Smart Fashion Recommender Application

ABISHEK PS	**(1901002)**
ADITYA KUSHWAHA	**(1901004)**
ARJUN RU	**(1901016)**
ASHWIN BALAJI PL	**(1901023)**

INDEX

1. INTRODUCTION

1.1 Project Overview

We have come up with 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:

1. Admin
2. User

Admin

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.

User

The user will login into the website and go through the products available on the website. Instead of navigating to several screens for booking products online, the user can directly talk to Chatbot regarding the products. Get the recommendations based on information provided by the user.

Features of Chatbot:

- Using chatbot we can manage user's choices and orders.
- The chatbot can give recommendations to the users based on their interests.
- It can promote the best deals and offers on that day.
- It will store the customer's details and orders in the database.
- The chatbot will send a notification to customers if the order is confirmed.
- Chatbots can also help in collecting customer feedback.

1.2 Purpose

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, an efficient 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 the 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 authors' 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. This paper will help researchers, academics, and practitioners who are interested in machine learning, computer vision, and fashion retailing to understand the characteristics of the different fashion recommendation systems.

2. LITERATURE SURVEY

2.1 Existing problem

The era of recommendation systems originally started in the 1990s based on the widespread research progress in Collective Intelligence. During this period, recommendations were generally provided to consumers based on their rating structure. The first consumer focused recommendation system was developed and commercialized by Goldberg, Nichols, Oki, and Terry in 1992. Tapestry, an electronic messaging system was developed to allow users only to rate messages as either a good or bad product and service. However, now there are plenty of methods to obtain information about the consumer's liking for a product through the Internet. These data can be retrieved in the forms of voting, tagging, reviewing and the number of likes or dislikes the user provides. It may also include reviews written in blogs, videos uploaded on YouTube or messages about a product. Regardless of communication and presentation, medium preferences are expressed in the form of numerical values. Table 1 presents the history of the progress of fashion recommendation systems over the last few decades.

Year	Recommendation System Approach	Properties
Before 1992	Mafia, developed in 1990	• Content filtering. • Mail filtering agent for providing a cognitive intelligence-based service for document processing.
1992 to 1998	Tapestry, developed in 1992	• Collaborative filtering. • Developed by Palo Alto. • Allowed users only to rate messages as either good or bad product and service.
	Grouplens, first used in 1994 Movielens, proposed in 1997	• Rate data to form the recommendation. • Useful to construct a well-known dataset.
1999 to 2005	PLSA (Probabilistic Latent Semantic Analysis), proposed in 1999	• Developed by Thomas Hofmann. • Collaborative filtering.
2005 to 2009	Several Latent Factor Models such as Singular Value Decompositions (SVD), Robust Singular Value Decomposition (RSVD), Normalized Singular Value Deviation (NSVD).	• Collaborative filtering approach. • Find out factors from rating patterns.
2010 to onwards	Context-aware-based, instant-personalization-based	• Combined techniques of content and collaborative approach.

2.2 References

- Zhang, M.; Andrew, S. Gill, S. Exploring fashion choice criteria for older Chinese female consumers: A wardrobe study approach. In Advances in Intelligent Systems and Computing; Springer International Publishing: New York, NY, USA, 2018; pp.109–121, doi:10.1007/978-3-319-60597-5_10.
- Zheng, Y.; Tang, B.; Ding, W.; Zhou, H. A Neural Autoregressive Approach to Collaborative Filtering. arXiv 2016, arXiv:1605.09477.
- Du, C.; Li, C.; Zheng, Y.; Zhu, J.; Zhang, B. Collaborative Filtering with User-Item Co-Autoregressive Models. arXiv 2018, arXiv:1612.07146 [Cs].
- Taifi, M. MRR vs MAP vs NDCG: Rank-Aware Evaluation Metrics and when to Use Them. 2019.

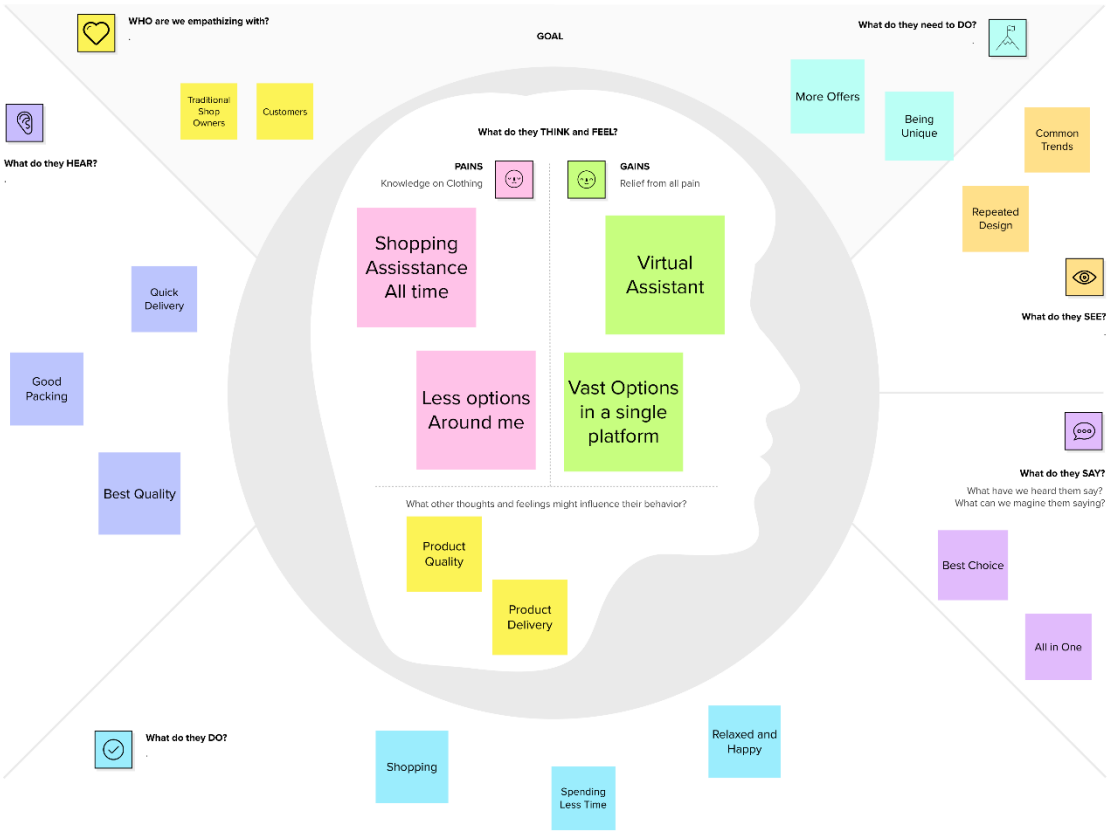
- Valcarce, D.; Bellogín, A.; Parapar, J.; Castells, P. Assessing ranking metrics in top-N recommendation. Inf. Retr. 2020, 23, 411–448, doi:10.1007/s10791-020-09377-x.
- Guan, C.; Qin, S.; Long, Y. Apparel-based deep learning system design for apparel style recommendation. Int. J. Cloth. Sci. Technol. 2019, 31, 376–389, doi:10.1108/ijcst-02-2018-0019.

2.3 Problem Statement Definition

Recommendation system (RS) is referred to as a decision-making approach for users under a multidimensional information environment. RS has also been defined as an e-commerce tool, which helps consumers search based on knowledge that is related to a consumer's choices and preferences. RS also assists in augmenting social processes by using the recommendations of other users when there is no abundant personal information or knowledge of the alternatives. RS handles the complication of information overload that consumers usually encounter by offering customized service, exclusive content, and personalized recommendations. There are multiple phases involved in the recommendation system that develop the foundation of any state-of-the-art recommendation system. These are defined as the information collection phase, the learning phase, and the recommendation phase. The interrelationship of these phases involved in the recommendation process. It shows that information collection is the initial stage of RS, which is followed by the learning phase and the recommendation phase. The recommendation provided in the last phase can be generated based on information gathered during the information collection phase.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

1

Smart Fashion Recommender Application

A smart way to select new and suitable fashion products Shopping Online

5 minutes

PROBLEM

A smart way to select new and suitable fashion products Shopping Online with best suitable outfits of Best quality products.

2

Brainstorm

Different Ideas from the Team mates

10 minutes

Abishek PS

New Fashion Productss	Easy Payment Modes
Easy Return Policy	Easy Tracking Goods

Aditya Kushwaha

Anytime Shopping	Cash On Delivery
Discounts and Offers	Free Shipping

Arjun RU

Feedback Processing	Proper Review Management
Best marketplace	Price Comparission

Ashwin Balaji

Shopping Assistant	AI Recommendation
Custom Design Facility	Best Packing

4

Prioritize

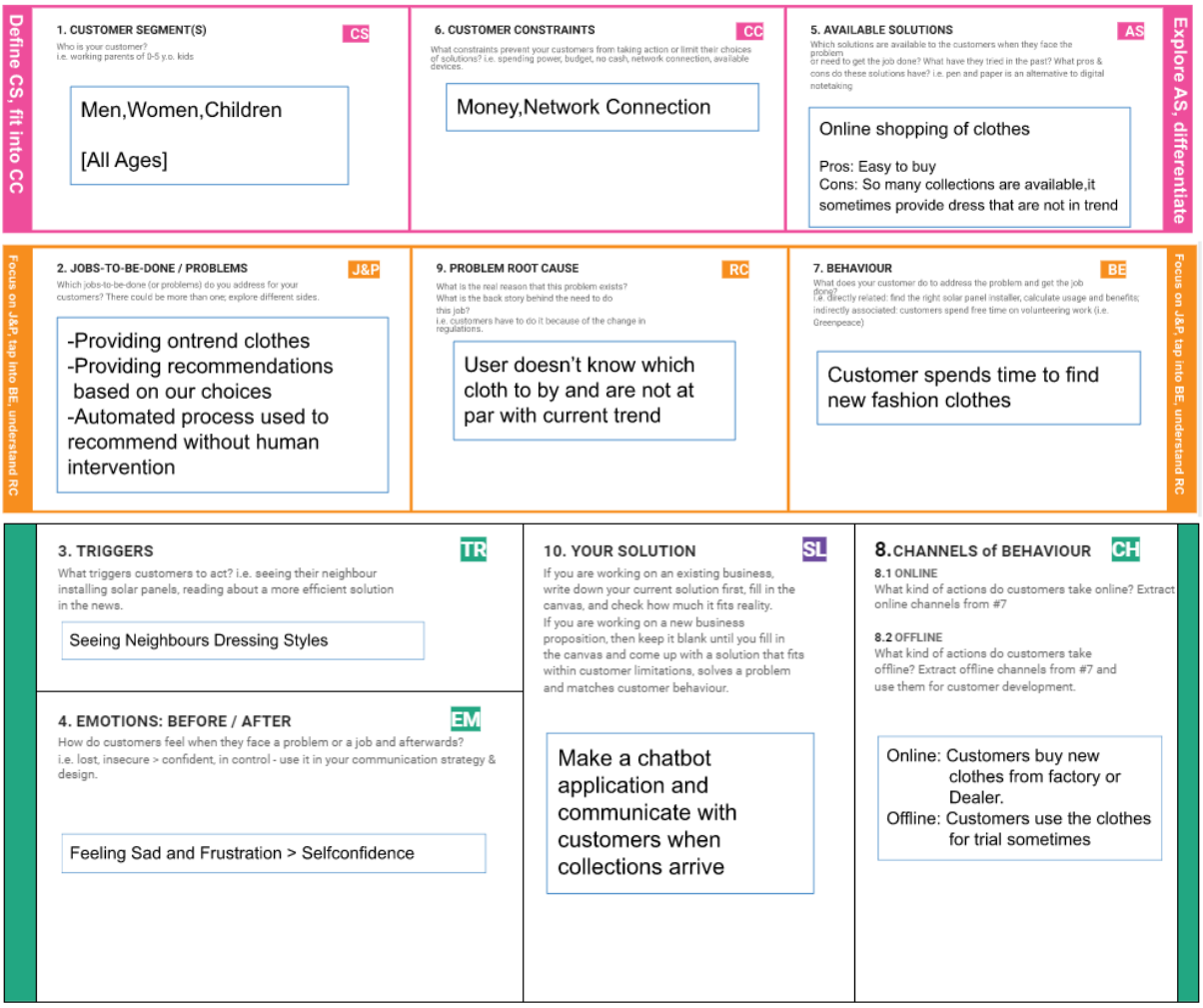
Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

3.3 Proposed Solution

S. No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Customer needs to visit many websites to gain knowledge on new trends and should choose on their own
2.	Idea / Solution description	Customer can get recommendations based on their choices in accordance with the new trend with reduces tedious work
3.	Novelty / Uniqueness	Automated process with the help of a Chatbot which gives recommendations based on user choice.
4.	Social Impact / Customer Satisfaction	User friendly interface and unique interaction with chatbot will make customer satisfied and this recommendation is taken care by chatbot large group of customers can use it side by side.
5.	Business Model (Revenue Model)	The chatbot is useful in selling the products to the customers which is helpful for revenue.
6.	Scalability of the Solution	We can easily scale our app by increasing the recommendation dataset

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

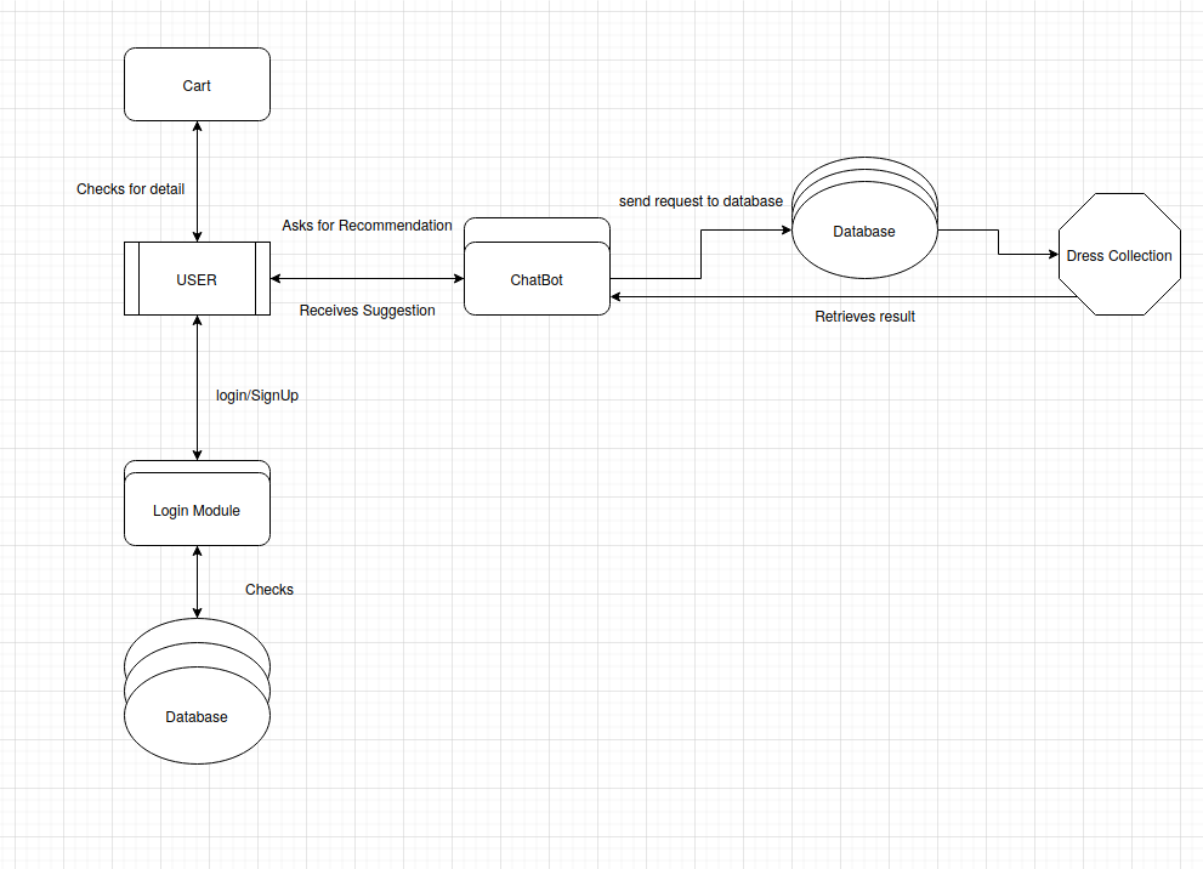
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Interaction	Interaction via chatbot
FR-4	Buying Products	Bought through chatbot recommendation
FR-5	Tracking Products	Separate Tracking facility via chatbot
FR-6	Returning Product	Query through chatbot
FR-7	New Collection	Recommendation through chatbot

4.2 Non-Functional requirements

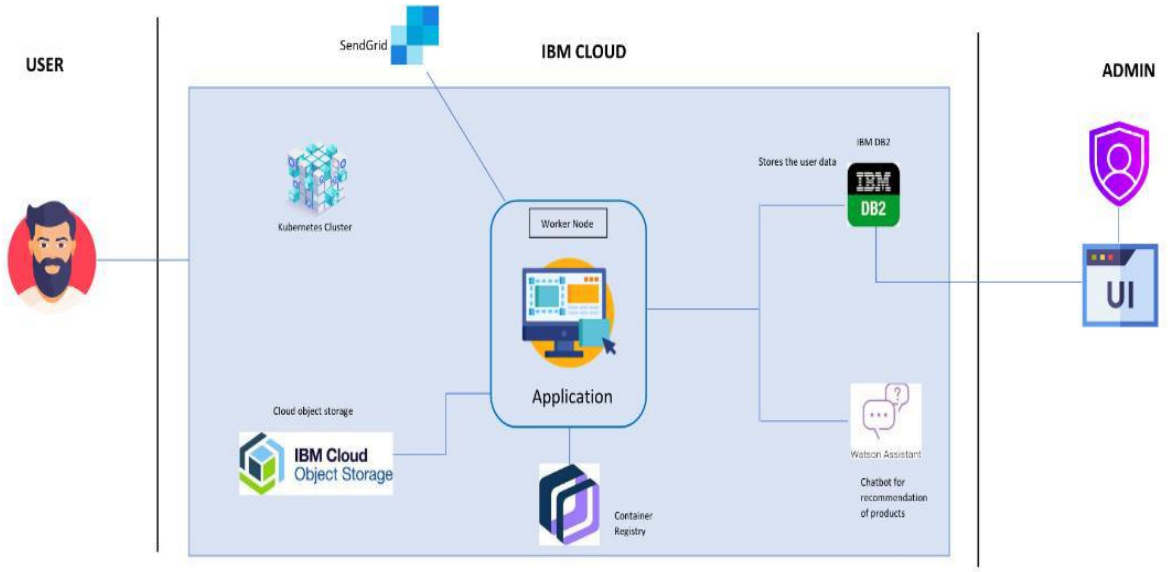
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Can be used from app or website from any os
NFR-2	**Security**	Data are stored in IBM cloud
NFR-3	**Reliability**	The quality of the product are tested and if not satisfied can be returned
NFR-4	**Performance**	Multiple clients can access the site without any network traffic
NFR-5	**Availability**	Available 24/7 for all users
NFR-6	**Scalability**	It is easy to scale as per the size of the users

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web 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 or redirected to next process	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
	Login	USN-3	As a user, I can log into my account using email id and password	I can be redirected to dashboard	Low	Sprint-1
	Dashboard	USN-4	As a user, I can explore the products on the dashboard	I can ask recommendation from chatbot	Medium	Sprint-1
	Chatbot	USN-5	As a user, I can find the desired product using chatbot recommendation	I can reduce my time searching	High	Sprint-2
	Cart	USN-6	As a user, I can add the required product to cart	I can get to finalize the products to buy	Medium	Sprint-2
	Payment	USN-7	As a user, I can use the payment option to buy	I will receive acknowledgement after successful payment	High	Sprint-3
	Order Confirmation	USN-8	As a user, I can get confirmation of my buying	I can be assured of secured payment	Low	Sprint-4
	Shipping	USN-9	As a user, i will know the estimated time of delivery	I can track order	Medium	Sprint-4
Administrator	Login	USN-10	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account or redirected to next process	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING
6.1 Sprint Planning & Estimation

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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-4	20	6 Days	14 Nov 2022	19 Nov 2022		19 Nov 2022

Velocity:
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

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

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Panel	USN-1	The user will login into the website and go through the products available on the website	20	High	Abishek.P.S Aditya kushwaha Arjun.R.U Ahwin Balaj.P.L
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	Abishek.P.S Aditya kushwaha Arjun.R.U Ahwin Balaj.P.L
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	Abishek.P.S Aditya kushwaha Arjun.R.U Ahwin Balaj.P.L
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	Abishek.P.S Aditya kushwaha Arjun.R.U Ahwin Balaj.P.L

6.2 Reports from JIRA

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	31Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-2	20	6 Days	05 Nov 2022	10 Nov 2022	20	10 Nov 2022
Sprint-3	20	6 Days	10 Nov 2022	15 Nov 2022	20	15 Nov 2022
Sprint-4	20	6 Days	15 Nov 2022	21 Nov 2022	20	21 Nov 2022

7. CODING

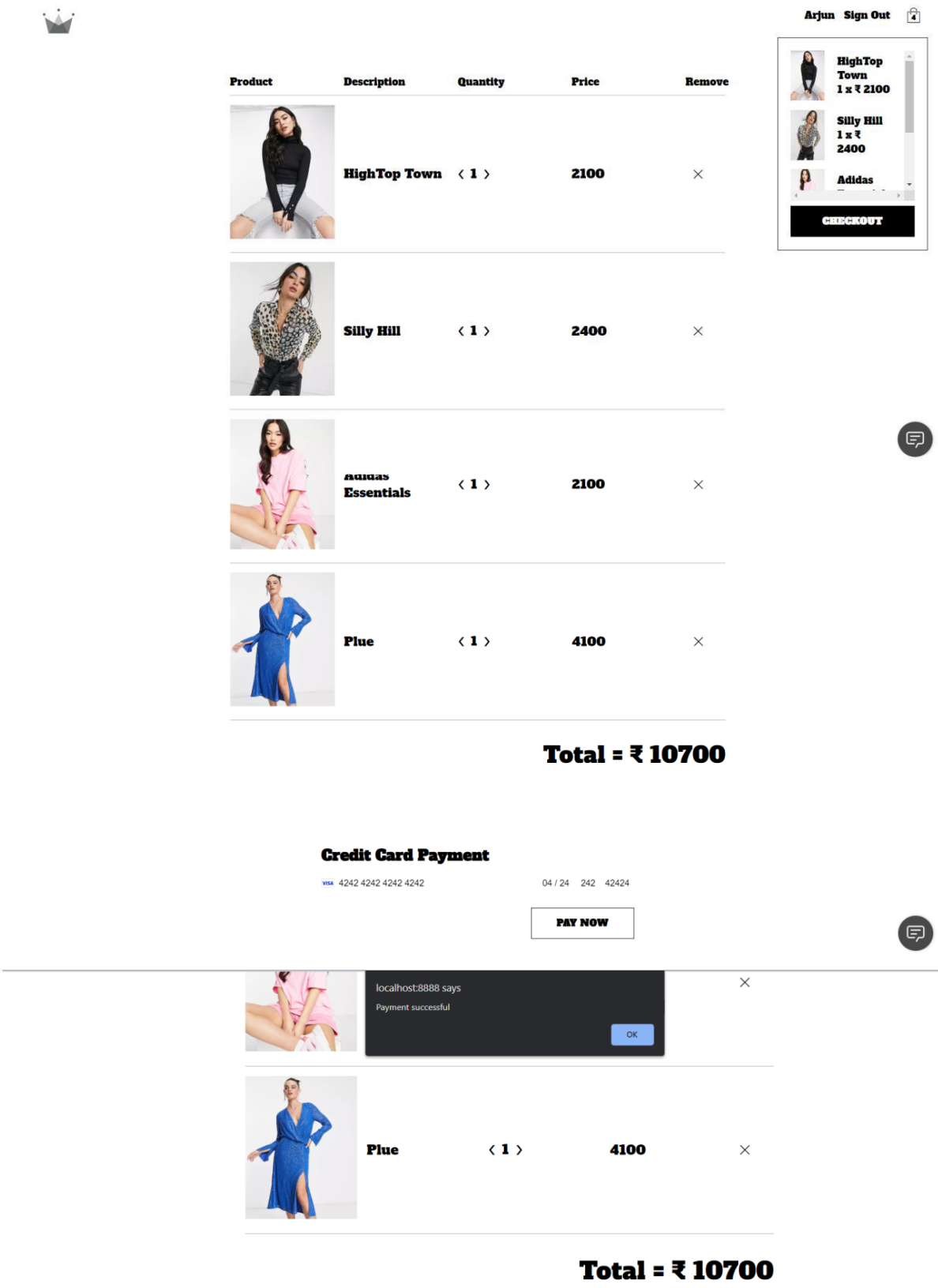
```
import { Routes, Route } from 'react-router-dom';

import Home from './routes/home/home';
import Authentication from './routes/authentication/authentication';
import Navigation from './routes/navigation/navigation';
// import Shop from './routes/shop/shop';
import Category from './components/category/category';
import Checkout from './routes/checkout/checkout';

const App = () => {

  return (
    <Routes>
      <Route path='/' element={<Navigation />}>
        <Route index element={<Home />}/>
        <Route path="shop/:category" element={<Category />}/>
        <Route path="auth/*" element={<Authentication />}/>
        <Route path="checkout" element={<Checkout />}/>
      </Route>
    </Routes>
  );
};

export default App;

import { Routes,Route } from "react-router-dom";
```

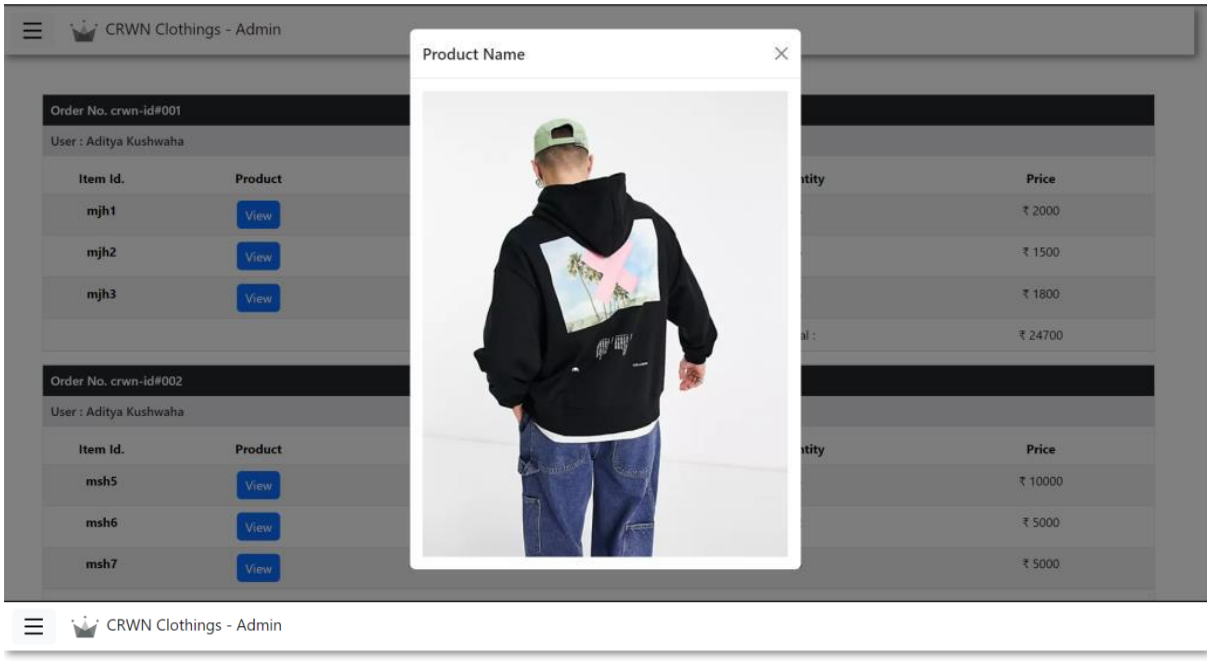
```
import SignInForm from "../../components/sign-in-form/sign-in";
import SignUpForm from "../../components/sign-up-form/sign-up-form";

import { AuthenticationContainer } from "./authentication.styles";

const Authentication = ()=>{
    return (
        <AuthenticationContainer>
            <Routes>
                <Route path='login' element={<SignInForm />}/>
                <Route path="signup" element = {<SignUpForm />}/>
            </Routes>
        </AuthenticationContainer>
    );
}

export default Authentication;

import styled from "styled-components";

export const AuthenticationContainer = styled.div`
    width: 900px;
    margin: 30px auto;
`;
import { Fragment} from "react";
import CategoryItem from "../../components/category-item/category-item";
import { PreviewContainer } from "./previews.styles";
import { subCategories } from "./subcategories";
const CategoriesPreview = ()=>{
    return (
        <Fragment>
            {
                subCategories.map((subCategory)=>{
                    const products = subCategory.products;
                    return (
                        <div key={subCategory.id}>
                            <h2>
                                {subCategory.title.toUpperCase()}
                            </h2>
                            <PreviewContainer key={subCategory.id}>
                                {
                                    Object.keys(products).map((product)=>{
                                        const item = products[product]
                                        return <CategoryItem key={item.id} category={item}/>
                                    })
                                }
                            </PreviewContainer>
                        </div>
                    )
                })
```

```
          }
        </Fragment>
    );
}

export default CategoriesPreview;
import styled from "styled-components";
export const PreviewContainer = styled.div`
  width: 100%;
  display: flex;
  flex-wrap: wrap;
  justify-content: space-between;
`;
export const subCategories = [
    {
      "id": "mens",
      "title": "Mens",
      "products":{
        "jacket&hoodie":{
            "id":"jacket&hoodie",
            "title":"JACKET & HOODIE",
                                                    "imageUrl":         "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Men/Jacket&Hoodie/AdiddasGreen.webp",
            "route":"mens/jacket&hoodie"
        },
        "jeans":{
            "id":"jeans",
            "title":"JEANS",
                                                    "imageUrl":         "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Men/Jeans/ArmaniExchange-darkblue.webp",
            "route":"mens/jeans"
        },
        "shirts":{
            "id":"shirts",
            "title":"SHIRTS",
                                                    "imageUrl":         "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Men/Shirts/BarburBlair.webp",
            "route":"mens/shirts"
        },
        "t_shirts":{
            "id":"t_shirts",
            "title":"T-SHIRTS",
                                                    "imageUrl":         "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Men/tshirt/blueInSkeleton.webp",
            "route":"mens/t_shirts"
        },
        "shoes":{
            "id":"shoes",
            "title":"Shoes",
                                                    "imageUrl":         "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Men/Shoes/Adidas-Originals-darkgrey.webp",
```

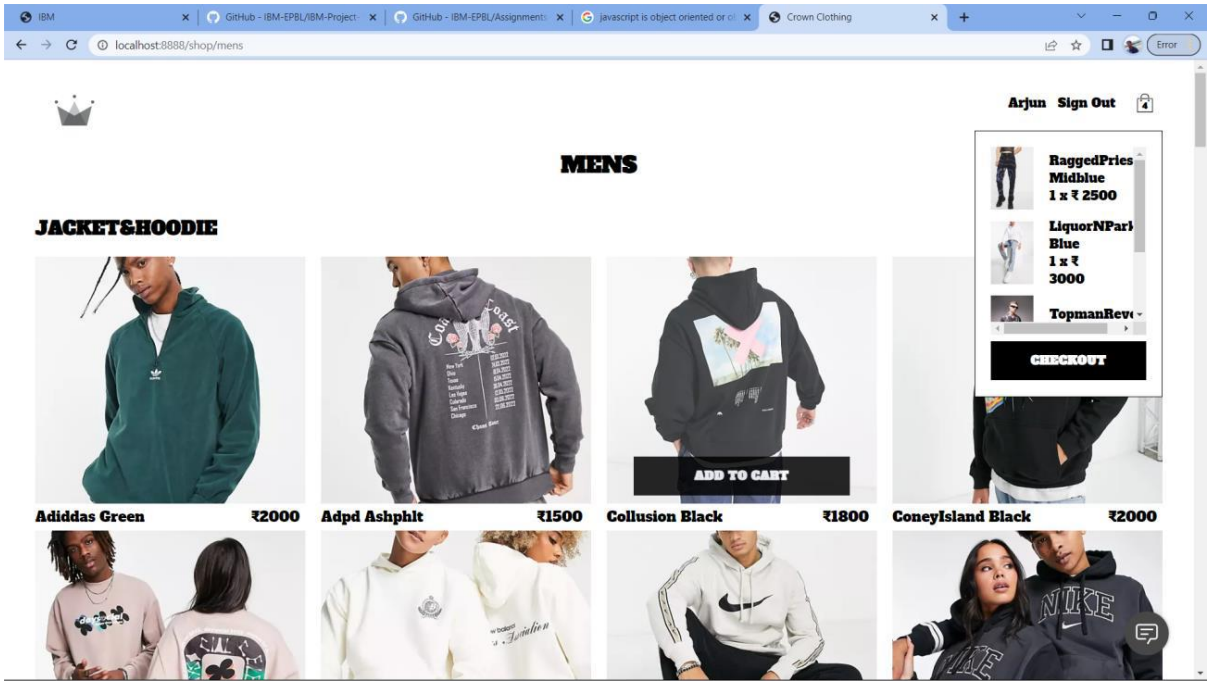
```
            "route":"mens/shoes"
         }
      }
   },
   {
      "id": "womens",
      "title": "Womens",
      "products":{
         "coat&jacket":{
            "id":"coat&jacket",
            "title":"COAT & JACKET",
                                                "imageUrl":       "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Women/Coat&Jacket/AdidasOriginals-brown.webp",
            "route":"womens/coat&jacket"
         },
         "dresses":{
            "id":"dresses",
            "title":"DRESSES",
                                                "imageUrl":       "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Women/Dresses/ASOShighneck-paisleyprint.webp",
            "route":"womens/dresses"
         },
         "tops":{
            "id":"tops",
            "title":"TOPS",
                                                "imageUrl":       "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Women/Tops/AdidasEssentials-pink.webp",
            "route":"womens/tops"
         },
         "trousers":{
            "id":"trousers",
            "title":"TROUSERS",
                                                "imageUrl":       "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Women/Trousers/1990fallout.webp",
            "route":"womens/trousers"
         },
         "footwear":{
            "id":"footwear",
            "title":"FOOTWEAR",
                                                "imageUrl":       "https://ak3.s3.jp-tok.cloud-object-
storage.appdomain.cloud/Women/Footware/DomainExpansion.webp",
            "route":"womens/footwear"
         },
      }
   }
]
```

8. RESULTS


Arjun Sign Out
HighTop Town 1 x ₹ 2100
Silly Hill 1 x ₹ 2400
Adidas
CHECKOUT
Product
Description
Quantity
Price
Remove
HighTop Town
1
2100
Silly Hill
1
2400
Adidas Essentials
1
2100
Plue
1
4100
Total = ₹ 10700
Credit Card Payment
4242 4242 4242 4242
04 / 24
242
42424
PAY NOW
localhost:8888 says
Payment successful
OK
Plue
1
4100
Total = ₹ 10700



S.No.	Name	Email	Password	Account Created
1	Aditya Kushwaha	aditya@gmail.com	$2b$12$2kZitxmYRrs.Yxlz66cNt.cfgjrVndalXpF5f6AoScoT6mxO5CAgC	Wed, 16 Nov 2022 00:00:00 GMT
2	TestUser	testuser@gmail.com	$2b$12$pxVryvwX8fa5HD/tAB.owu0MPPkCl/coAEVTwTkCLplfrsXPxhWrO	Wed, 16 Nov 2022 00:00:00 GMT



9. CONCLUSION

Recommendation systems have the potential to explore new opportunities for retailers by enabling them to provide customized recommendations to consumers based on information retrieved from the Internet. They help consumers to instantly find the products and services that closely match with their choices. Moreover, different stat-of-the-art algorithms have been developed to recommend products based on users' interactions with their social groups. Therefore, research on embedding social media images within fashion recommendation systems has gained huge popularity in recent times. This paper presented a review of the fashion recommendation systems, algorithmic models and filtering techniques based on the academic articles related to this topic. The technical aspects, strengths and weaknesses of the filtering techniques have been discussed elaborately, which will help future researchers gain an in-depth understanding of fashion recommender systems. However, the proposed prototypes should be tested in commercial applications to understand their feasibility and accuracy in the retail market, because inaccurate recommendations can produce a negative impact on a customer. Moreover, future research should concentrate on including time series analysis and accurate categorization of product images based on the variation in colour, 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 Informatics offerings for users. Hence, this research will be highly beneficial for researchers interested in using augmented and virtual reality features to develop recommendation systems.

10. FUTURE SCOPE

The future researchers could conduct a systematic literature review on the same topic. The initial keyword searching did not include "garment" and "outfit"; however, this did not influence the search results because we also studied the fashion recommendation articles that contained these keywords. The future research can also conduct a review of the datasets that have been used in fashion recommendation-based research articles. Additionally, further reviews of fashion recommendation systems can apply our proposed potential algorithms to any of the available fashion image datasets to evaluate the performance of the recommender systems