IBM – NALAIYA THIRAN PROJECT

SMART FASHION RECOMMENDER APPLICATION

INDUSTRY MENTOR : KRISHNA CHAITANYA

FACULTY MENTOR : AYSHA SUFREEN

TEAM ID : PNT2022TMID37394

TEAM LEAD : ASHFAQUE AHAMED F

TEAM MEMBER : NAVANEETHAN P

TEAM MEMBER : NITHISH B

TEAM MEMBER : MOHAMED MUSHRAF K

ABSTRACT

In recent years, the textile and fashion industries have witnessed an enormous amount of growth in fast fashion. On e-commerce platforms, where numerous choices are available, a recommendation system is required to sort, order, and efficiently convey relevant product content or information to users. Image-based fashion recommendation systems (FRSs) have attracted a huge amount of attention from fast fashion retailers as they provide a personalized shopping experience to consumers. With technological advancements, this branch of artificial intelligence exhibits a tremendous amount of potential in image processing, parsing, classification, and segmentation. Despite its huge potential, the number of academic articles on this topic is limited. The available studies do not provide a rigorous review of fashion recommendation systems and the corresponding filtering techniques. To the best of the author's knowledge, this is the first scholarly article to review the state-of-the-art fashion recommendation systems and the corresponding filtering techniques. In addition, this review also explores various potential models that could be implemented to develop fashion recommendation systems in the future.

Fashion is perceived as a meaningful way of self-expressing that people use for different purposes.It seems to be an integral part of every person in modern societies, from everyday life to exceptional events & occasions. Fashionable products are highly demanded, and consequently, fashion is perceived as a desirable and profitable industry. Although this massive demand for fashion products provides an excellent opportunity for companies to invest in fashion-related sectors, it also faces different challenges in answering their customer needs.

TABLE OF CONTENT

1. INTRODUCTION

1.1 PROJECT OVERVIEW

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 . The combination of fashion preferences and the abovementioned factors associated with clothing choices could transmit the image features for a better understanding of consumers' preferences.

1.2 PURPOSE

There is currently no existing system that is capable of recommending clothes based on the occasion. Different occasions call for different clothing. Moreover, a lot of fashion is based on the color combinations of outfits. A person with no or little fashion sense will have a hard time deciding on clothes that leave a lasting impression. The proposed Fashion Recommendation System is intended to be used by individual users in order to store images of the clothes that they own in what is called a digital wardrobe and also to get recommendations by the system on what clothes to wear for a given occasion. The main aim of the project is to recommend the most appropriate clothes for a given occasion based on the clothes existing in the user's wardrobe to relieve the user of the burden of making decisions about what clothing to wear. Such a system should be capable of helping someone who has no fashion sense to wear clothes that leave a good impression on others. The system should be such that it is easily accessible and easy to take advantage of the various features that it provides. One of the features should be the ability to store images that the user uploads into a wardrobe. A wardrobe is a very useful entity that the user can use to view and manage the images of clothes that they have uploaded. This feature can also be used by the recommendation algorithm to recommend the clothes. Another feature is the classification of the type and color of the clothing that is uploaded by the user.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM:

In the existing system only simple web applications and their rating has been implemented. In the existing system, An ecommerce product recommendation engine is a piece of technology that displays recommended products to shoppers throughout your store. It uses machine learning to get smarter and show increasingly relevant products to shoppers based on their interests and previous browsing behavior

2.2 REFERENCES:

Shankar D., Narumanchi S., Ananya H.A., Kompalli P., and Chaudhury K. Deep learning based large scale visual recommendation and search for e-commerce, 2017, arXiv preprint arXiv:1703.02344.

Yang Z., Su Z., Yang Y., and Lin G., From recommendation to generation: A novel fashion clothing advising framework. In2018 7th International Conference on Digital Home (ICDH), IEEE, pp.180-186, 2018.

Zhou W., Mok P.Y., Zhou Y., Zhou Y., Shen J., Qu Q., and Chau K.P.Fashion recommendations through cross-media information retrieval.Journal of Visual Communication and Image Representation, 61, pp.112-120, 2019.

[MF. Isinkaye, Y. Folajimi and B. Ojokoh, "Recommendation systems: principles, methods and evaluation", Egyptian Informatics J., vol. 16, no. 3, pp. 261-273, 2015. [Online]. Available: https://en.wikipedia.org/wiki/Artificial_neural_network, [Accessed: 12-Apr-2018]

R. Girshick et al, "Rich feature hierarchies for accurate object detection and semantic segmentation," in 2014 IEEE Conference on Computer Vision and Pattern Recognition, 2014. DOI: 10.1109/CVPR.2014.81.

R. Girshick, “Fast R-CNN,” in 2015 IEEE International Conference on Computer Vision (ICCV), 2015. DOI: 10.1109/ICCV.2015.169.

2.3 PROBLEM STATEMENT DEFINITION

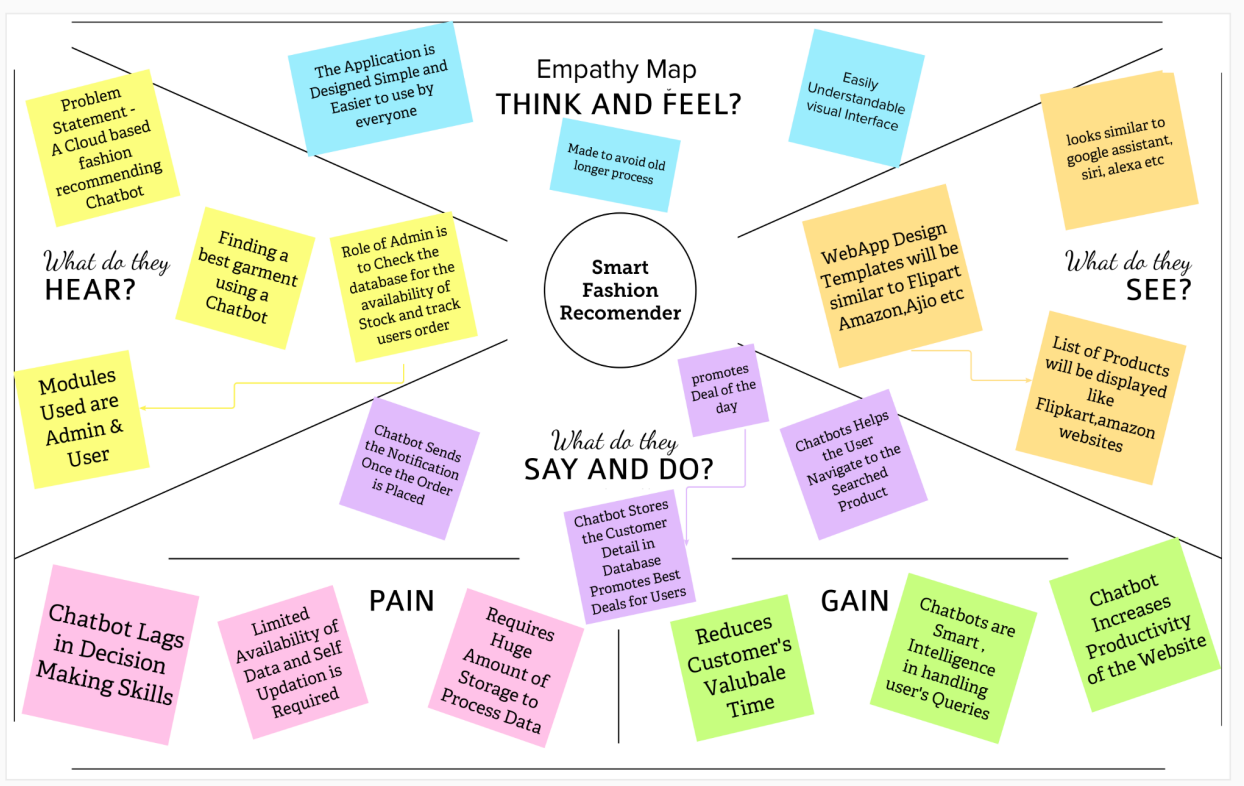
The personal information collected by recommenders raises the risk of unwanted exposure of that information. Also, malicious users can bias or sabotage the recommendations that are provided to other users. In recent years, the textile and fashion industries have witnessed an enormous amount of growth in fast fashion. On ecommerce platforms, where numerous choices are available, an efficient recommendation system is required to sort, order, and efficiently convey relevant product content or information to users.

- ➢ The problem of the work is to design static web applications deployments with customer deployment
- ➢ Lack of interaction between application and user
- ➢ User need to navigate across multiple pages to choose right product
- ➢ Confusion in choosing product
- ➢ Lack of sales
- ➢ Complex User Interface.
- ➢ Lack of proper guidance.

3.IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes. It is a useful tool to help 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. An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers.



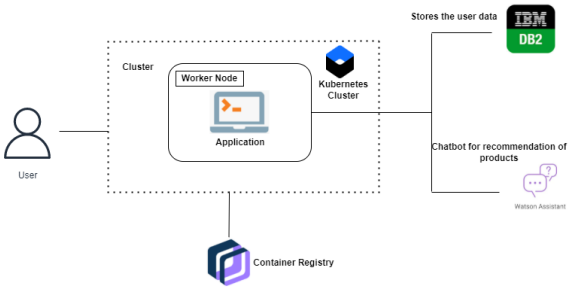
3.2 IDEATION & BRAINSTORMING:

A group problem-solving technique that involves the spontaneous contribution of ideas from all members of the group. The mulling over of ideas by one or more individuals in an attempt to devise or find a solution to a problem.

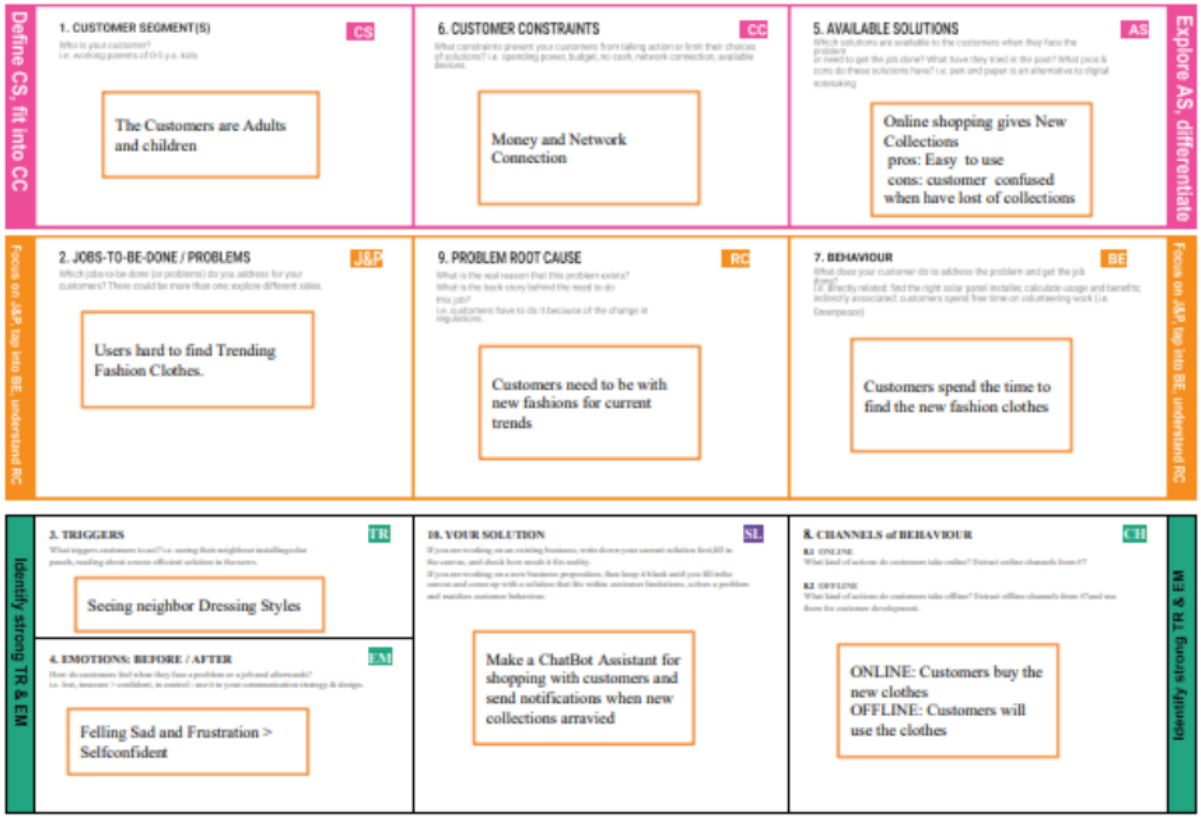
3.3 PROPOSED SOLUTION:

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	• Customers find it difficult to Search many websites to find Fashion clothes and accessories that suits them. • A new innovative solution came up which can directly make online

		shopping based on the choice of the user without any search. ● It can be done by using the chatbot which can be achieved by a smart fashion recommender application.
2	Idea / Solution description	● Customers directly make online shopping based on customer choice without any search ● Users can be able to mention their preferences by interacting with chatbots. ● The user must receive a notification on order confirmation/failure. ● The chatbot must gather feedback from the user at the end of order confirmation.
3	Novelty / Uniqueness	● The customer will talk to Chatbot regarding the Products. Get the recommendations based on information provided by the user ● Instead of searching manually a chatbot will help to find the right product effectively, with this feature user can save time and it is an easy process, chat keep sending a notification about new collections
4	Social Impact / Customer Satisfaction	● The customers are provided with the fashion clothes they are seeking for using chat Bot. ● The model can recommend products that are more suitable to the customer. ● Directly do online shopping based on customer ● The customer purchase the product that are provided by chat Bot and generate avenue • Better experience and Feasibility.

5	Business Model (Revenue Model)	
6	Scalability of the Solution	• The application can increase scalability by providing various kinds of products that the users are looking for • Storing user preferences along with the product in the browser cookie will enable it to provide a response instantly and allows for fetching related products.

3.4 PROBLEM SOLUTION FIT:



4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT :

FR No.	Functional Requirement (Epic)	Sub Requirement(Story/Sub-Task)
FR-1	User Registration	Registration through Form
FR-2	User Interaction	Interact through the Chat Bot
FR-3	Buying Products	Through the chat bot to Track my Orders
FR-4	Track Products	Ask the Chat bot to Track my Orders
FR-5	Return Products	Through the chat bot
FR-6	New Collections	Recommended from chat Bot

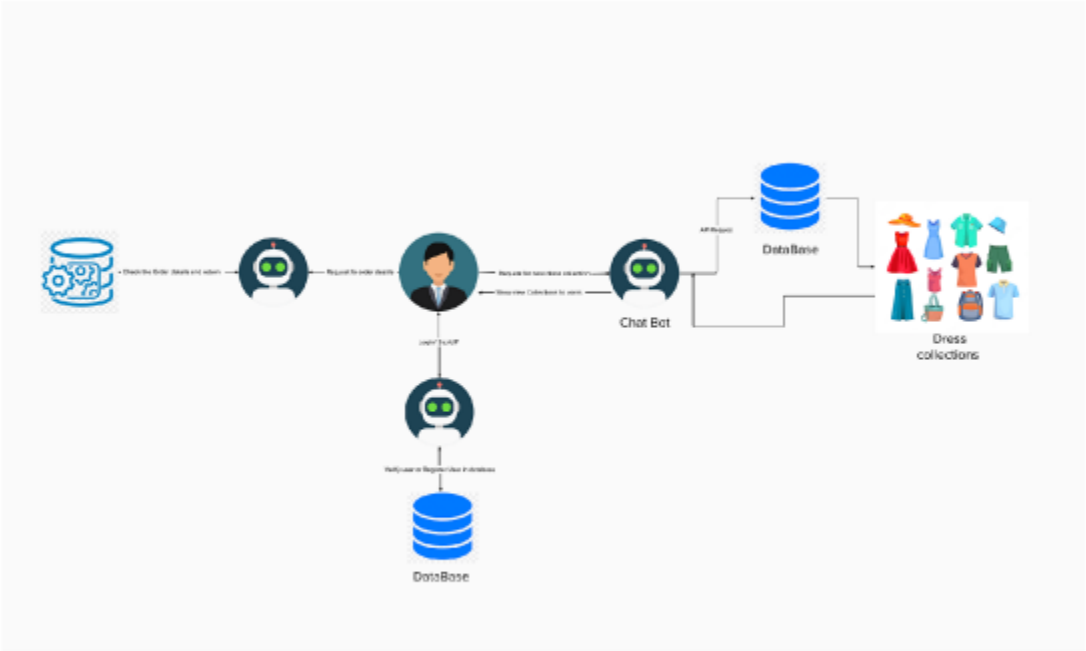
4.2 NON-FUNCTIONAL REQUIREMENTS :

FR No.	Non -Functional requirement	Description
NFR-1	**Usability**	Using Android or IOS or windows applications.
NFR-2	**Security**	The user data is stroed securely in IBM cloud.
NFR-3	**Reliability**	The Quality of the services are trusted.
NFR-4	**Performance**	Its Provide smooth user expeience.
NFR-5	**Availability**	The services are avaiable for 24/7
NFR-6	**Scalability**	Its easy to scalable size of users and products.

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

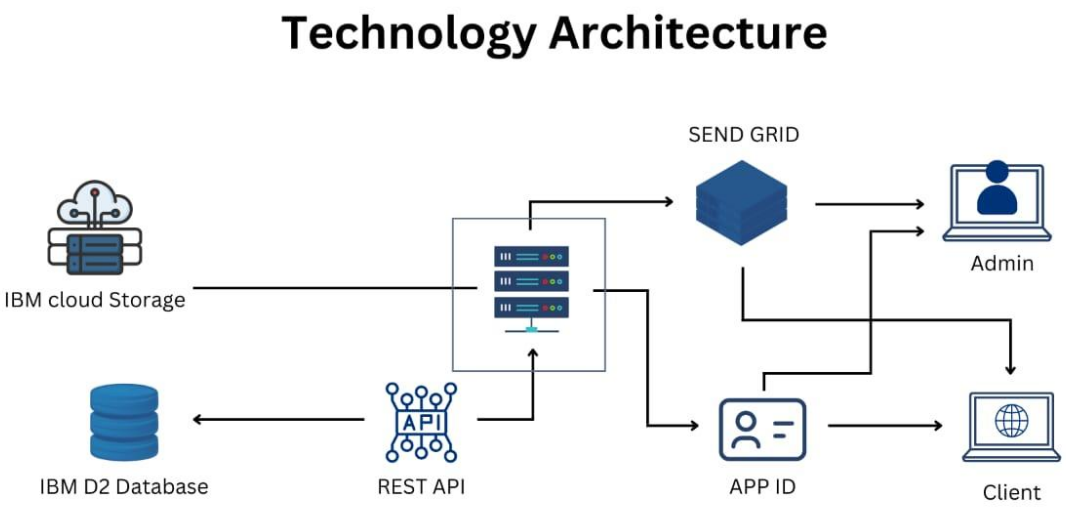


5.2 SOLUTION & TECHNICAL ARCHITECTURE:

We have developed a new innovative solution through which you can directly do your online shopping based on your choice without any search. It can be done by using the chatbot. In this project you will be working on two modules:

- Admin
- User

The solution is implemented in such a way as to improve the interactivity between customers and applications. The chatbot sends messages periodically to notify offers and preferences.



5.3 USER STORIES :

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 confriming my password	I can access my account/ dashbord	High	Sprint-1
		USN-2	As a user , I will receive conformation email once I have registered for the application	I can receive confrimation email & click confrim	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my data by login	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the dashboard and by products		High	Sprint-2
Customer (Web user)	Registration /Login	USN-7	As a user, I can register for the application by entering my email, password,and confriming my password.	I can access my account/ dashboard		Sprint-1
Customer Care Executive	Contact with Customer	USN-8	As a Customer, customer care executive, I slove the customer Requirements and feedback	I can receive calls from customers	High	Sprint-1
Adminstrat ion	Check stock and Price,order	USN-9	As a Administration, I can Check the database and stock details and buying and selling prices	I am the administrator of the company	High	Sprint-2

6.PROJECT PLANNING & SCHEDULE

6.1 SPRINT PLANNING & ESTIMATION:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Member
Sprint-1	User Panel	USN-1	The user will login into thewebsite and go through the products available on the website	20	High	Ashfaque Ahamed F Nithish B Navaneethan P Mohamed Mushraf K
Sprint-2	Admin panel	USN-2	The role of the admin is to check out the database about the stock and have a track of all the things that the users are purchasing	20	High	Ashfaque ahamed F Nithish B Navaneethan P Mohamed Mushraf
Sprint-3	Chat Bot	USN-3	The user can directly talk to Chatbot regarding the products. Get the recommendations based on information provided by the user.	20	High	Ashfaque ahamed F Nithish B Navaneethan P Mohamed Mushraf
Sprint-4	final delivery	USN-4	Container of applications using docker kubernetes and deployment the application.Create the documentation and final submit the application	20	High	Ashfaque ahamed F Nithish B Navaneethan P Mohamed Mushraf

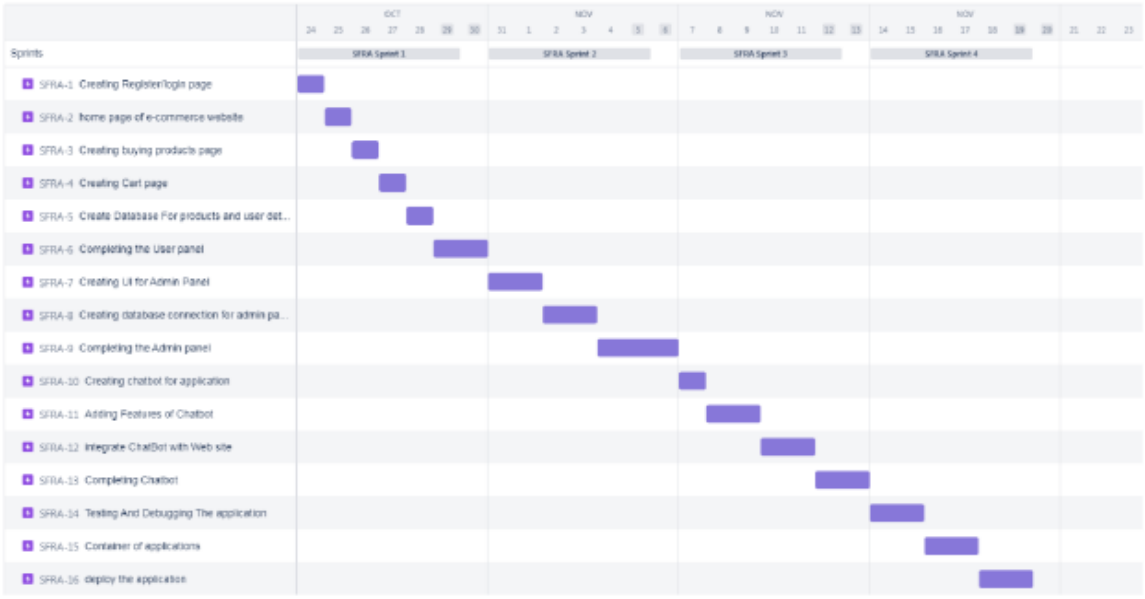
6.2 SPRINT DELIVERY SCHEDULE:

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		29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022		05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		12 Nov 2022
Sprint-45	20	6 Days	14 Nov 2022	19 Nov 2022		19 Nov 2022

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

6.1 REPORTS FROM JIRA:

Burndown Chart:



\

7. CODING & SOLUTIONING

7.1FEATURE 2:

FINALHOME.HTML:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initialscale=1.0">
<title>Smart Fashion shop </title>
<style>
body {
background-color:#FFFDD0;
display: flex;
align-items: center;
justify-content: center;
flex-direction: column;
}
img
{
height: 240px;
border-radius: 7px;
margin: 10px;
}
</style>
</head>
<body>
<h1>Welcome To Fashion Store</h1>
<div>
<img src="https://ibm001.s3.jp-tok.cloud-objectstorage.appdomain.cloud/img01.jfif"
alt="Dress" srcset="">
<img src="https://ibm001.s3.jp-tok.cloud-objectstorage.appdomain.cloud/img02.png"
alt="Dress" srcset="">
<img src="https://ibm001.s3.jp-tok.cloud-objectstorage.appdomain.cloud/img03..jfif"
alt="Dress" srcset="">
```

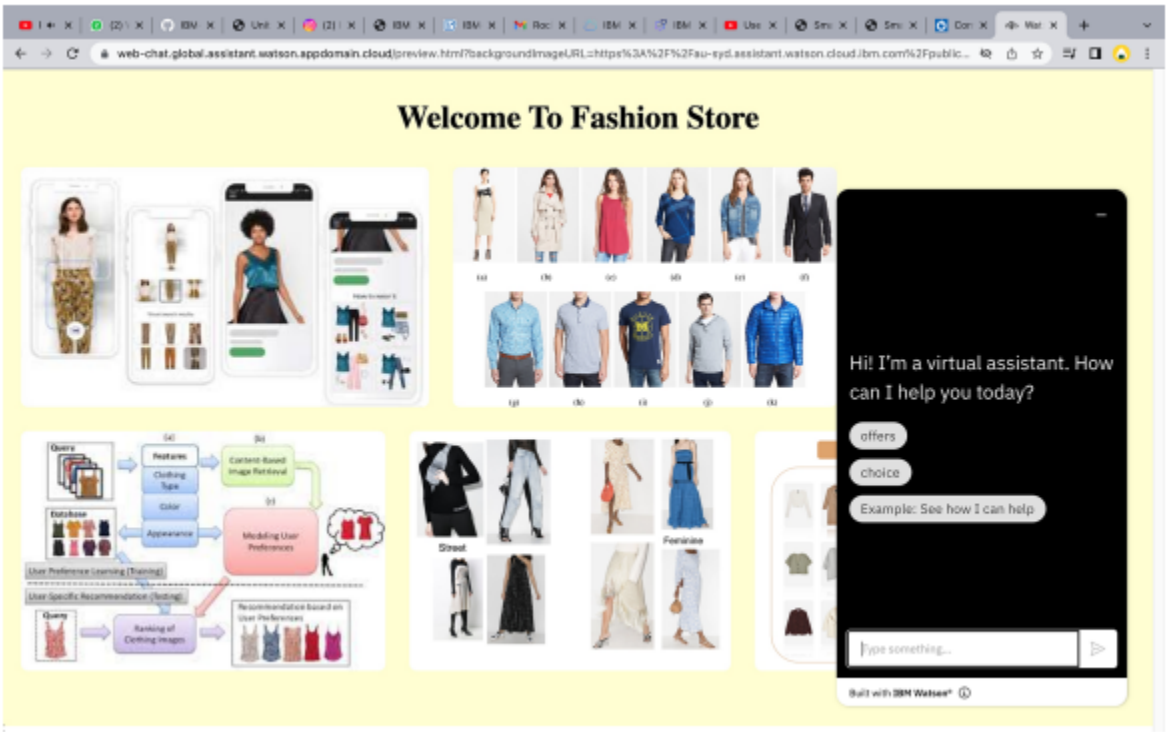
<img src="https://ibm001.s3.jp-tok.cloud-objectstorage.appdomain.cloud/img04.png" alt="Dress" srcset="">
<img src="https://ibm001.s3.jp-tok.cloud-objectstorage.appdomain.cloud/img05.png" alt="Dress" srcset="">

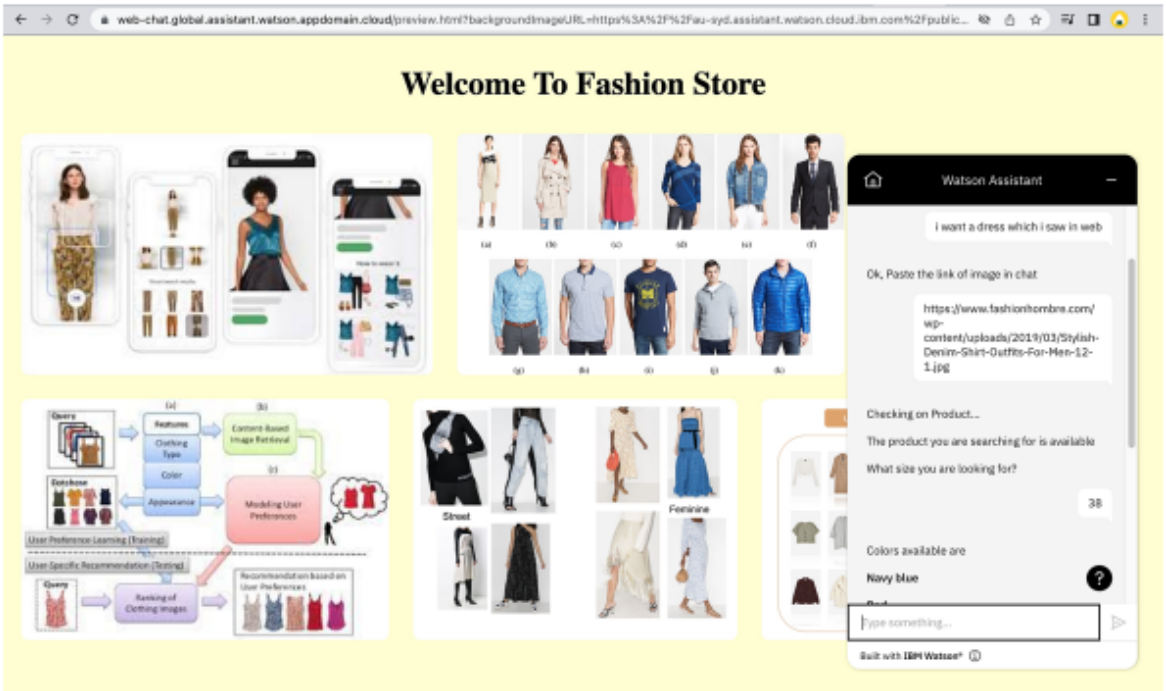
</body>
</html>

7.2 DATABASE SCHEMA:

8. TESTING

8.1 TEST CASES:


web-chat.global.assistant.watson.appdomain.cloud/preview.html?backgroundImageURL=https%3A%2F%2Fau-syd.assistant.watson.cloud.ibm.com%2Fpublic...
Welcome To Fashion Store
Hi! I'm a virtual assistant. How can I help you today?
offers
choice
Example: See how I can help
Type something...
Built with IBM Watson®
Street
Feminine


web-chat.global.assistant.watson.appdomain.cloud/preview.html?backgroundImageURL=https%3A%2F%2Fau-syd.assistant.watson.cloud.ibm.com%2Fpublic...
Welcome To Fashion Store
Watson Assistant
i want a dress which i saw in web
Ok, Paste the link of image in chat
https://www.fashionhombre.com/wp-content/uploads/2019/03/Stylish-Denim-Shirt-Outfits-For-Men-12-1.jpg
Checking on Product...
The product you are searching for is available
What size you are looking for?
38
Colors available are
Navy blue
Type something...
Built with IBM Watson®
Street
Feminine

9.RESULTS

9.1 PERFORMANCE METRICS:

The performance of a recommendation algorithm is evaluated by using some specific metrics that indicate the accuracy of the system.The type of metric used depends on the type of filtering technique. Root Mean Square Error (RMSE), Receiver Operating Characteristics (ROC), Area Under Cover (AUC), Precision, Recall and F1 score is generally used to evaluate the performance or accuracy of the recommendation algorithms.
Root-mean square error (RMSE). RMSE is widely used in evaluating and comparing the performance of a recommendation system model compared to other models. A lower RMSE value indicates higher performance by the recommendation model. RMSE, as mentioned by [61] , can be as represented as follows:

$$RMSE = \sqrt{\frac{1}{N_p} \sum_{u,i} (p_{ui} - r_{ui})^2}$$

where, Np is the total number of predictions, pui is the predicted rating that a user u will select an item i and rui is the real rating.
Precision. Precision can be defined as the fraction of correct recommendations or predictions (known as True Positive) to the total number of recommendations provided, which can be as represented as follows:

$$Recall = \frac{True\ Positive\ (TP)}{True\ Positive\ (TP) + False\ Negative\ (FN)}$$

It is also defined as the ratio of the number of relevant recommended items to the number of recommended items expressed as percentages. Recall. Recall can be defined as the fraction of correct recommendations or predictions (known as True Positive) to the total number of correct relevant recommendations provided, which can be as represented as follows:

$$Recall = \frac{True\ Positive\ (TP)}{True\ Positive\ (TP) + False\ Negative\ (FN)}$$

It is also defined as the ratio of the number of relevant recommended items to the total number of relevant items expressed as percentages. F1 Score. F1 score is an indicator of the accuracy of the model and ranges from 0 to 1, where a value close to 1 represents higher recommendation or

prediction accuracy. It represents precision and recall as a single metric and can be as represented as follows:

$$F1\ score = 2 \times \frac{Precision * Recall}{Precision + Recall}$$

Coverage. Coverage is used to measure the percentage of items which are recommended by the algorithm among all of the items. Accuracy. Accuracy can be defined as the ratio of the number of total correct recommendations to the total recommendations provided, which can be as represented as follows:

10.ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Smart fashion recommender application is user friendly.
- With the help of chatbot users can find the products very easily.
- This application used to discover the product based on the user's choice, very easily and quickly.
- It has the ability to reduce transaction costs for consumers, and increase revenue for retailers.

DISADVANTAGES:

- It needs an active internet connection.
- Privacy concerns.
- Too many choices.
- Cold-start problem.

11. CONCLUSION

The Fashion Recommendation System is mainly used to recommend the best possible outfit combinations to a user who has no fashion sense based on their wardrobe . It may not always provide the best possible outfit to wear for an occasion as the system is dependent completely on the clothes present in the user's wardrobe. Also another reason is that fashion is highly dependent on the time period. However the system does a great job in inculcating a fashion sense among the users and can provide the best recommendations based on the user's wardrobe. Since the system is implemented as a website, it is very easy for the end users to access as well as use. The scope

of this system can be expanded by including the ability to detect the various designs and patterns on clothing, and to increase the number of occasions.

12. FUTURE SCOPE

In the future, to implement this recommendation system to be extended to include male and non-binary fashion items including apparel, footwear, accessories etc. This work can further be enhanced to predict fashion items based on the skin color and weather conditions. Future research should concentrate on including time series analysis and accurate categorization of product images based on the variation in color, trend and clothing style in order to develop an effective recommendation system. The proposed model will follow brand-specific personalization campaigns and hence it will ensure highly curated and tailored. offerings for users. Hence, this research will be highly beneficial for researchers interested in using augmented and virtual reality features to develop recommendation systems.

13.APPENDIX

SOURCE CODE:

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-42802-1660709488