SMART FASHION RECOMMENDER APPLICATION

A PROJECT REPORT

NALAIYA THIRAN PROJECT

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in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

CK COLLEGE OF ENGINEERING AND TECHNOLOGY, CUDDALORE

ANNA UNIVERSITY : CHENNAI 600 025

NOV/DEC 2022

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1. INTRODUCTION

During the last few years, online shopping has been growing. In 2013, the total turnover for e-commerce in Europe expanded by 17% in contrast to the 12 months before and huge organizations can have hundreds and hundreds of products or even more from which we can select on websites. Clothing is a kind of symbol that represents people's internal perceptions through their outer appearance. It conveys information about their choices, faith, personality, profession, social status, and attitude towards life. Therefore, clothing is believed to be a nonverbal way of communicating and a major part of people's outer appearance. Recent technological advancements have enabled consumers to track current fashion trends around the globe, which influence their choices. The fashion choices of consumers depend on many factors, such as demographics, geographic location, individual preferences, interpersonal influences, age, gender, season, and culture. Moreover, previous fashion recommendation research shows that fashion preferences vary not only from country to country but also from city to city.

According to different studies, e-commerce retailers, such as Amazon, eBay, and Shop style, and social networking sites, such as Pinterest, Snapchat, Instagram, Facebook, Chictopia, and Look book, are now regarded as the most popular media for fashion advice and recommendations. Research on textual content, such as posts and comments, emotion and information diffusion, and images has attracted the attention of modern-day researchers, as it can help to predict fashion trends and facilitate the development of effective recommendation systems. An effective recommendation system is a crucial tool for successfully conducting an e-commerce business. Fashion recommendation systems (FRSs) generally provide specific recommendations to the consumer based on their browsing and previous purchase history. Social-network-based FRSs consider the user's social circle, fashion product attributes, image parsing, fashion trends, and consistency in fashion styles as important factors since they impact upon the user's purchasing decisions.

1.1 Project Overview

In recent years, with the huge amount of information and users of the internet service, it is hard to know quickly and accurately what the user wants. This phenomenon leads to extremely low utilization of information, also known as the information overload problem. Traditionally, keywords are used to retrieve images, but such methods require a lot of annotations on the image

data, which will lead to serious problems 8 such as inconsistent, inaccurate, and incomplete descriptions, and a huge amount of work. To solve this problem, Content Based Information Retrieval (CBIR) has gradually become a research hotspot.

CBIR retrieves picture objects based entirely on the content. The content of an image needs to be represented by features that represent its uniqueness. Any picture object can be represented by its specific shapes, colors, and textures. These visual characteristics of the image are used as input conditions for the query system, and as a result, the system will recommend the nearest images and data set. This research designs and implements a two-stage deep learning-based model that recommends a clothing fashion style. This model can use a deep learning approach to extract various attributes from images with clothes to learn the user's clothing style and preferences. These attributes are provided to the correspondence model to retrieve the contiguous related images for the recommendation. Based on data-driven, this thesis uses a convolutional neural network as a visual extractor of image objects. This experimental model shows and achieves better results than the ones of the previous schemes.

1.2 Purpose

The combination of fashion preferences and the above-mentioned factors associated with clothing choices could transmit the image features for a better understanding of consumers' preferences. Therefore, analyzing consumers' choices and recommendations is valuable to fashion designers and retailers. A recommendation system is an artificial intelligence or AI algorithm, usually associated with machine learning, that uses Big Data to suggest or recommend additional products to consumers. These can be based on various criteria, including past purchases, search history, demographic information, and other factors. A recommender system aims to estimate the utility of a set of objects belonging to a given domain, starting from the information available about users and objects. Product recommendation engines are an excellent way to deliver customers with an improved user experience.

Leveraging advanced algorithms such as machine learning and AI, a recommendation system can help bring customers the relevant products they want or need. Product recommendations are part of an e-Commerce personalization strategy wherein products are dynamically populated to a user on a webpage, app, or email based on data such as customer attributes, browsing behavior, or situational context—providing a personalized shopping experience.

2. LITERATURE SURVEY

Recommender Systems are typically characterized by their way to deal with the estimation of ratings. Here, we study different types of recommender systems. The definition was expressed in for the first time and has been considered widely.

Additionally, recommender systems are normally arranged into these categories, considering how suggestions are made:

1. Content-based: Recommendation of items happens based on how the user favored items previously.

2. Collaborative-based: In this case, we look for users with similar preferences and tastes, and based on this, the user will be suggested items.

3. Hybrid-base: These are methods that club together both "content-based and collaborative-based methods".

2.1 Existing Problem

It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. It is a problem-solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose.

2.2 References

1. S. Namasudra. Cloud computing: A new era. Journal of Fundamental and Applied Sciences. To achieve high security and get accessed from anywhere, anytime we are moving to cloud. Hence it is utilized for projects by using virtualization methodology in 2018.
2. Michael Giering. Retail Sales Prediction and Item Recommendations Using Customer Demographics at Store Level. ACM SIGKDD Explorations Newsletter. The implementation of this system enables to improve sales forecasting for a large retailer and also acts as an analysis tool busing Retail Data Mining Methodology in 2008.
3. Bing Fang, Shaoyi Liao, Kaiquan Xu, Hao Cheng, Chen Zhu, Huaping Chen. A novel mobile recommender system for indoor shopping. International Journal of New Technology and Research. The mobile positioning approach overcome the disadvantages of existing indoor

positioning technologies. The system achieves much better user satisfactions by using Received Signal Strength Methodology in 2012.

4. Vibhor Sharma, Monika Goyal, Drishti Malik. An intelligent behaviour shown by chatbot system. International Journal of New Technology and Research. The user will write out his query on the platform provided. The addition of this chatbot in our system make it more user interactive as it responds to the queries. Hence customer satisfaction is achieved by using Artificial Intelligence and Natural Language Processing Methodology in 2017.
5. Hanke, Jannis, Hauser, Matthias, Durr, Alexander, Thiesse, Frederic. Fashion Store Product Recommendation System. Twenty-Sixth European Conference on Information Systems. The implementation of recommendation systems in the physical world allows for the integration of additional contextual information. It enables the product recommendation system to generate better recommendations by using Internet Of Things (Smart Fitting Rooms), Predictive Analysis methodology in 2018.
6. Alexander Felfernig, Seda Polat-Erdeniz, Christoph Uran, Stefan Reiterer, Muesluem Atas, Thi Ngoc Trang Tran, Paolo Azzoni, Csaba Kiraly, Koustabh Dolui. An overview of recommender systems in the internet of things. Journal of Intelligent Information Systems. SeqReq provides intelligent workflow/node recommendations whereas ConfReq and DiagReq increases runtime performance and prediction quality of CSP solvers. Hence these approaches can be applied in AGILE project's use cases. Hereby, to select a recommendation approach based on the application domain is known by using Sequences based recommendation (SeqReq) Recommendation for configurators (ConfReq) Recommending diagnoses (DiagReq) methodology in 2019.
7. Anjan M., Abhishek V., C.Balamanikantan, Dheeraj, Dr.Venugeetha Y. Fashion Recommendation System using CNN. International Journal of Advanced Research, Ideas and Innovations in Technology. The product recommendation engine help bring customers the relevant products they want or need. The engine is able to intelligently select which algorithms and filters to apply by using Content based filtering using Convolutional Neural Network in 2022.
8. Bingjie (Jenny) Xu, Shunan Guo, Eunyee Koh, Jane Hoffswell, Ryan Rossi, Fan Du. In-Store Shopping Decision Support through Augmented Reality and Immersive Visualization. International Journal of New Technology and Research. The design of visualization makes it

more understandable to novice users. It aims to help customers make better decisions across multiple products by using Mixed/Augmented Reality, Human-centered computing in 2022.

2.3 Problem Statement Definition

A problem statement is a concise description of the problem or issues a project seeks to address. The problem statement identifies the current state, the desired future state and any gaps between the two. A problem statement is an important communication tool that can help ensure everyone working on a project knows what the problem they need to address is and why the project is important.

A problem statement is important to a process improvement project because it helps clearly identify the goals of the project and outline the scope of a project. It also helps guide the activities and decisions of the people who are working on the project. The problem statement can help a business or organization gain support and buy-in for a process improvement project.

Problem Statement (PS)	I am	I'm trying to	But	Because	Which makes me feel
PS-1	a customer	find the item I wish to purchase	searching requires more time	to purchase the necessary items, I must continue to navigate to multiple pages	frustrated

Table 2.1 Problem Statement Definition

3. IDEATION AND BRAINSTROMING

3.1 Empathy Map Canvas

- An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.
- It is a useful tool to helps teams better understand their users.
- Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

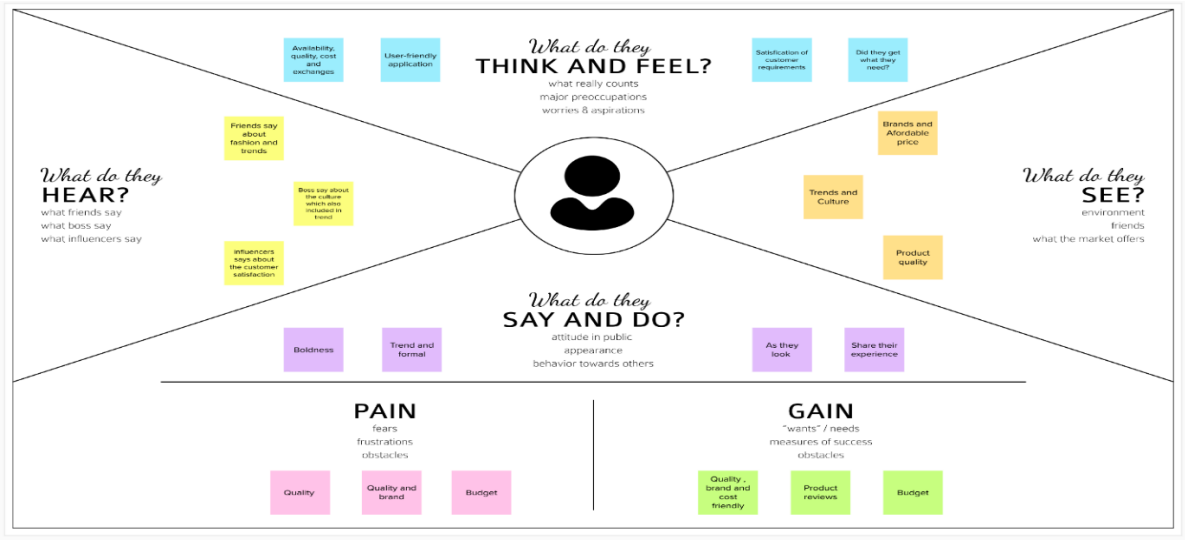

Fig 3.1 Empathy Map Canvas

3.2 Ideation and Brain Stroming

- Ideation is the process of forming ideas from conception to implementation, most often in a business setting. Ideation is expressed via graphical, written, or verbal methods, and arises from past or present knowledge, influences, opinions, experiences, and personal convictions.
- Brain Stroming is a group problem-solving method that involves the spontaneous contribution of creative ideas and solutions.
- Steps involved in Brain Stroming will be

Step 1 : Team Gathering, Collaboration and Select the Problem Statement.

Step 2 : Brainstrom, Idea listing and Grouping.

Step 3 : Idea Prioritization.

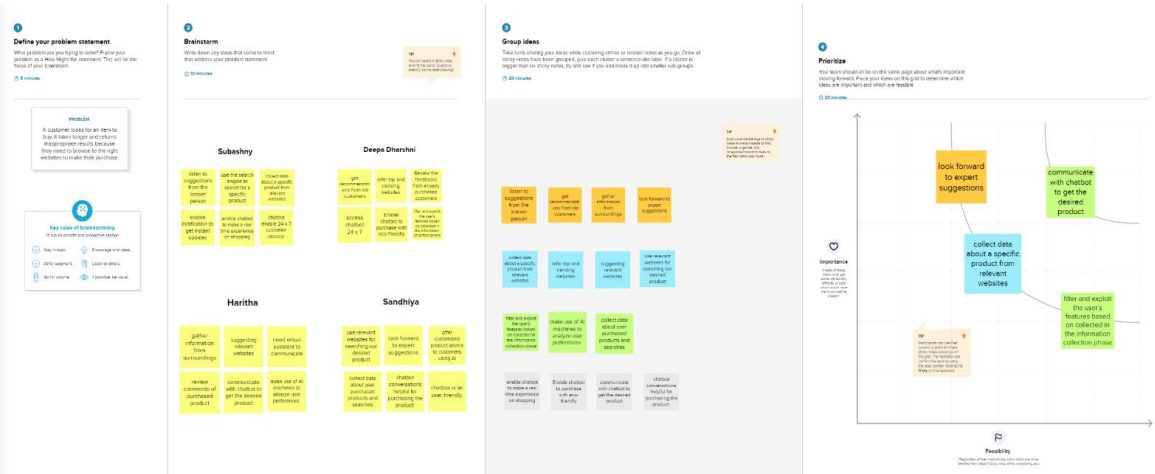

Fig 3.2 Ideation and Brain Storming

3.3 Proposed Solution

The proposed solution means the data de-duplication system submitted by a Vendor as described in its response, consisting of the products and services.

S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	A customer looks for an item to buy, it takes longer and returns inappropriate results because they need to browse to the right websites to make their purchase.
2.	Idea / Solution description	Customer can directly buy their products online without navigating to lots of websites and doing several searches by utilizing chatbot.
3.	Novelty / Uniqueness	✓ Chatbot enables real time shopping experience. ✓ Customized product search.
4.	Social Impact / Customer Satisfaction	✓ User friendly interface. ✓ Accurate and easy product search. ✓ Personalize the customer experience. ✓ Deals with customer queries.

5.	Business Model (Financial Benefit)	✓ Chatbot in shopping serve as a powerful lead generation tool for online retailers. ✓ Shopping with chatbot cut cost and increase revenue ✓ Reduces the cost of operation
6.	Scalability of the Solution	✓ Drive sales. ✓ Serves the customer whenever. ✓ Always online. ✓ Minimizes human error.

Table 3.1 Proposed Solution Chart

3.4 Problem Solution Fit

Problem Solution Fit is used to solve complex problems in a way that fits the state of customers. Succeed faster and increase the solution adoption by tapping into existing mediums and customer behaviour. It Sharpen the communication and marketing strategy with the right triggers and messaging. It says about increased touchpoints with company by finding the right problem-behaviour fit and build trust, solving frequent annoyances or urgent / costly problems. It is based on Lean Start-up, Design Thinking, Lazy User Model (LUM) principles and fundamentals of User Experience design and understand the existing situation to design for improvement.

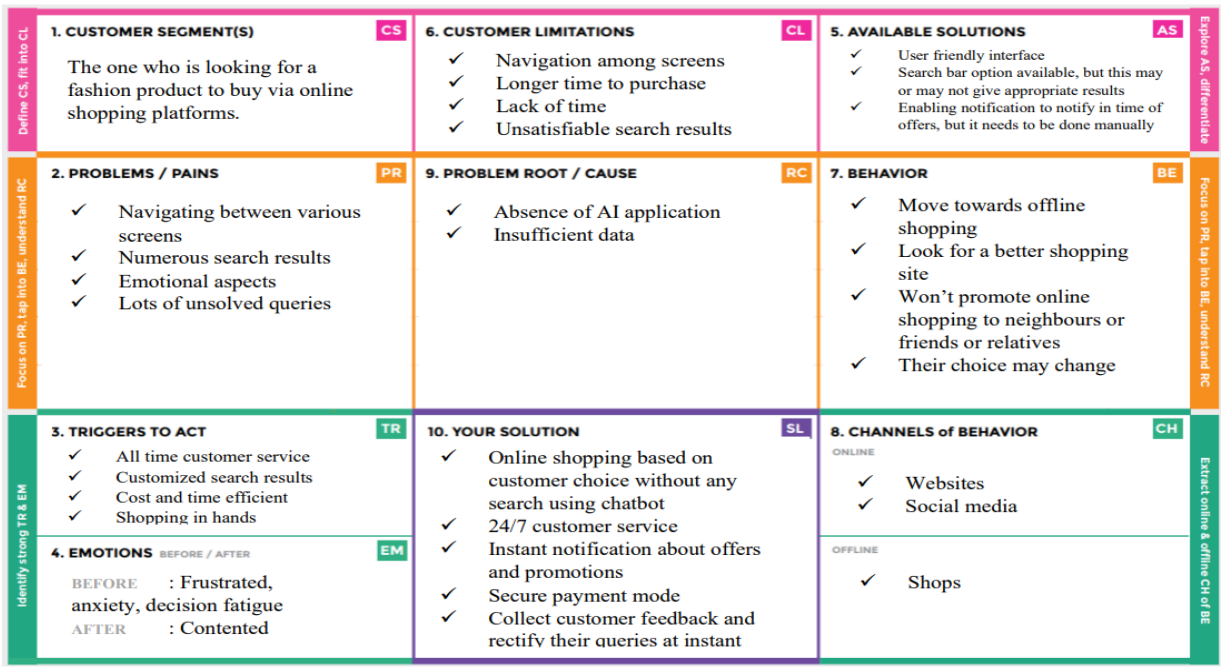

Fig 3.3 Structure of Solution Fit

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement

Following are the functional requirements for the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	✓ Registration through Form ✓ Registration through Gmail
FR-2	User Confirmation	✓ Confirmation via Email ✓ Confirmation via OTP
FR-3	Chatbot	✓ To recommend products depending on the user interests ✓ Notify the user about their order placement and payment ✓ To collect feedback from customer ✓ Advertise about offers
FR-4	Orders	To display the status of orders placed, ✓ Added to cart ✓ Confirmed ✓ Processing ✓ Shipping ✓ Date of return
FR-5	Payment	✓ To make available various payment options to user ✓ Generate an online payment statement to make user viewable

Table 4.1 Functional Requirement

4.2 Non-Functional Requirement

Following are the Non-functional requirements for the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	✓ User-friendly web application ✓ Navigation is made easier by enabling chatbot

NFR-2	Security	✓ The user is verified and confirmed about registration ✓ Account details provided are secure
NFR-3	Reliability	✓ Focusing on the data collection and storing of data
NFR-4	Performance	✓ Minimized shopping time ✓ Minimization of navigation ✓ Effective chatbot – human interaction
NFR-5	Availability	✓ 24 x 7 customer service by chatbot ✓ Need to check the stock availability in database
NFR-6	Scalability	✓ To expand memory space, server capacity so that more people can make purchase and transaction over website

Table 4.2 Non-Functional Requirements

5.PROJECT DESIGN

5.1 Data Flow Diagram

- A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text tables, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled.
- Using any convention's DFD rules or guidelines, the symbols depict the four components of data flow diagrams.

1.External Entity: an outside system that sends or receives data, communicating with the system being diagrammed. They are the sources and destinations of information entering or leaving the system. They might be an outside organization or person, a computer system or a business system. They are also known as terminators, sources and sinks or actors. They are typically drawn on the edges of the diagram.

2. Process: any process that changes the data, producing an output. It might perform computations, or sort data based on logic, or direct the data flow based on business rules. A short label is used to describe the process, such as "Submit Payment".

3. Data Store: files or repositories that hold information for later use, such as a database table or a membership form. Each data store receives a sample label, such as “Orders”.

4. Data flow: the route that data takes between the external entities, processes and the data stores. It portrays the interface between the other components and is shown with arrows, typically labelled with a short data name, like “Billing details”.

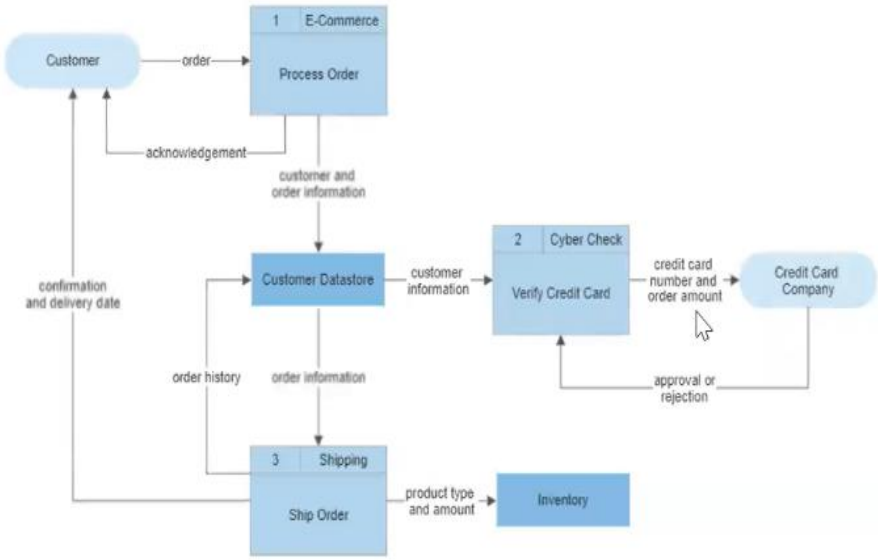

Fig 5.1 Data Flow Diagram

5.2 Solution and Technical Architecture

Solution Architecture

- Solution Architecture is the process of developing solutions based on the predefined processes, guidelines and best practices with the objective that the developed solution fits within the enterprise architecture in terms of information architecture, system portfolios, integration requirements and many more.
- It can then be viewed as a combination of roles, processes and documentation that are intended to address specific business needs, requirements or problems through the design and development of applications and information systems.

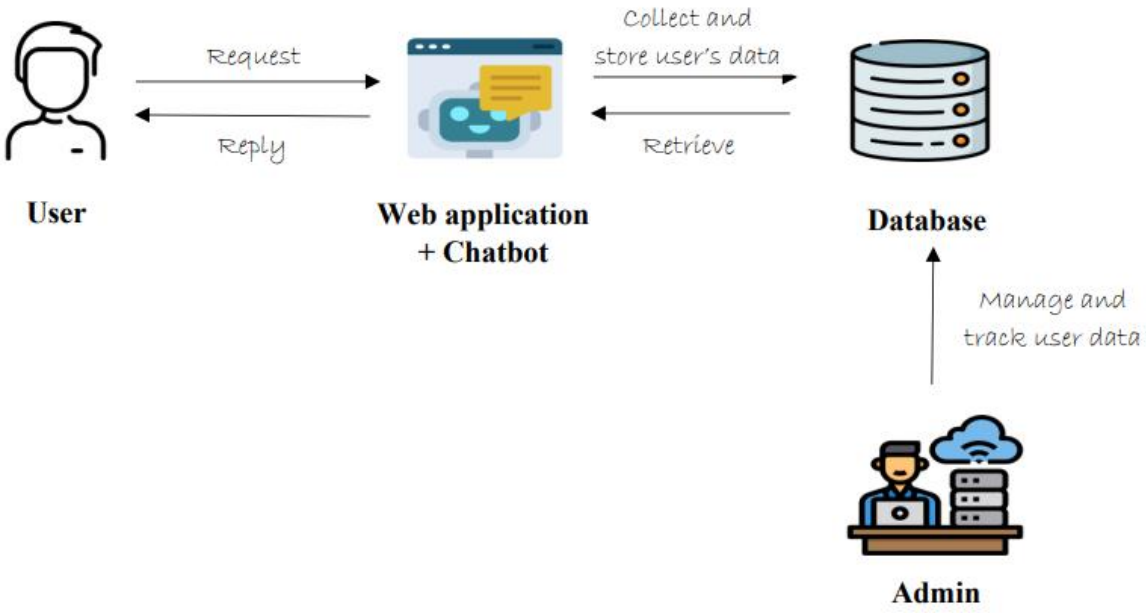

Fig 5.2 Solution Architecture

Technical Architecture

- Technical Architecture is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.
- Technical Architects are the people who plan, design, build, implement and maintain network systems. They are responsible for the security, communications, hardware and software that the company needs to deliver innovative products and reach long-term business goals.

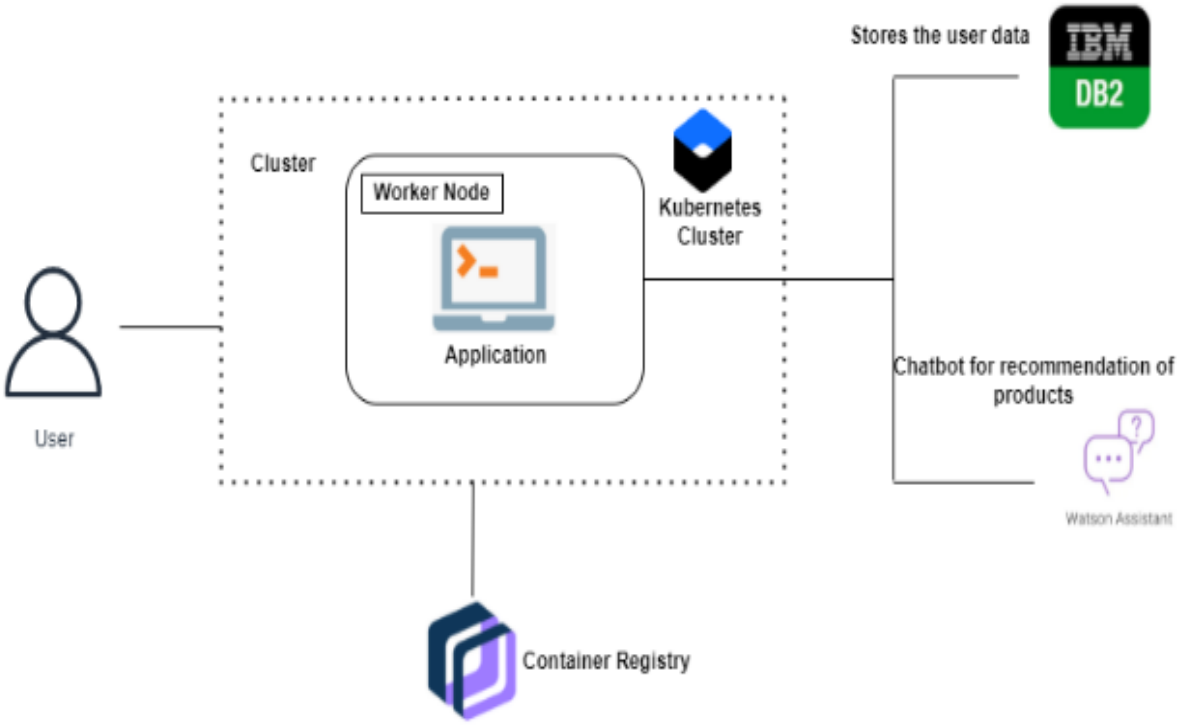

Fig 5.3 Technical Architecture

Components and Technology:

S.No	Component	Description	Technology
1.	User Interface	User interaction with application – Web UI and Chatbot	HTML, CSS, JavaScript, Bootstrap
2.	Email Service	To verify user and mail id	SendGrid
3.	Chatbot	Get details from use and recommend	IBM Watson Assistant
4.	Cloud Database	Database Service on Cloud	IBM DB2
5.	Infrastructure (Server / Cloud)	Application Deployment on Cloud System	Docker, Cloud Foundry, Kubernetes

Table 5.1 Technologies used

Application characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Web technologies	HTML, CSS, JS, Python, Flask
2.	Security Implementations	User verification through Email Service	Sendgrid
3.	Scalable Architecture	Run the app in local and cloud system	Docker and Kubernetes
4.	Availability	Justify the availability of application (i.e., use of load balancer, distributed servers)	Docker, IBM Cloud
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of cache, use of CDN's)	IBM Cloud, Kubernetes Cluster, Container Registry

Table 5.2 Application Characteristic

5.3 User Stories

A User Story is an informal, general explanation of a software feature written from the perspective of the end user. Its purpose is to articulate how a software feature will provide value to the customer. User stories are one of the core components of an agile program. They help to provide a user-focused framework for daily work-which drives a collaboration, creativity and a better product overall.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release

Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Gmail	I can access my account / dashboard	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password	I can receive confirmation email & click confirm	High	Sprint-1
	Dashboard	USN-5	As a user, I can view the proudcts	I can receive the latest updates	High	Sprint-2
Customer (Web user)	Search	USN-6	As a user search product	Happy as a customer finding ease to use	High	Sprint-2
Customer Care Executive	Chatbot	US-7	To suggest the user required product	If the product is available, it will be displayed	High	Sprint-3
Customer (Activity)	Orders	US-8	As a user can place orders	I can receive the confirmation message for placing order	High	Sprint-3

	Exchange and cancelling	US-9	As a user can exchange the product and cancelling it	I can receive confirmation message for such activity	High	Sprint-3
	Payment	US-10	Makes the payment for what I shopped	I can pay b utilizing numerous payment options and get confirmation email for billing	High	Sprint-4
Administrator	Tracking	US-11	As an admin, I can keep track of goods and check availability	I can update the database	High	Sprint-4
Customer Care Executive	Feedback	US-12	As a user can share their views about the shopping experience and product quality	User-friendly customer support	High	Sprint-4

Table 5.3 User Stories Chart

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Subashny V

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Deepa Dharshni M
Sprint-1		USN-3	As a user, I can register for the application through Gmail	2	Medium	Haritha N
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	1	High	Sandhiya S
Sprint-2	Dashboard	USN-5	As a user, I can view the products	3	High	Deepa Dharshni M
Sprint-2	Search	USN-6	As a user search product	5	High	Haritha N
Sprint-3	Chatbot	USN-7	To suggest the user required product	8	High	Subashny V
Sprint-3	Orders	USN-8	As a user can place orders	3	High	Sandhiya S
Sprint-3	Exchange and cancelling	USN-9	As a user can exchange the product and cancelling it	3	High	Haritha N
Sprint-4	Payment	USN-10	Makes the payment for what I shopped	5	High	Deepa Dharshni M
Sprint-4	Tracking	USN-11	As an admin, I can keep track of goods and check availability	13	High	Subashny V
Sprint-4	Feedback	USN-12	As a user can share their views about the shopping experience and product quality	1	High	Sandhiya S

Table 6.1 Sprint plan

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	6	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	8	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	14	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	12 Nov 2022	19	12 Nov 2022

Table 6.2 Sprint delivery

6.3 Reports from JIRA

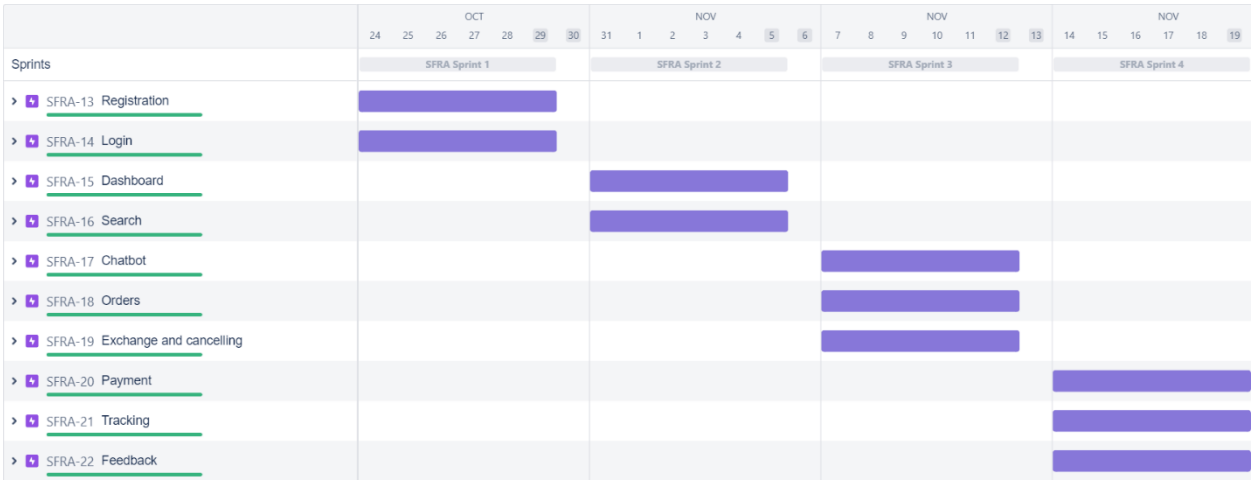

Fig 6.1 Road map

7.CODING & SOLUTIONING

7.1 Feature 1 - Chatbot

In this Smart Fashion Recommended System Chatbot is added. This Chatbot is used to recommend products to the user. The user has given the details about the product. The Chatbot will analyze the details and it recommends the product based on the user's given details. By using this Chatbot the user can easily find the required products. It saves the time for users.

```
<script>
      window.watsonAssistantChatOptions = {
        integrationID: "e2079239-e8bb-4da3-bc66-fcb9fee17d69", // The ID of
this integration.
        region: "au-syd", // The region your integration is hosted in.
        serviceInstanceID: "9ab4030b-a4fe-4a4d-bea4-c9b9ba3adbf8", // The ID of
your service instance.
        onLoad: function(instance) { instance.render(); }
      };
      setTimeout(function(){
        const t=document.createElement('script');
        t.src="https://web-
chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
        document.head.appendChild(t);
      });
    </script>
```

7.2 Feature 2 - Database

This application uses the ibmdb2 database. In this database user credentials, admin credentials and the product details are stored.

```
import ibm_db
conn = ibm_db.connect("DATABASE=bludb;HOSTNAME=b0aebb68-94fa-46ec-a1fc-
1c999edb6187.c3n41cmd0nqnrk39u98g.databases.appdomain.cloud;PORT=31249;SECURITY
=SSL;SSLServerCertificate=DigiCertGlobalRootCA.crt;UID=lyj19879;PWD=O5FeEzqOfN2
7OpWt",'','')
print(conn)
print("connection successful...")
```

8.TESTING

8.1 Test Cases

A test case is a set of actions performed on a system to determine if it satisfies software requirements and functions correctly. A test case is a document, which has a set of test data, preconditions, expected results and postconditions, developed for a particular test scenario.

Test case ID	Feature Type	Component	Test Scenario
RegisterPage_TC_001	Functional	Register Page	Verify the details in register page and move the details to the database
LoginPage_TC_002	Functional	Login Page	Verify the UI elements in Login
Dashboard_TC_003	Functional	Home Page	User can view the user dashboard
Product_TC_004	Functional	Product Page	Verified user can view the product details
Chatbot_TC_005	Functional	Product Page	Chatbot will appear after pressing the products

Table 8.1 Test case

8.2 User Acceptance Testing

This sort of testing is carried out by users, clients, or other authorized bodies to identify the requirements and operational procedures of an application or piece of software. The most crucial stage of testing is acceptance testing since it determines whether or not the customer will accept the application or programmer. It could entail the application's U.I., performance, usability, and usefulness. It is also referred to as end-user testing, operational acceptance testing, and user acceptance testing (UAT).

S.No	Security test cases	Type-Negative/Positive Test Case
1	Verify if a user cannot enter the characters more than the specified range in each field (Username and Password).	Positive

2	Verify the login page by pressing 'Back button' of the browser. It should not allow you to enter into the system once you log out.	Negative
3	Verify the timeout functionality of the login session.	Positive
4	Verify if a user should not be allowed to log in with different credentials from the same browser at the same time.	Negative
5	Verify if a user should be able to login with the same credentials in different browsers at the same time.	Positive
6	Verify the login page against SQL injection attack.	Negative
7	Verify the implementation of SSL certificate.	Positive

Table 8.2 User Acceptance test

9.RESULTS

9.1 Performance Metrics

Performance testing is a non-functional software testing technique that determines how the stability, speed, scalability, and responsiveness of an application holds up under a given workload.

S.No	Parameter	Performance
1	Response Time	0.2s (Average of 10 trails)
2	Workload	500 users (Calculated based on Cloud Space)
3	Revenue	Individual users and pharmaceutical industries
4	Efficiency	Simple and straight forward workflow, which makes the process efficient
5	Down Time	Almost no down time due to IBM Cloud enabled solution

Table 9.1 Performance metric

10. ADVANTAGES & DISADVANTAGES

Advantages:

1. Easy recommendations make fewer searches and sometimes end up in good deals.
2. User reviews will give accurate information, this is also an advantage if we purchase online as we can see other reviews too, most of the time honest.
3. Speed up the process of decision and purchase based on the previous statistics.
4. A recommendation engine can bring traffic to were sites. It accomplishes this with customized email messages and target blasts.

Disadvantages:

1. If the system recommends products with bias, then the customer will be landing on the wrong deals.
2. Chances are that some websites may suggest products wrongly based on analysis of little information gathered.
3. Since the feature representations of the items are hand-engineered to some extent, this technique requires a lot of domain knowledge. Therefore, the model can only be as good as the hand-engineered features.
4. The model can only make recommendations based on the existing interests of the user. In other words, the model has limited ability to expand on the users' existing interests.

11. CONCLUSION

Chatbots are, first and foremost, customer self-service solutions. This basically means that they are there to help customers find information, learn about products and services, and get answers to simple questions on the fly. With a chatbot, your organization can easily offer high-quality support and conflict resolution any time of day, and for a large quantity of customers simultaneously. The use of chatbots can help businesses maintain a great level of consistency in answers and improve customer experience with the brand.

12. FUTURE SCOPE

Chatbots are changing the way businesses communicate and understand their customers. With AI, chatbots will have the ability to deliver a more personalized customer experience. It's also saving companies money through customer service, internal processes, and marketing efforts.

13. APPENDIX

Source Code

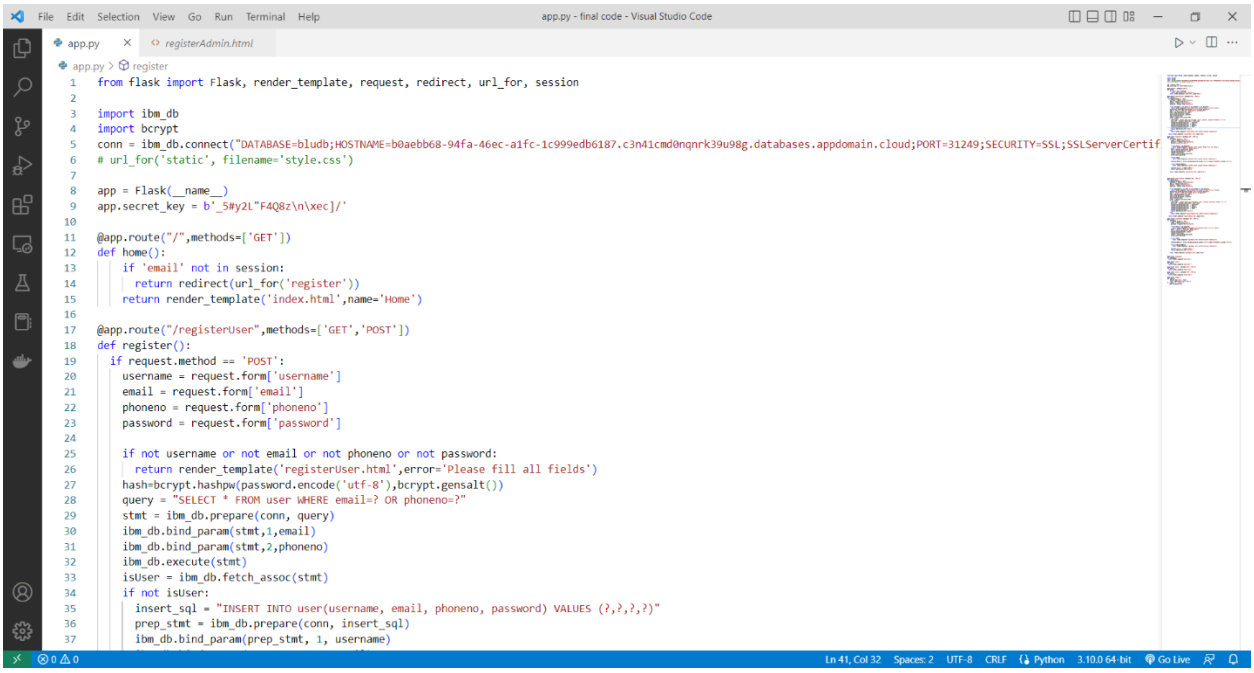

Fig 13.1 app.py

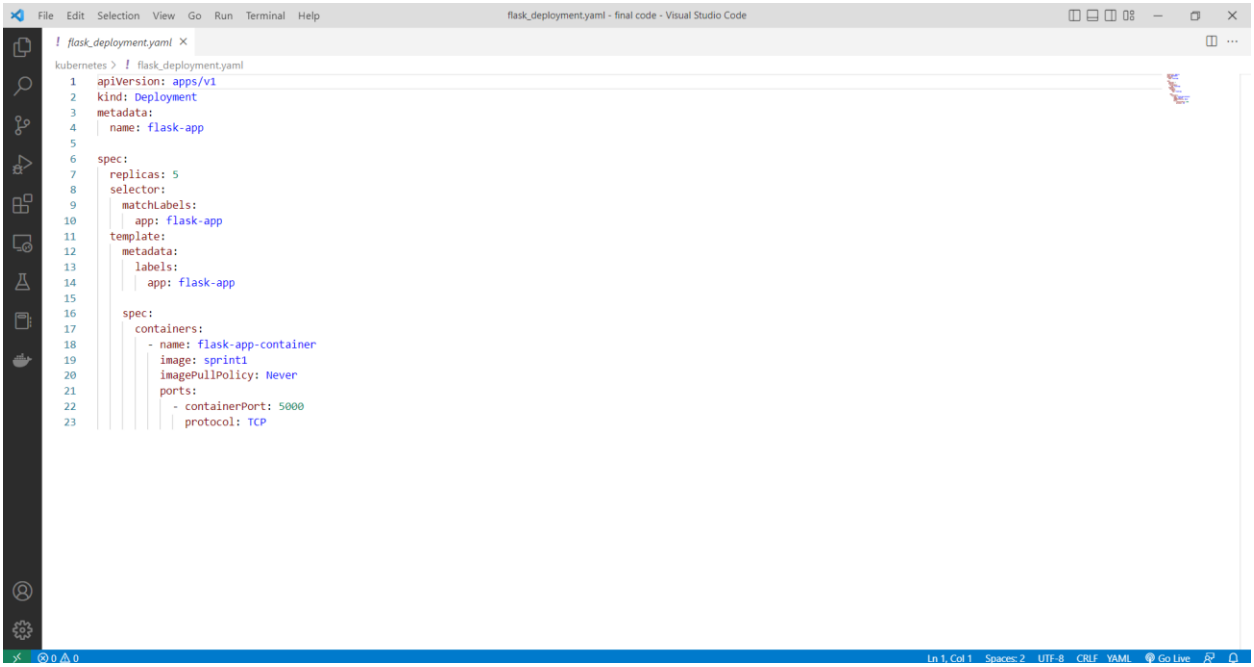

Fig 13.2 flask_deployment.yaml

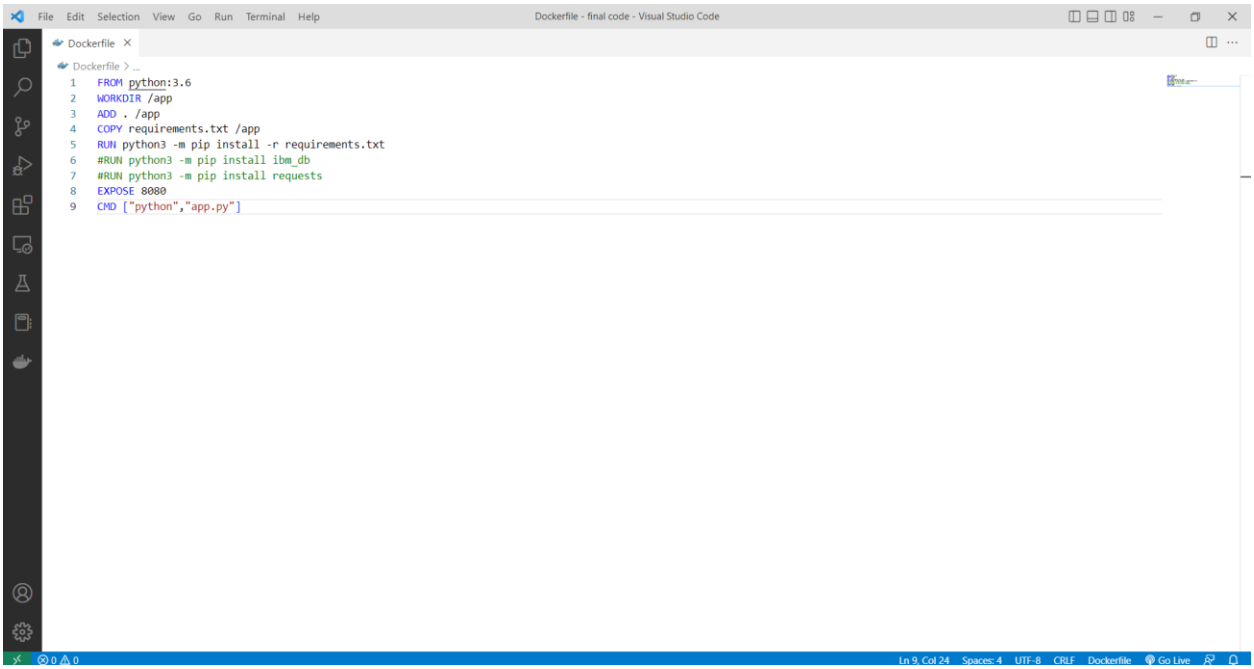

Fig 13.3 Dockerfile

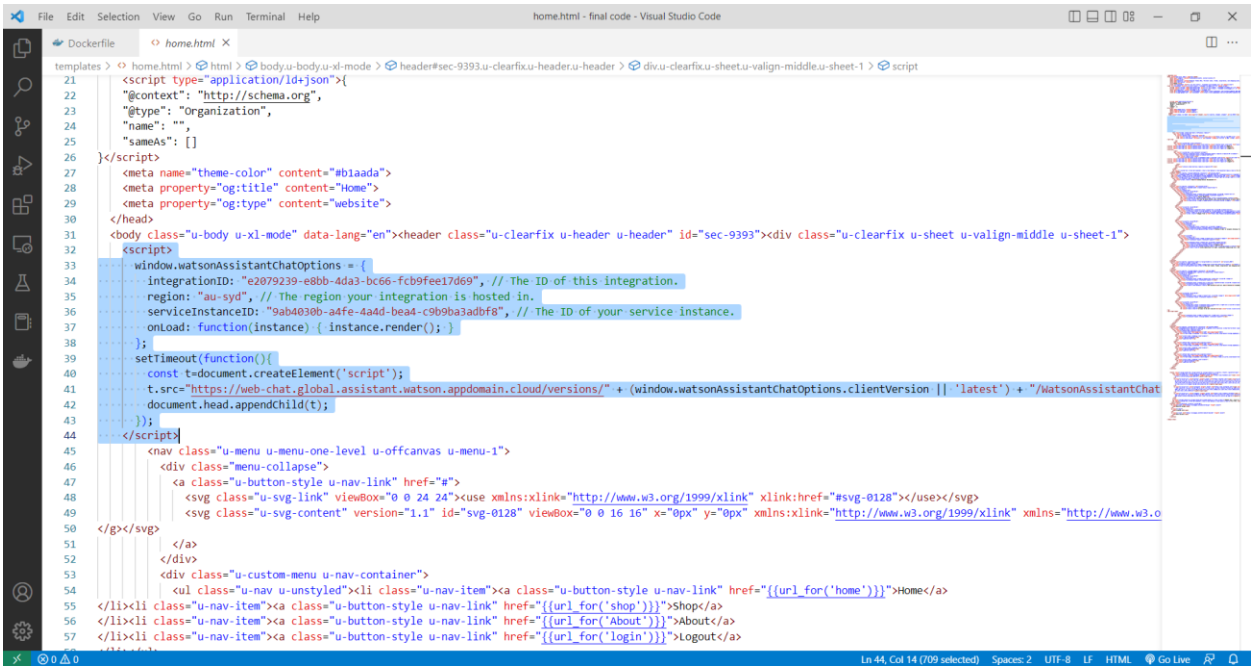

Fig 13.4 home.html

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-3810-1658644509

PROJECT DEMO VIDEO LINK:

https://drive.google.com/file/d/1rzHxy9B-ZtPEng6vhIPazVMYRfyyxMA0/view?usp=sharing