Development of Smart Online Grocery Shopping App

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Abstract. This Smart Grocery Shopping App is a web based Application which will have more additional features for providing the easy and smooth shopping experience to customers. The software's and hardware's that we have used to develop this system are easily available and easy to work with. The aim is to add advanced functionalities to the existing shopping system using the prediction module so that the admin can predict the future stock for his market. Users can buy the groceries as per their requirements and can pay the respective bills with the help of online payment module which will be built-in this system and for the admin, system has the prediction module which will help the admin to predict the future stock for his market based on the previous sales. Basically the project describes how to manage for good performance and better services for the clients and as well as for the shopkeeper.

Keywords: Admin Module · Customer Module · Prediction Module · Payment Module

1 Introduction

Now a days, People have shopping problems such as limited time, a transportation issue, people consider physical shopping as a waste of time, health issues, long-distance to market [1]. While grocery shopping is an essential activity, in COVID-19 pandemic that imposed circulation limitations and more restrictive behaviors on consumers due to fears of contracting the virus and boosting online grocery shopping [2, 3]. To overcome such problems there is need for development of smart grocery shop. The Smart Grocery Shopping App is developed to help the customers to buy groceries online without physically visiting the shop and thus it will save a lot of time of customers and also it will reduced the hard-work as customers can placed their orders sitting comfortably in their house or from anywhere. And also it consists the prediction module which will help the admin to predict the future stock based on the previous sales in his shop so that there will be no shortage of items in his shop and no wastage of items in his shops.

Every organization whether big or small has to manage all the information about the Customers, Grocery, Product stock, Address etc. So for this we have developed this user friendly Smart Grocery Shopping App which will manage all the details about the

customers, products, orders easily. And also it consists the prediction module which will help the admin to predict the future stock based on the previous sales in his shop so that there will be no shortage of items in his shop and no wastage of items in his shops.

The Smart Grocery Shopping App is user friendly as it does not required any formal or prior knowledge to use it. Also this system helps to avoid errors while entering the data by giving the error messages. Smart Grocery Shopping App, as described above, can lead to error free, secure, reliable and fast management system. The Smart Grocery Shopping App has been developed to overcome the problems and errors occurring in the existing shopping system and as well as to add advanced functionalities to carry out operations in a smooth and effective manner.

2 Objective

The Smart Grocery Shopping App has been developed to overcome the problems and errors occurring in the existing shopping system [4] and as well as to add advanced functionalities to carry out operations in a smooth and effective manner.

The main objective to develop this Smart Grocery Shopping App is to manage all the details of Customers, Grocery, Orders and Product Stock. Earlier also researchers also proposed the neural network-based prediction-based system which was designed to provide suitable predictions about the future orders of the customer [5]. So, for this we have developed this user-friendly Smart Grocery Shopping App which will manage all the details about the customers, products, orders easily As Shown in Fig. 1. And also, it consists the prediction module which will help the admin to predict the future stock based on the previous sales in his shop so that there will be no shortage of items in his shop and no wastage of items in his shops. Smart Grocery Shopping App, as described above, can lead to error free, secure, reliable and fast management system.

Technology used in this project:

- HTML: Page Layout has been designed in HTML
- CSS: CSS has been used for all the designing part
- PHP: It helps in creating dynamic web pages which will interact with database
- JavaScript: JavaScript helped in the validation and animation task
- Bootstrap: The themes and templates of the system are created by using Bootstrap
- Google Font: The fonts are added in to the system using Google fonts
- J Query: The interaction between the JavaScript code and HTML elements becomes easy by using the J Query library.
- A JAX: The dynamic web pages are created using A JAX
- Razor Pay API: Used for Payment module
- Machine Learning Algorithm: Used for prediction module

3 Use Case Diagrams for Different Modules

System consists of four modules as Admin module, Customer module, Payment Module, Prediction Module. The system consists of two user profiles namely a customer account and an admin account. Functionalities of each module are shown in Fig. 2 and 3.
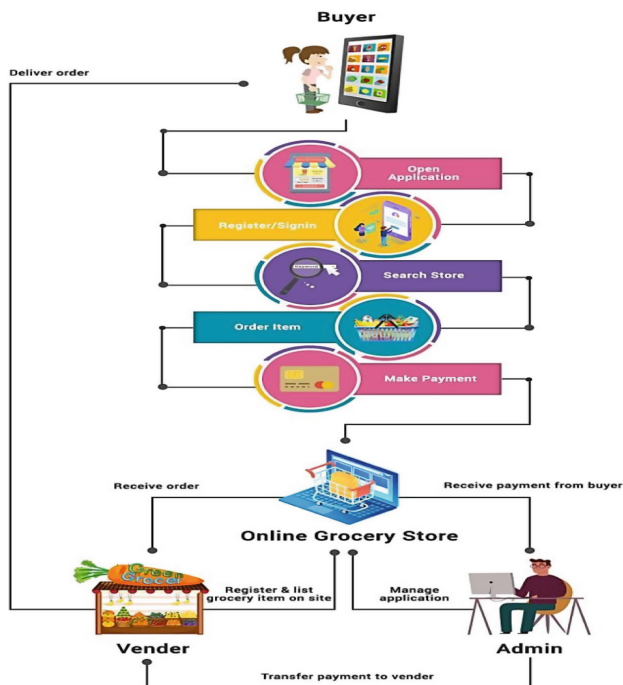
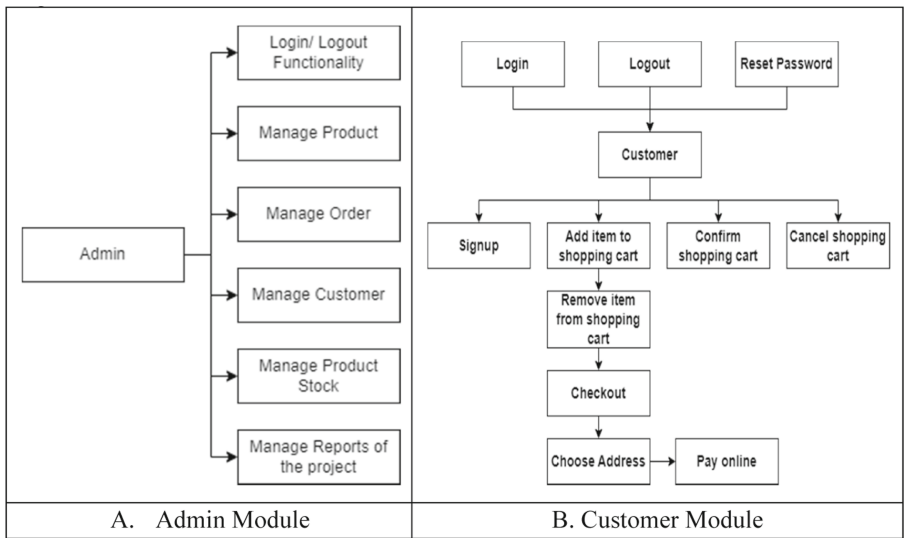**Fig. 1.** Proposed System Architecture
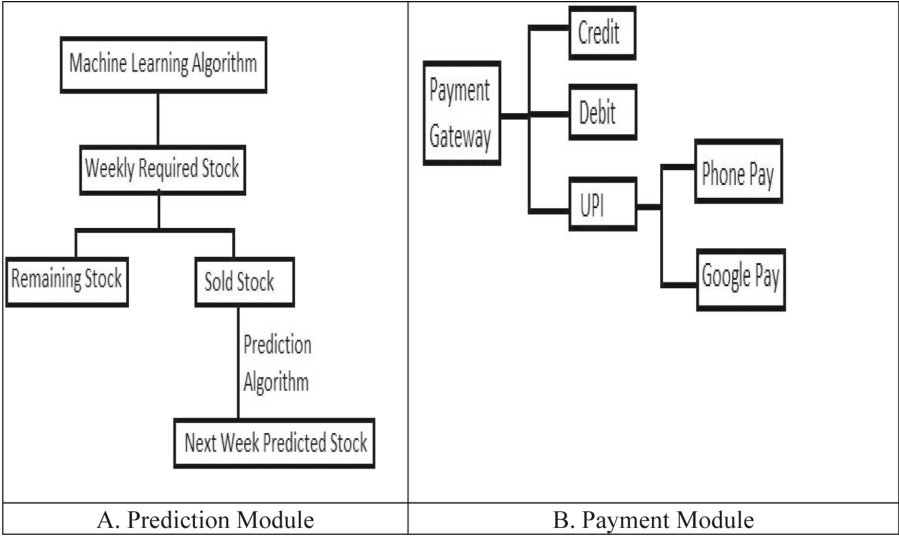

Fig. 2. Admin and Customer Module

| A. Prediction Module | B. Payment Module |

Fig. 3. A. Prediction Module B. Payment Module
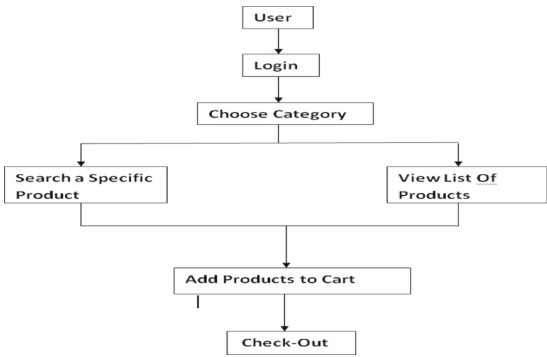

Fig. 4. User Functionalities

4   Functional Model and Description

4.1   Functional Model of User

Figure 4 explains the functional model of user side. User will first sign up on this system and then user can login to the system. After login user will be directed on the home page screen where he will be able to see the different categories of products and list of products. Also by using the search option user can search for a specific product and can add the products into the cart.

If the user wants to remove a product from shopping cart then they can just click on the delete icon and item will get removed from their cart. Then they can check-out using the payment module and they can get the delivery of their products on their doorstep.
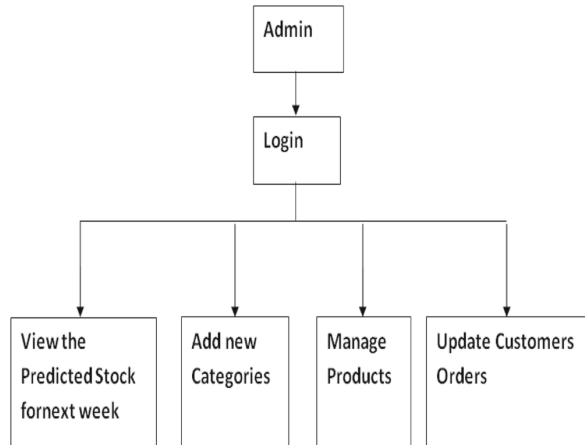
Fig. 5. Admin Functionalities

4.2 Functional Model of Admin

Figure 5 explains the functional model of admin side. Admin will be able to view the predicted stock for the next week on home screen after login to the system. Also admin can add new categories of the products and can edit them or delete them as well. Admin can also add the new products along with the description and actual price and discounted price so that user can see the discounted price on their side. If admin wants to delete a product then that facility is also available in the system. Admin can manage or update the Customers orders according to their status means whether the order is approved or not or whether the order is packed or not whether the order is out for delivery and also whether the order is delivered or not. In this system admin will be benefited as it can view the predicted stock for next week so that there will be no shortage of items and no wastage of items in his shop.

5 System Implementation

5.1 Implementation Details

The main function module of the system includes order management, managing product details, prediction module, payment gateway and implementation of user login and registration. MYSQL is used in this system to store the data at the backend and to perform various operations on the data stored in MYSQL.

5.2 Front-End Implementation

- HTML: Page Layout has been designed in HTML
- CSS: CSS has been used for all the designing part
- PHP: It helps in creating dynamic web pages which will interact with database
- JavaScript: JavaScript helped in the validation and animation task

- Bootstrap: The themes and templates of the system are created by
- using Bootstrap
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- elements becomes easy by using the J Query library.
- A JAX: The dynamic web pages are created using A JAX

5.3 Back-End Implementation

MYSQL database has been used to store the data at the backend in this project. All the details about the customers which they are providing while registering on this system will be saved on the database for authentication purpose. As well as the details of the products and orders will be saved on the database so that admin can keep the record of the product stock and order details and can make changes into them as per the requirement.

5.4 Razor Pay API Implementation

The dependencies of the Razor Pay API are added to the project to implement it in the project. The library of Razor Pay API is imported in PHP and the attributes like the customer details and price are passed in it and then a call is given to a jQuery code which will generate the payment on the window.

5.5 Prediction Module Implementation

The prediction module is implemented using Linear Regression Algorithm. This is done by implementing the linear regression algorithm from scikit. The dummy dataset is created which consists of 4 interdependent attributes such as total available stock, sold stock, remaining stock and predicted stock. The predicted stock will be the prediction of next week stocks. For working with the array of the dataset numpy-a python library is used and to analyse the dataset with attributes Pandas-a python library is used.

A specific feature of most machine-learning methods is that they can work with stationary data only. In case of a small trend, we can find bias using linear regression on the validation set [6, 7]. The linear regression algorithm is implemented using Linear Regression () and predict () function from sklearn. The dataset is split into two parts one is used for prediction module onto the system the Machine Learning algorithm is imported in system using flask and virtual environment is imported in flask.

Training purpose and other part is used for testing purpose. After testing the algorithm on dataset, we achieved the accuracy of 96%. And to show this UI for the flask application takes the input from the user to predict a particular instance, this data is further applied in the algorithm and the predicted output is displayed on the screen.

6   Data Model

The idea of this model is that the app (web, mobile, or both) will allow registered customers to place an order (made with products from our store). This order will then be delivered to the customer. Obviously we will keep customer data and a list of all available products to support this.

Customers can place multiple orders placing different items at different prices. Once a customer order has been received, store staff should be notified to receive and pack the required items (Table 1).

The data model consists of three subject areas:

• Customer details table
• Order
• Product details

6.1   Customer Details Table

• User id – The UNIQUE ID we'll use for that customer
• User_name – The name of the custome
• User_email – The customer's email address, which is also used as the confirmation
• EmailUser_address - The customer's home address
• User_mobile_no - The customer's phone number

6.2   Order Details Table:

• User_id – The ID of the customer that placed this order
• ct_phone – The customer's phone number
• Delivery_address – The preferred delivery addrss
• Card_details – The customer's bank account details

6.3   Customer Details Table

• Product_name – The name of the product
• Product_price- The price of the product

Table 1. Customer details table

Field name	Data Type	Character Length	Primary key
User_id	Varchar	20	YES
User_name	Varchar	50	NO
User_email	Varchar	50	NO
User_address	Varchar	50	NO
User_mobile_no	Number	10	NO

- Product_photo – The image of the product
- Product_description – The details of the product
- Product_discount – The discount on that product

7 Result

Test cases are used against software products, and then the expected results are compared with the actual results to determine whether the test passed or failed (Table 2).

The table shows the test cases and results (Table 3).

Table 2. Order details table

Field name	Data type	Character length	Primary key
User_id	Varchar	20	YES
Contact_phone	Number	10	NO
Delivery_address	Varchar	50	NO
Card_details	Varchar	20	NO

Table 3. Customer details table

Field name	Data type	Character length	Primary key
Product_name	Varchar	20	YES
Product_price	Double	20	NO
Product_photo	Varchar	50	NO
Product_description	Varchar	50	NO
Product_discount	Varchar	20	NO

Table 4. Test results

Test carried out	Test data	Expected result	Actual result
User input	User enters details for registration	After successful registration, user will be prompted with the login page	Pass
User input	User enters the credentials created during registration	Successful login and home page is displayed	Pass
User input	User has to pay the required bill via payment gateway	After payment, the order would be places	Pass

1. Verification registration
2. Verify Login
3. Add items to the cart

8   Conclusion

This web-based app helps customers choose their daily needs and add the product is in their shopping cart. Consumers provide their full address and contact details and find their preferred products in their home. This web application saves a lot of customer time. The online grocery industry is one of the fastest growing industries in India. Customers because they gain access to the Internet more often and tend to shop online, often choose to buy from online companies that offer better customer service and satisfaction among other brands that the main reason for buying groceries online is to save. No time limits on purchasing. Customer expectations while shopping online and in virtual markets are completely different (Table 4).

This web-based system has a prediction module that will help the regulator predict the future stock of his market based on previous sales. It includes a payment module and thanks to this user can easily make payments sitting comfortably at home or office. Online payments help the organization pay faster and allow customers to make purchases without physical presence.

9   Future Scope

For the next generation everything will be digital as well as shopping mall. And it will have a huge impact on meat stores, the opportunities for people who choose to shop online rather than real-time shopping are in the current generation so definitely in the next generation people will buy 100 percent online rather than going to grocery stores as it saves a lot of time and hard work too. As everything becomes digital the scope of this particular program will grow and even smaller retailers will be able to use this program and can access digital. In the next few years, we will see a reduced number of people in offline stores as more purchases will go online. Advanced delivery systems such as drones and robust logistics will also add to the future of online grocery delivery services. E- Shopping Increase the number of mobile phone buyers. The subscriber model of purchase may be very popular here.

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