information of product easily without entering into the supermarkets. The image processing of product or nameplate will be done using OCR(Optical Character Recognition) Retailer can update details of stock and generate report based on sell. The searched data will be send to the server via vision API, then using machine algorithms like CNN, KNN, server will search the required data into database. It will also store the data which is uploaded by whole seller about the products.

The actual motivation is to help the person to find the right product in his or her choice and it helps to know the right cost estimation of the product. It helps to find the availability of the product before entering the market as the person has the right intelligent device. This solves the problem of the people to know that they are purchasing right amount of commodities to their usage of day to day activities.

The problem statement of the proposed system is that to develop an android application based on Artificial Intelligence and Image recognition which would help customer to check whether a product is available in a particular shop by scanning the shops name plate and proceed to buy that product, depending upon the availability of that product. For the dealers also who provide goods for the super market they can scan the necessary requirements and then the dealer can get demand of their resources very easily.

In this system after searching the product by scanning or textual data, we will provide the extra facility of online shopping. This feature is very helpful for customer. After searching the product customer can select the supermarket which is nearest to their location. Then they can add that product in to the cart, if customer wants to buy that product online then they can order that product and make payment online or they can do cash on delivery. But many times customer doesn't have enough time to weight for the online delivery so we will also provide one extra feature in which customer can visit the shop manually and that customers will guided through the map to reach the nearest shop in their location [2]. The algorithms used in system are described below:

3.1. OCR (Optical character Recognition) [4]:
OCR is conversion of typewritten text into machine encoded form which the computer can understand.
OCR translates handwritten text in machine editable text. The main purpose of this algorithm is to recognize the text which is handwritten or text present on any image by scanning it.
The image file is converted in to the text file by scanning it and stores it in very less space. The converted text files take less space than the original image file and can be indexed.
Hence the use of OCR adds an advantage to the user who had to deal with conversion of great amount of paper works in to electronic form.

3.2. KNN (K-Nearest Neighbor)[4] :
1. Input data Loading
2. K- initial value
3. For predicted class , iterate from 1 to total number of training data points
    1. Calculate the distance between test data and each row of training data. Euclidean distance is used as distance metric. Based on distance values sort the calculated distances in ascending order
    2. Get top k rows from the sorted array
    3. Get the most frequent class of these rows
    4. Return the predicted class

3.3. Proposed System algorithm:
Customer Side:
Step1: Login and Registration: Customer will login to system or register into the system.
Step2: Searching:- Customer will search the product or supermarket details in various ways.

    1. Search using Image: It will scan the product using machine learning algorithms i.e OCR and CNN

    2. Search using Textual data: It will search the product buy simply passing key words or by typing name of product.

    3. Search shops by using Image: Customer can search shops or supermarkets by scanning the nameplates of supermarket. for this CNN algorithm is used.

    4. To search nearest shops KNN and Naive Bayes is used.

Step3: View product: - At this step customer will get the details of products, if he/she wants to buy the product then they will add the product into the cart.
Step4: Order Product: - After adding the products into cart he/she can proceed to next step for ordering the product.

    1. View cart

    2. Select product from cart.

    3. Insert all details regarding payment and shipping.

Step5: Payment: - Customer can pay the bills using payment gateways or can do cash on delivery.
Step6: View order Details: - In this step customer will track the order and they can cancel the order.
Step7: Logout: - At this step customer can simply logout from the system

Admin Side:
Step1: Login: - Admin will login to the system.
Step2: Modification or Updation:- Admin can update or modify the stock, admin can add, remove and update the stocks, Also can search the products by scanning the image or by textual format.
Step3: Get products: - Admin can get products from supplier then repeat step 2.
Step4: Get Order: - In these step admin gets the orders from the customer.
Step5: Shipping: - After getting order admin get's payment from customer and then send's the product for delivery.
Step6: Logout: - Admin simply logout's from the system.

The benefits of proposed system are:

- The application gives direct shop names to the customer in the application itself.
- The user does not have to stand in long queues.
- He can check product availability from the application itself without entering shop.
- Instant product delivery.
- Easy to use and time saving system.
- Free or competitive shipping options

IV. EXPERIMENTAL SET UP:
Software Requirements

- Android Studio
- Java
- Vision APIs
- Some supporting basic language tools

Hardware Requirements

- OS-Microsoft Windows 95,98/NT 2000
- 512 MB RAM
- Single core processor with 1 GHz frequency
- 4 GB Hard Disk

4.1 Dataset Description:

Firebase database used to store the all information about the system. Firebase is the platform for developing the mobile and web applications. Firebase provide Real-time database which is very helpful in mobile applications. This Real-time Database is a cloud-hosted NoSQL database. The syncing makes it easy for all the users to access their data from any device and from anywhere. Real-time Database also helps the users to collaborate with one another. The all information regarding customer, retailer, products, orders and shops will be store in the database. We can use .csv, .xls and other dataset files to store the data into the database but at start we are going to create our own dataset. In these dataset the main categories are created and then we simply add the data in those categories with the help of application.
The data is generated in database is by the customer and retailer, if customers creates account then there the information is directly added into the database and like these when retailers creates new account then there information is also added into the database.
The products information can be added by retailer, there is no any difficulty while adding these information. Many categories are already present in database, retailer simply scans the product and update or add the product details. Order details of every customer can also be added in the database. When any customer places its order then the order details of that customer will be added into the database.
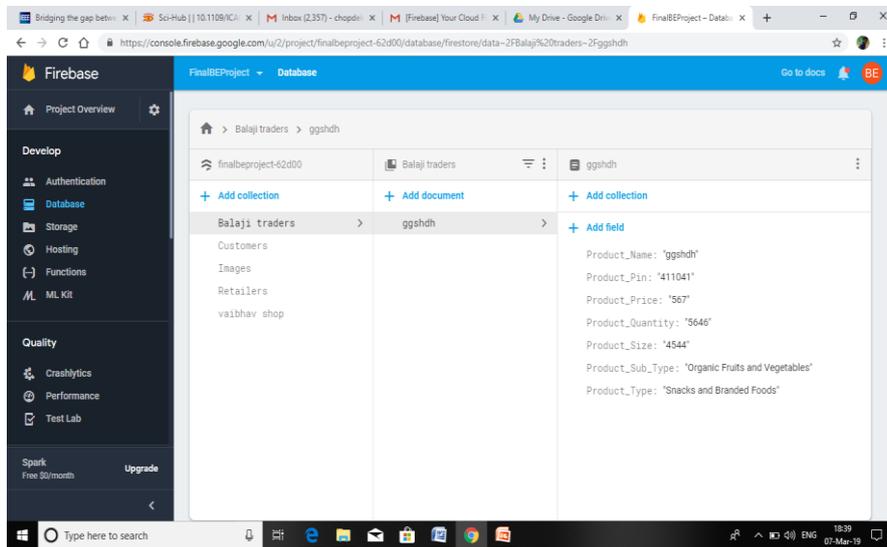
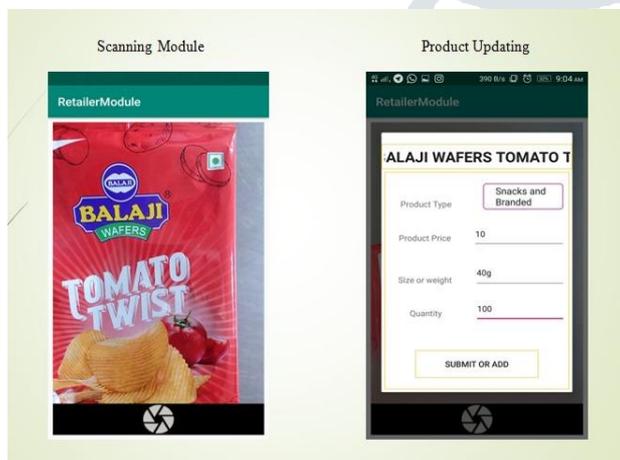*Figure 3 Firebase Database*

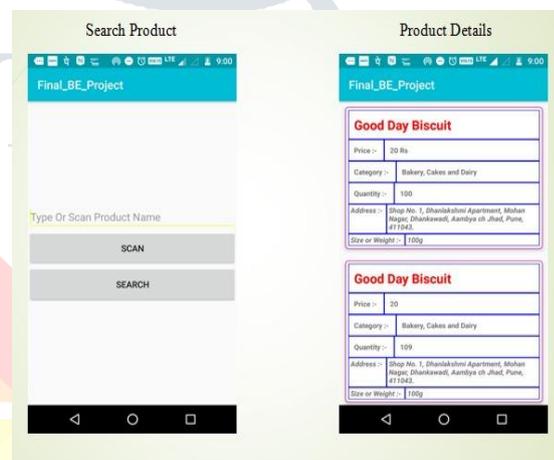**4.2 Result Screenshot:**

Figure 4 a)   Scanning Module   *Figure 4 b) Searching Products*
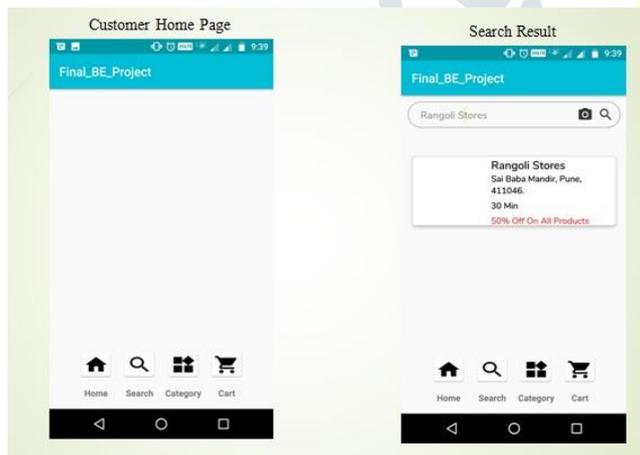

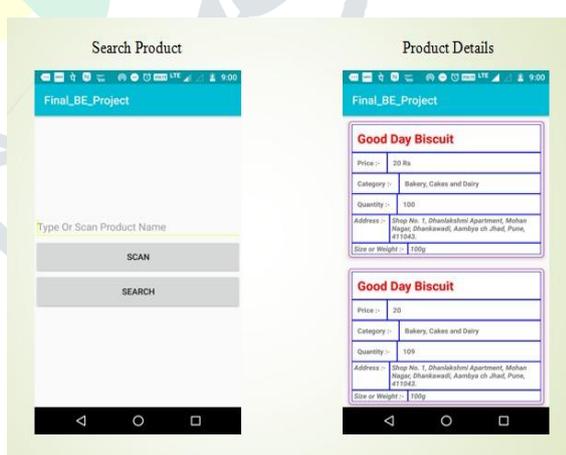*Figure 4 c) Searching Result*   *Figure 4 d) Product Details*

V. APPLICATIONS

In big Shopping market

Our system is very useful for big shopping markets like D-mart, Big Bajar, M-Mart,etc. It will improve the business of shopping market. Personalized shopping experience

Personalized shopping experience

Personalization is real-time customization of a customers journey. Likely as not, your platform already collects and stores a ton of information about your users.

Product Recommendation:

Product recommendation is typically the first thing people have in mind when they think about machine learning for e-commerce. Features like if you like product x, you will probably also like product y have been shown to work remarkably well, and they can serve as a valuable tool to guide users through the ever-increasing masses of options available to them.

Image search

Have you ever encountered a situation where you liked any product or item but don't know what it is called or what it is? This task is made easier for you by artificial intelligence service. With the application of artificial intelligence, the concept of image search is implemented in e - commerce websites. Artificial intelligence enabled images to be understood. Buyers can make a picture - based search. Mobile apps of E-commerce websites can find the product by just pointing the camera towards the product. This eliminates the need for keyword searches.

Better Decision Making

By applying Artificial Intelligence, e - commerce can make better decisions. Every day, data analysts need to handle a lot of data. This data is too big to handle for them. It also becomes a difficult task to analyze the data. Artificial intelligence has strengthened e - commerce's decision - making process. AI algorithms can easily identify the complex patterns in the data by predicting user behavior and their purchasing pattern.

VI. CONCLUSION

With the help of this application we can help the customer to search the exact commodity which he intends to check in the early stages of its cycle. The person can then check on many products as they wish. The system helps to make tasks easy for the developer as he can make on updates. We have also discussed that how this app could help shopkeepers to improve the production. The big shopping queue which is created in front of stores can be reduced to an extent. This can help to save more time by not standing in queues and our country will see a tremendous growth by this project. We are hoping to build upon a payment gateway system to the application so as it will be convenient for the user to buy the commodities.

REFERENCES

[1] Jingsong Le. Super market commodity Identification using Convolution Neural Network. IEEE 2017.

[2] RB. Wahyu, Cikarang Baru. Integration of google map in android shop alliance. IEEE 2017.

[3] Jiachen Hou, Gang Xiong, Xiwei Liu, "A Kind of Online Power Materials Supermarket System", IEEE 2012.

[4] Tapan Kumar Hazra. Optical Character Recognition using KNN on custom Image dataset. IEEE 2017.

[5] Vinita Jain. Comparative analysis of Machine learning algorithm in OCR. IEEE 2016.

[6] Swapnil Sharma. A SVM based character recognition system.IEEE 2016.

[7] Hideaki Yanagisawa, Takuro Yamashita, Hiroshi Watanabe. A Study on Object Detection Method from Manga Images using CNN.IEEE 2018

[8] Yamei Zhangl, Liting Jing. Convolution Neural Network Application for Glioma Image Processing. IEEE 2018

[9] Priyanga Chandrasekar, Kai Qian. The Impact of Data Preprocessing On the Performance of Nave Bayes Classifier. IEEE 2016.

[10]Anal Kumar, A B M Shawkat. i-SHOP: A MODEL FOR SMART SHOPPING. IEEE 2016

[11]Yi-Jing Wu and Wei-Guang Teng,. AN ENHANCED RECOMMENDATION SCHEME FOR ONLINE GROCERY SHOPPING. IEEE 2011

[12] Syafruddin Syarif ; Anwar ; Dewiani, https://cloud.google.com/vision/docs/ocr (05 Oct 2018)

[13] https://ujjwalkarn.me/2016/08/11/intuitive-explanation-convnets/ (05 Oct 2018)

[14] https://en.wikipedia.org/wiki/Convolutional neural network(06Sept2018)