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INTERACTIVE E-COMMERCE PROGRESSIVE WEB APPLICATION USING WEB FRAMEWORK AND MACHINE LEARNING TECHNOLOGIES

KAAVYA SHANKAR.R[1], DR.S.VAIRAMUTHU[2]

[1]M.Tech in Artificial Intelligence and Machine Learning,School of Computer Science,VIT University,Vellore,India
[2] HOD-Department of Software Systems, School of Computer Science ,VIT University, Vellore, India

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Abstract - *The E-Commerce world is developing rapidly. Nowadays it is very firm to imagine our lives without e-commerce platforms. Companies are always looking to get a leg up on their competitors through the most interactive web design. We need to be more effective and fast in responding to the customers to satisfy their needs instantly. So it is highly important to make our e-commerce application well designed and fully optimized for a better user experience. The major aim of the paper is to do research on PWA'S and to implement a progressive web application (PWA) for an e-commerce platform named K-Zone which is clothes shopping virtual store using Django and ReactJs including all the advantages of using PWA over native and web applications. To make the PWA more adaptive, machine learning integration is done by taking one of its major applications, which is the recommendation system. Eventually the paper focuses on the recommendation system using collaborating filtering approaches and deploy the model in a application.*

Key Words: **PWA, Django,ReactJs,TensorFlow,Keras**

1. INTRODUCTION

Internet Commerce is the platform used by the buyers and sellers to purchase and sell products with the help of internet.In 2023, there will be a huge hike in the revenue generated by the mobile applications[1].These applications helps online business grow to a huge extent. PWA's are websites or web applications which imitates a mobile application. PWA's are gaining more popularity among the developers because of its reduced installation friction,easy updation,higher user engagement,responsiveness,ability of working offline and importantly its app-like interface.PWA's rely heavily on machine learning which helps making them more faster,safer and convenient.This paper will initially give a detailed information about the progressive web application which provides the reason for making PWA as an alternative which will be proved by giving the comparison on all the development architectures such as native ,traditional web and hybrid application with PWA. Furthermore,it will focus on the sales revenue difference made by pwa when compared with the applications which is installed from the play store or app store.

This paper will be deeply discussing on the development and testing of the web application and also gives a detailed view on the convertion of the developed web application to a PWA.Furthermore,this paper also concentrates on the testing of the api's in backend using postman and also PWA as a whole using lighthouse testing.

This paper is then completely into the recommendation system for the PWA developed for making it more adaptive.It first gives the detailed description on several applications of machine learning in a PWA especially for an e-commerce application and further it focuses on the recommendation system which provides better customer acquisition and retention[4].For the implementation ,the delveloped application dataset with the ratings by each user is then built and deployed using TensorFlow.JS which is a open source machine learning platform and keras which is a high-level API for deep learning models to enable the user to get their recommended products using their user id.

2. LITERATURE SURVEY

2.1 Development Of A Website For E-Commerce

Zyed Emmad Ulaah , Taniya Alauddhin , Zamane,2016.This research paper gives various aspects in which an e-commerce website can be developed , challenges faced in the development process. The whole advancement measure is fundamentally isolated into two sections namely the UI improvement with server advancement. Information base plan was likewise examined along the accentuation in its social availability.

2.2 A Review On Big Data Analytics In An E-Commerce Platform

Sahrar Akier and Sam Fasso Womba,2016.This review paper gives us a system that investigates the perspectives of definitions, unmistakable attributes, categories, economic worth and difficulties of big data analytics in the web based business scene. It also explains the different categories of big data used in e-commerce.

2.3 Developing An User Friendly Online Shopping Web-Site

Prashanth and Vaidya sanivarapu,2018.This paper explains the expansion of online business in the immature world isn't unreasonably incredible and there is a ton to want for It comprises of the arranging cycle, which begins with deciding the utilization case, space demonstrating and compositional example of the web application. Clients communicated their powerful urge to have full and express control of information and collaboration.

2.4 Some Trends in Web Application Development

Mehdi Jazayeri ,2017.This paper discusses the evolution of web application since early 1994.It also explains on the software engineering techniques used for the web application development namely the Component orientation and standard components.It also mentions on the future development using advanced browser technologies

2.5 Modern Web-Development Using Reactjs

Sanchit Aggarwal ,2018.This paper focuses on the frontend framework especially with reactjs which incorporates model-view-controller (M-V-C)pattern.The features of reactjs mentioned are Lightweight DOM,JSX, performance and one way data flow. It concludes with the point of making reactjs as a game changer in the frontend development despite of its advantages.

2.6 Rising Of PWA And The Downfalls Of Other Mobile Development Architectures

Oluwatofnmi Adetjia, Chigozirim Ajaegb, Nzeckwu Otunem,2020.In this research ,they have compared all the important featues of native app,traditional app and Progressive web application.The main comparion is based on the installability,performance,ability to work offline,push notification and the user experience.Finally the work has concluded that PWA has an upper hand when compared to other architectures based on the feature comparison.The main comaparison is based on the flexibility.

2.7 Object-Oriented Web Application Development

H.W.Gellerson,M. Gaedke ,2010.In this paper they have summed up chip away at WebComposition, a model for Web application advancement, at that point present the Web Composition Markup Language, a XML-based language that actualizes the model.

2.8 Applications Of Artificial Intelligence In E-Commerce

Shyna Kakkar and Vishal Monga,2017.This paper just depicted the online business improvement circumstance and possibilities of AI innovation, examines the current circumstance of the utilization of AI innovation in the field of online business, principally consider and talk about in detail from the part of colleague of AI, astute coordinations, suggestion motor and the ideal evaluating application through the examination of internet business canny activity occurrence.

2.9 A Voice Controlled E-Commerce Web Application

Farhana Zulkemine ; Haruna Isah ,2018.In this paper, they have proposed a scientific classification of discourse acknowledgment frameworks (SRS) and present a voice-controlled item buy online business application utilizing IBM Watson discourse to-text to show its convenience.A voice-controlled framework implanted in a web application can improve client encounter and can give voice as a way to control the usefulness of internet business sites.

2.10 A Review On E-Commerce Applications Using Artificial Intelligence

Syna Kagear and Vishak Mona,2017.This paper features the part of computerized reasoning in online business and its application in various zones of online business. It also presented the information on innovative features included for the web based enterprise.Companies like Google, Microsoft and many other well reputed companies are keen in taking up many AI related activities.

2.11 Responsive Application For E-Commerce Using Basic And Advanced Methods

Geogia Isace,Hameed Hamezeh,2018.In this paper, the recommendation system is implemented in both basic level and in advanced level.The basic level involves use of cookies for the recommendation.Since it cannot be applied for large scale applications,integration of machine learning has taken place.The TF-IDF algorithm is used and a movie dataset has been taken.From the results,the TF-IDF score is obtained for the similar products with respect to a particular product.

2.12 Progressive Web Application For Salons Using Artificial Intelligence

Carolyn Brodie June,2020.The paper mainly discusses on the development process of a PWA for a salon in which they also implemented a chatbot for personal assistance for the customers coming to the salon.The application developed is a PWA and it can also be used in offline mode and a better user interface which attracts more customers.The chatbot provided helps the customers in making their appointment to the salon.

3. PROGRESSIVE WEB APPLICATIONS AND ITS ADVANTAGES OVER OTHER DEVELOPMENT ARCHITECTURES

PWA is a mobile development approach that seeks to overcome the challenges or weaknesses of earlier approaches like native , traditional web etc. Adopting the approach of PWA produces special kind of web apps which requires no installation before using and is served from a remote server via a secured Hypertext Transfer Protocol (HTTPS) unlike regular mobile web apps which might be served using the HTTP.PWA users will have the advantage of using a top level mobile application with a full screen mode after the installation process in their own device[2].The PWA is based on the concepts of a single application for all platforms just like the hybrid approach[5].

- Progressive Web Applications provide the clients with a local application like experience which tends to be one the highlighted features of PWA's.
- PWA combines the features of both native and traditional web application which gains the preference over all other architectures.
- PWA's are device independent and they work perfectly on all the devices be it a mobile, laptop or tablet.
- The most important feature of PWA is that,it need not be downloaded from a playstore.It can easily be installed fom the homescreen with a single click.Whereas ,the native appliucations includes several procedures for installing it on the device.
- The payment of 99 USD has to be done every year to maintain a native application by purchasing the account supscription for google play store and 30 percent from sales revenue if we are selling goods in ios app.Whereas, PWA's are easily maintained [3].

- PWA's always have an upper hand because of its ability to work offline and on low networks.

Table-1 **: Native, Web And Progressive App Compared.**

Features	Native app	Web app	Progressive web app
Installation	The app is installed directly on a device. The installation requires such steps as visiting an app store accepting numerous permissions, and signing in.	The app is not installed in a device,the website has to be visited by the user everytime	The app is not installed in a device,the website has to be visited by the user and adds it to homescreen.
Access to device's features	Access to the devices's features is full	Limited access to device's features	Limited access to device's features
Connection dependency	Some app requires connection while some doesnot.	Depends on the connection.	The app works even on low networks.With the help of caching,some functionalities in offline more are available
Update delivery	Any update before release needs approval from app store.	Instant update without app store permission	Updates are instant and automatic without app store

4. DEVELOPMEMNT PROCESS OF WEB APPLICATION

The web application developmet process needs to be carried out in two phases which includes backend and frontend development[6].The application is developed in a

macOS environment.VS Code (Visual Studio)is software used for writing and editing the code as a the developing environment.It supports all the main operating systems like windows,macOS,linux.It is popular among the developers because of its features which include the support for debugging,syntax highlighting,snippets,code refactoring and intelligent code completion.

4.1 Backend Development

Back end devekopment refers to the application's server side .It usually consists of three parts which includes a server,an application and a database.The backend code will communicate the database information to the browser.The backend languages are Java,PHP,Ruby on rails,Python and .Net .For the application developed for K Zone,python is used with specifically Django-rest framework.The application runs in the server which is the computer receiving the requests[7].The waiting time will be allotted for the server to receive and requests and act accordingly by sending a response.The task of organising data is managed by the database.In Django,by default SQLite database is supported for the project.In addition,Django also supports other relational databases such as PostgreSQL,MySQL and Oracle[9].

4.2 Frontend Development

Frontend development mainly focuses on the client side development. It basically manages everything which the user see in their browser ie.., the user interface. The most popular frontend languages are html,css and javascript. All three combined gives a better user experience. HTML is a computer language which is designed to create websites which can be accessed through internet. CSS is mainly used for the styling purpose with full featured features such as bootstrap and semantic UI[13]. The javascript has several main frameworks such as angular react, view.js and JQuery. The most recently popular framework is the reactjs which is used in the developed application.

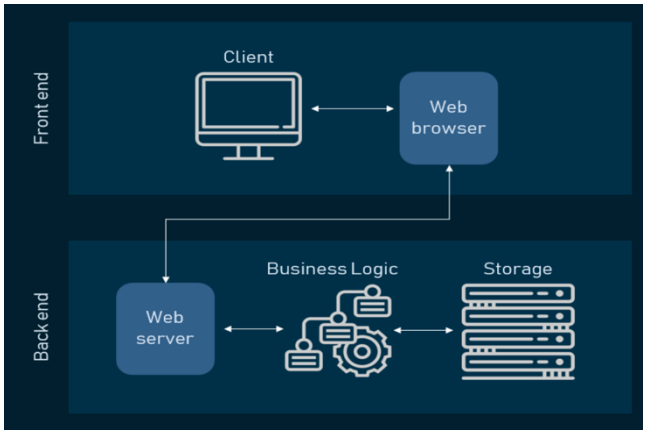


Fig-1 : Web Requests-Response System

5. BACKEND DESIGN AND IMPLEMENTATION

Django-REST framework is used in the backend.Since we use python in the backend and javascript in the frontend, not all the frontend frameworks can read the database.Django REST framework has several features[8].One of the most important feature is serialization where the data is converted to json format which can be read by all the frontend frameworks.In Django terminology we represent api's which are extracted and will be used in one component.

5.1 Development

5.1.1 Category

The Django is model-view framework. Model determines the way of the database looks and view is the method, which can be get, post, put or delete. Here we have a model in which the name and description of the category can be mentioned.

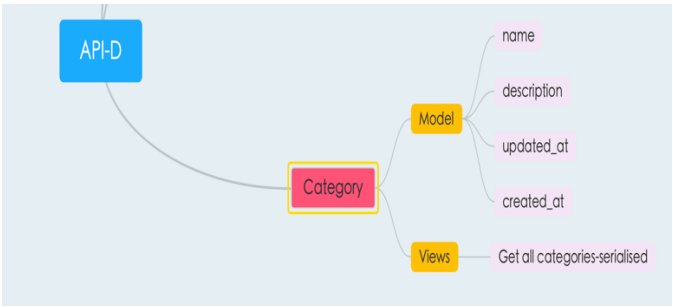


Fig-2 : Category Api Design

When the implementation of the category api is done,there will be fields provided in the Django administration for adding the category database such as clothes category incase of the K Zone application.Under eaxh category there will name and description as designed.

Figure-3: Lists Of Categories Added In Django Admin

5.1.2 Products

In relational databases we have a foreign key which relates two databases. In this model, we have the category as a foreign key which relates databases of products and category.

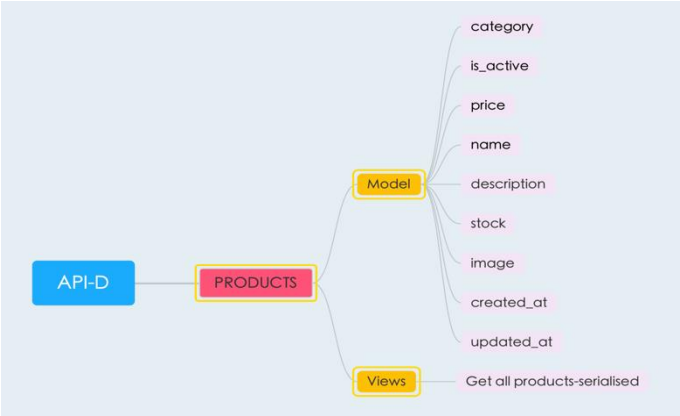


Figure-4 : Products api design

The Product api needs to be updated with the name,description,price and image of the product.It also represents the stock present for a particular product and finally the category field which can relate the product to a particular category.

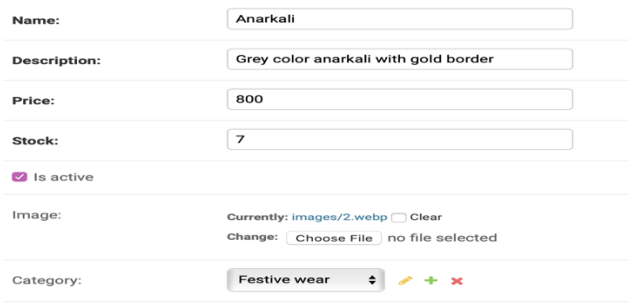


Figure-5 : Fields In Product Api

5.1.3 User

When the user is signing up,session token is generated for the particular user and it will expire after a certain duration so the the user needs to login again.The session token is to check whether the user is logged in or not.This helps the application to provide the condition that only when the user is logged he/she will be able to place an order.

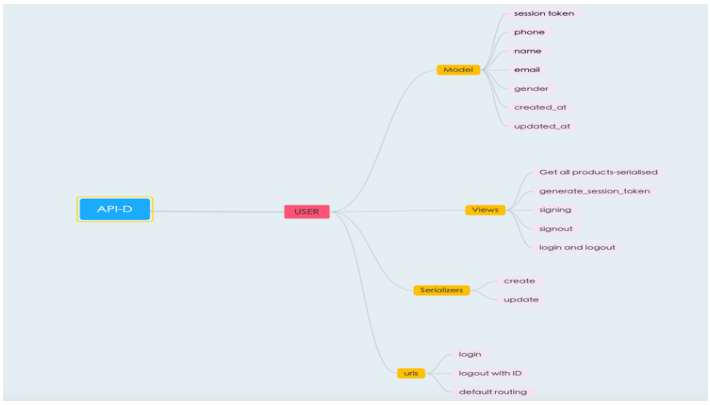


Figure-6 : User Design

The User authentication details are provided in the user api.The Signed in user name,email,phone,gender and mainly session token will be generated once logged in.If the user is logged out,the session token will be 0.

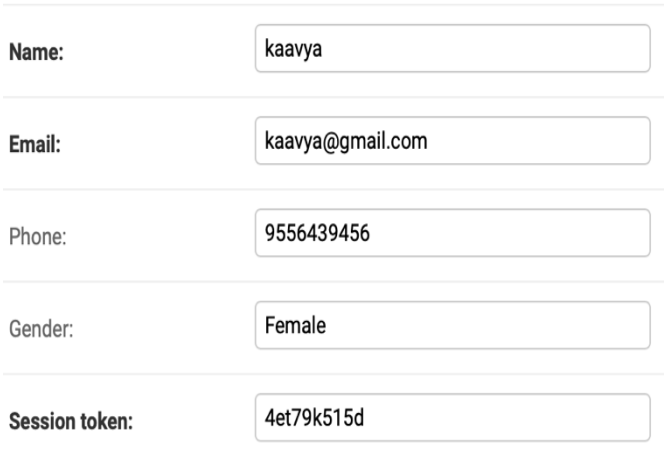


Figure-7 : User Crendentials

5.1.4 Order

The process when an order is placed includes model,views and urls apps.Only the user who has logged in to the application can place an order i.e.validating session token.

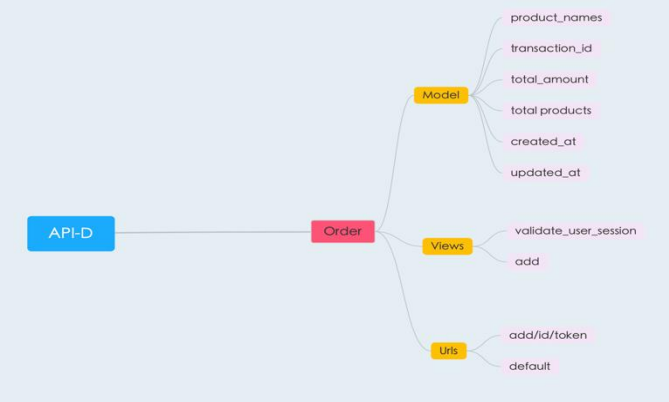


Figure-8 :Order Api Design

The order api consists of the placed order details such as the user who placed the order,the product name.total no.of products,successful payment transaction id and also the total amount.

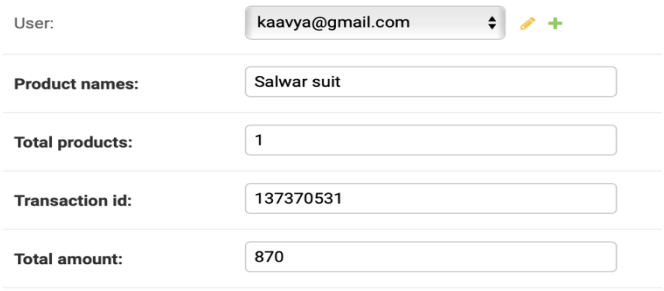


Figure-9 : Placed Order Information

5.1.5 Payment

The payment app will be handling the payment process initiated for the order.We can use any of the payment gateways for the transaction.Unlike user session token,Validate session is handled by the payment gateway.

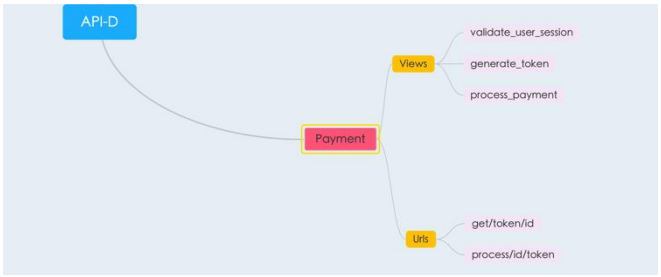


Figure-10: Payment Api Design

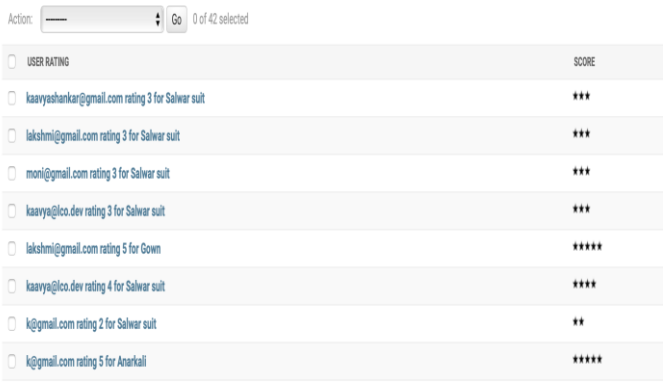
For Payment,a paypal's division Braintree is significsntly used by several e-commerce applications for web payments.It serves as the best payment system which provides a smooth payment .The implementation of the payment API has been done by grabbing the private key ,public key and the merchant ID from the Braintree website after logging in to the Braintree sandbox.Once the keys are grabbed,it has be fed in the backend code for payment.

```
gateway = braintree.BraintreeGateway(
    braintree.Configuration(
        braintree.Environment.Sandbox,
        merchant_id="n2dd8wg6gy6r59nk",
        public_key="c6kynh9hyrvyqwxd",
        private_key="b7e1b2eefd028c962d758570dfd2515e"
    )
)


def validate_user_session(id, token):
    UserModel = get_user_model()

    try:
        user = UserModel.objects.get(pk=id)
        if user.session_token == token:
            return True
        return False
    except UserModel.DoesNotExist:
        return False
```

Figure-11 : Braintree Credentials

5.1.6 User Ratings

The Star Ratings app is installed and added to the installed apps in the settings.py.This component provides two components ,one is the ratings and the user ratings.This component is mainly used to provide product recommendation to the users based on their user id.



Fig–12 : User Ratings

5.2 API Testing

The tool used for testing of the backend application is Postman which is a scalable API testing tool.There are several reasons for choosing postman.The major one's are its accessibility which helps the user to easily access the files anytime anywhere , use of collections which lets the users to create collections and also to create multiple requests under the collections,collaboration in a way where a direct link can be used to share the collection,repetitive tests can be made possible and also debugging is made simple with the console which helps the user to chech whether the data has been retrived.The api's can be tested for their respective http methods such as GET,POST,PUT and DELETE.The below figure gives the testing for the product api from K Zone .When the url is hit with a GET http method,it has retrieved the data from the database giving a 200 status response.

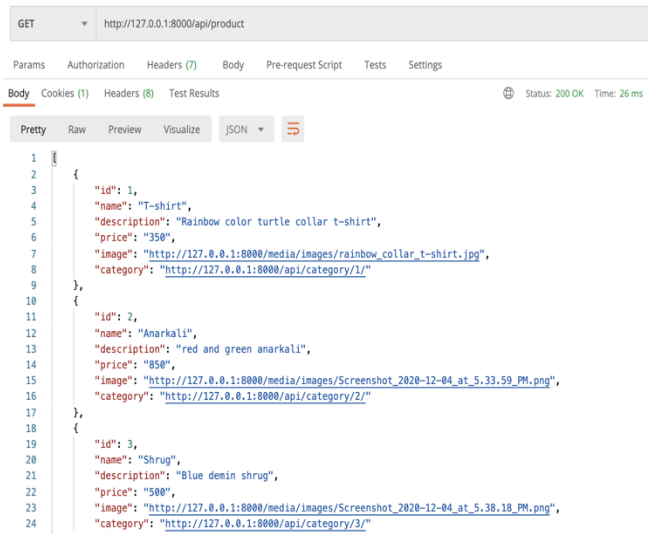


Fig-13 : Postman Testing For Product API

6. FRONTEND DESIGN AND IMPLEMENTAION

Once the backend development is completed, the most important part of developing the User Interface in priority. The application is created utilizing Reactjs. The motivation to pick Reactjs is that it works on the advancement of the application and it is easy to get a handle on[10]. A Web application planned in Reactjs doesn't have to reload each time when a few changes are made.React.js and bootstrap is used for the frontend implementation.

6.1 Signup

The user first has to signup in the page by using his credentials.Each user will have his own session token which has a expiry time.The signup page is created using conditional rendering.

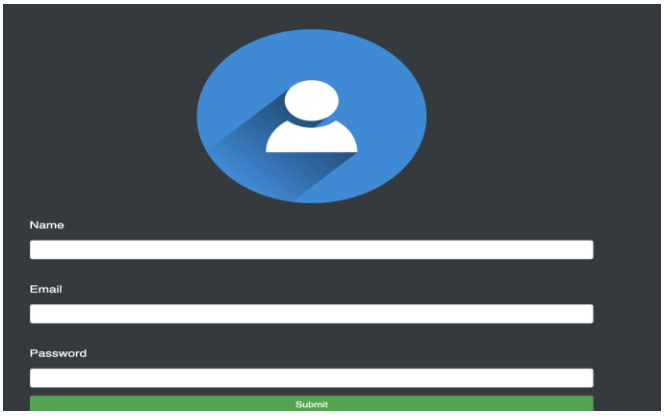


Fig-14 : Signup Page

6.2 Login

Once signed in successfully ,the user will be redirected to login page where he has to enter the credentials and after this it will navigate to the home page where all the products from the backend will be displayed.

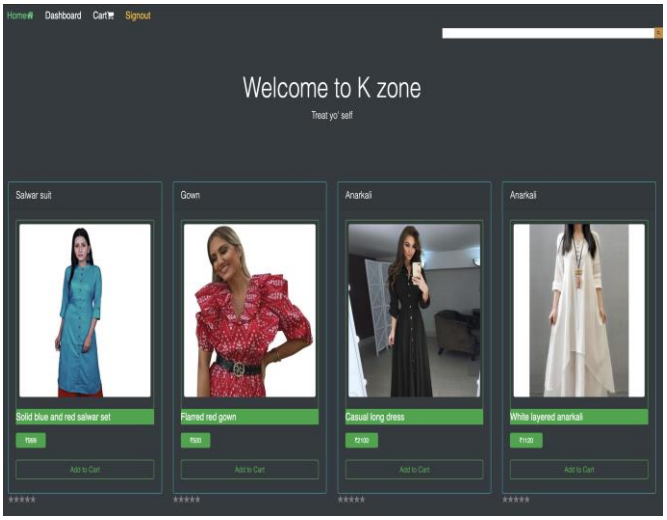


Fig-15: Home page after user logged in

6.3 Card

The user will have the option to add it to cart and also to remove it from the cart. A Card is created which has all the necessary methods which can also be modified later according to the user's need[11].

```
const addToCart = () => {
  if (isAuthenticated()) {
    addItemToCart(product,  () => setRedirect(true));
    console.log("Added to cart");
  } else{
    console.log("login Please!");
  }
};
// eslint-disable-next-line
const getAredirect = (redirect) => {
  if (redirect){
    return <Redirect to="/cart" />;
  }
};
```

Fig-16 : Card

Once the item has been added to the cart, the total amount will be displayed to the user and also with the help of Braintree payment we get the details of providing card details and also I have given a buy now button to be clicked on purchase.Braintree also provides us with test credit cards which can be used for making payments[12].The test cards which is provided in the Braintree sandbox will have the card details such as card number and the expiration date.The successful transaction can be also seen in the Braintree home page with the amount used.Braintree has been most favourite for the developers because of its simplicity and also it has a easier way of adding all other payment options such as gpay,paypal etc..,

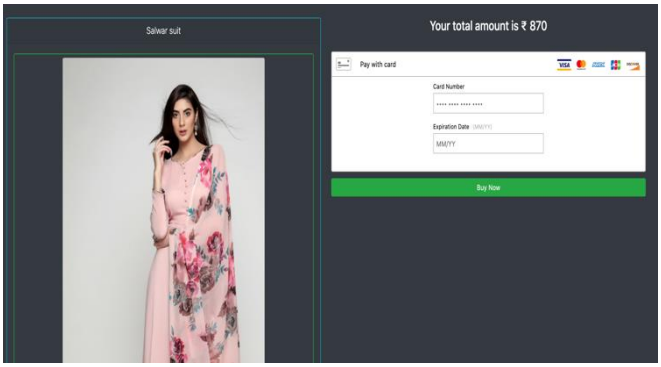


Fig-17: Checkout Page

7. RECOMMENDATION SYSTEM USING AI TECHNOLOGIES

Machine learning plays a major role on web development especially in PWA's. It helps to provide more adaptive features to the application for a better user experience. Adaptivity is mainly known for its feature of interacting with the client[14].One of the major applications of machine learning is the recommendation system which is widely used in e-commerce sites for the user to easily purchase the likely product based on the past purchases.There are two levels of adaptivity i.e., the basic and the advanced.The basic level deals with the use of cookies which holds the information about the last product visited with two parameters such as the user's id number and viewed items id number.the advanced level deals with the integration of machine learning.For far reaching applications,the usage of cookies method will not efficient so we certainly go for the advanced level of integrating machine learning[18].There are different types of recommender systems having their own pro's and con's.The Content based filtering recommender recommends the products based on the background information of the item or user.For instance,if an user is buying a product of category 1,the sytem recommends the product which has the same background information or same type/genre during next purchase.The disadvantage of this recoomedation sysyem is that everytime there needs to be a catalogue of background information.

In recommendations based on browsing history,the user gets the suggestion of products based on the products viewed already.Location based recommendation system is an algorithm which finds the people around or in a nearby area who bought the same product[15].This method is easier to implement but not very efficient because of less personalization option and almost everyone will get the same comment on leaving the new product. Whereas,incase of Collaborative filtering,it is based on clustering of customers with similar tastes together.For instance,if a user who buys a saree also buys a stole,the if another user is interested in stoles,then he/she will be recommended a saree but it is liable to suffer from cold start problem because it requires the existing user's items interactions before providing recommendation[19].

7.1 Implemementation Using Collaborative Filtering

There are ways in which collaborative filtering can be implemented.They are by using the classic rating or having people choose between two or more products and the system will automatically rank one over the other.

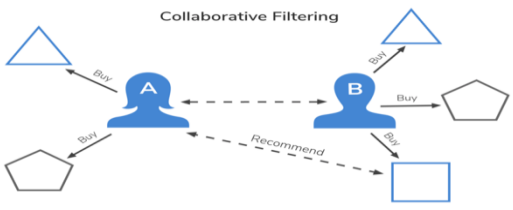


Fig-18 : Collaborative filtering

For the implementation of the collaborative filtering,two different datasets ,one with the product details and the other with ratings corresponding to the product is extracted as a csv files from sqlite database from backend application using the sqlite viewer.

```
ratings_df = pd.read_csv("ratings.csv")
products_df = pd.read_csv("product.csv")
ratings_df.head()
```

	product_id	user_id	rating
0	1	314	5
1	1	439	3
2	1	588	5
3	1	1169	4
4	1	1185	4

Fig-19 : loading dataset from application

After the process of getting the statistics about the dataset of ratings and making sure thet there are no missing values in the dataset,it has been splitted into train and test sets so that the performance of the model can be evaluated more prominanantly.

```
from sklearn.model_selection import train_test_split
Xtrain, Xtest = train_test_split(ratings_df, test_size=0.2, random_state=1)
print(f"Shape of train data: {Xtrain.shape}")
print(f"Shape of test data: {Xtest.shape}")
```

Fig-20: Splitting of train and test sets

7.1.1 Building The Recommendation Engine Using Tensorflow/Keras

The neural network created will consist of two embedding layers. The first layer acknowledges the products, and the second the clients. These two embeddings are trained independently and afterward consolidated together prior to being passed to a dense layer[16].The functional API in keras makes the architecture easy to code.

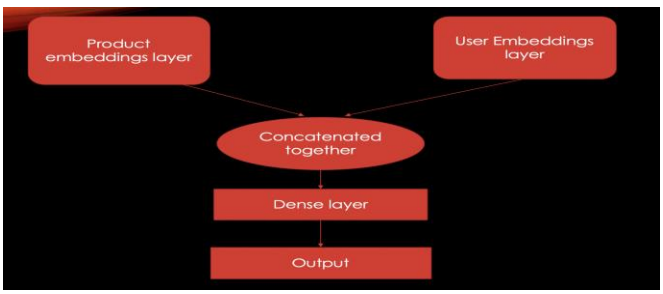


Fig 21: Neural network architecture of system

The network is then compiled using the optimizer and a loss function.

```
opt = tf.optimizers.Adam(learning_rate=0.001)
model.compile(optimizer=opt, loss='mean_squared_error')
model.summary()
```

Fig 22: Compilation of network

7.1.2 Visualizing Using Tensorflow Embedding Projector

Once looping over all unique product_id's,getting their descriptions and then injecting them to respective tsv files will obtain two tsv's, one (vecs.tsc) with the embedding weights and (meta.tsv) with the description of product.

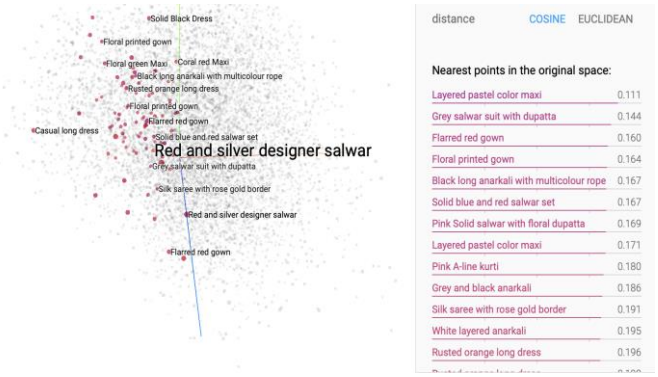


Fig 23:Tensorflow Embedding projector

```
train_loss = hist.history['loss']
val_loss = hist.history['val_loss']
plt.plot(train_loss, color='r', label='Train Loss')
plt.plot(val_loss, color='b', label='Validation Loss')
plt.title("Train and Validation Loss Curve")
plt.legend()
plt.show()
```

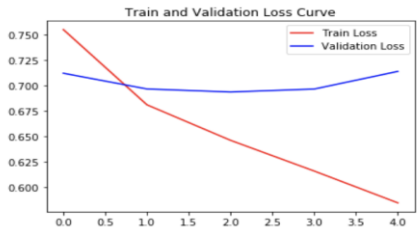


Fig 24: Train and Validation Loss Curve

7.1.3 Recommendations For The User

The product id and the user id are saved in separate arrays and passed it into the model.The passing model expects two inputs which are the product and the

user.Eventually the model returs array which contains the list of predicted ratings for each product.Eventually the pred_id returns predicted products for the user.

```
products_df.iloc[pred_ids][["product_id","title"]]
```

	product_id	title
7946	5031805	Black Solid maxi
5579	24494	Coral red Maxi
9565	70487	Solid Black Dress
3627	24812	Floral green Maxi
5206	24818	Red Kurt with white patiyalla

Fig-25: Retrieving subset of product data

7.1.4 Integrating The Recommendation System And User Interface

In the frontend project structure, new folders namely model and data is created.The convereted model with the json file is added to the model folder and some features from the product dataset has been extracted and saved in a json format is stored under the data folder.In a new python environment,tensorflowjs is installed and in the tensorflow wizard,the model folder name is mentioned and also in the tensorflow keras saved model,the converted model is saved.

7.1.5 Entry Points And Routes Creation

The app.js file serves as the entry point to the application.Intially,the function named require is used in loading the product data which is in json format followed by the module for model. Finally,When the app is up and running, there will be a field for providing the user id.For each specific user id, the recommended products will be displayed.

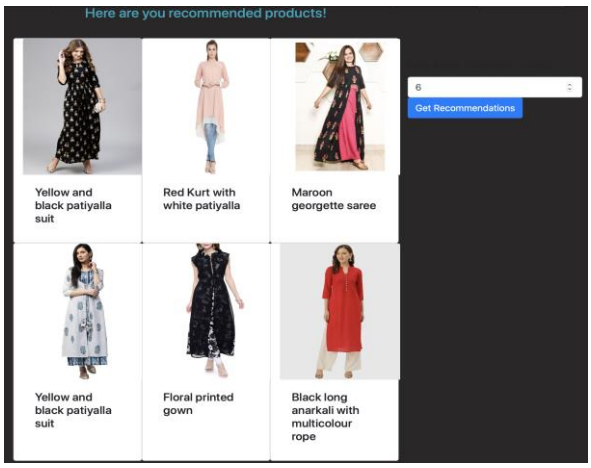


Fig-26: Recommended products

8. Conversion Of The Developed Application Into Progressive Web Application

The way towards changing the current web application into a PWA can be made possible by utilizing Service worker file and a Manifest file.

8.1 Web app Manifest file

The file utilized for web app manifest is the JSON file which comprises of the data about the application.This data is predominantly viewed when the application is running in a cell phone[17].Mainly the link of the manifest.json file needs to be provided in the index.html so that we get the option of adding to home screen.The information includes the application name,logo,icons,background screen,its theme color,the orientation of the application ,its start url ,its display and many more.The image shown is the manifest file of K Zone application.

Fig-27: Web app manifest file

8.2 Service Worker

Service Worker file is found as the foundation of a PWA.Service Worker is principally answerable for reserving the application,giving pop up message and also taking care of organisational traffic.If we take the normal web application,when connected to a network by a gadget,the app will consequently stack in the networkbut any if any of the connection is not found,the application won't load.This case,we will make use of the service worker which creates a huge difference in application when not connected to the network.In the browser cache,it will store the data and when the client is visiting the application,the service worker will stack the information in the browsing environment since it is previously cached[20].The service worker needs to be registered in the index.js file and also the worker.js file

containing the application cache information needs to be added.The fig gives us the registration code of the service worker for the developed application.

```
import React from "react";
import ReactDOM from "react-dom";
import "./styles.css";
import Routes from "./Routes";
import * as serviceWorkerRegistration from './serviceWorkerRegistration';

ReactDOM.render(<Routes />, document.getElementById("root"));

//Service worker Registration
serviceWorkerRegistration.register();
```

Fig-28: Service worker registration

8.3 Lighthouse Testing

Lighthouse is an open source mechanized testing software which is designed mainly for exhibition of a page or an application.It is a Google chrome extension tool which can run in Chrome Development tools by inspecting the page.With the help of Lighthouse we can identify whether the developed application is performing or functionaing enough as a progressive web application.The lighthouse testing provides the developer with a report on the application's performance,accessibility and SEO. When the score is in higher range simply greater than 90 ,then the developer can be much satisfied with its performance as a PWA.The figure gives us the lighthouse testing report for K Zone as a PWA.

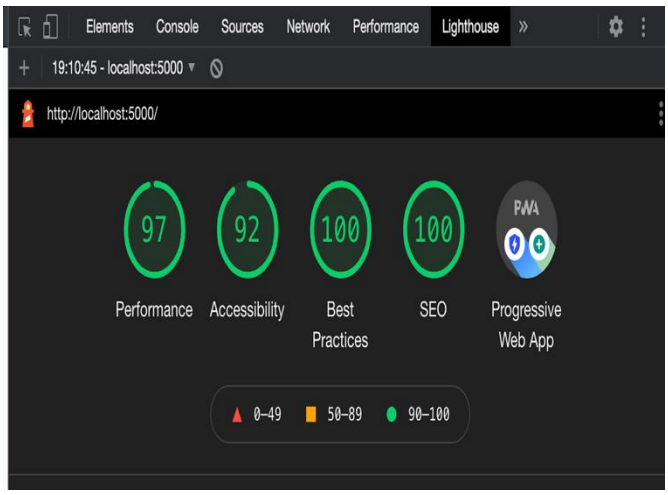


Fig-29:Lighthouse Testing report

9. Conclusion and Future Work

The industries are investing more into progressive web applications which is the future of web application development.This paper is an effort to design and develop a PWA for an online clothing store named K Zone.It also manages to convey the merits of progressive web application by comparing the features with other architectures.There are certain limitations of PWA such as the browser support in which Chrome gives the support for PWA whereas i0S safari browser is yet to be support the service worker api which plays a major role in pwa's and also includes the power consumption.Archibald in 2016 Google I/O Conference quoted that "We want everything to end up on the homescreen to be competitive with the native apps.We want to make the web a first-calss part of the operating system in the user's mind".Eventhough there are limitations ,PWA's advantages can easily reduce the intensity if the limitations. The paper does not end with only developing a PWA but also implementing a recommendation system using the application dataset to recommend similar clothes using neural network approach.From the implementation results,it is proved that algorithms used for recommendation system varies from app to app.Since the developed application is provided with ratings,collaborative filtering is used to provide more accurate results using neural network approach so that it will be easier to use tensorflow in the backend.Further work is needed to implement a system with customisation profiles which makes it more flexible and user-friendly.

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