Smart Fashion Recommender Application

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1.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, 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.

2.INTRODUCTION

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 . Therefore, analyzing consumers choices and recommendations is valuable to fashion designers and retailers . Additionally, consumers clothing choices and product preference data have become available on the Internet in the form of text or opinions and images or pictures. Since these images contain information about people from all around the world, both online and offline fashion retailers are using these platforms to reach billions of users who are active on the Internet . Therefore, e-commerce has become the predominant channel for shopping in recent years. The ability of recommendation systems to provide personalized recommendations and respond quickly to the consumer's choices has contributed significantly to the expansion of e-commerce sales.

According to different studies, e-commerce retailers, such as Amazon, eBay, and Shopstyle, and social networking sites, such as Pinterest, Snapchat, Instagram, Facebook, Chictopia, and Lookbook, 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 . FRSs have the ability to reduce transaction costs for consumers and increase revenue for retailers. With the exception of a single study from 2016 that focuses only on apparel recommendation systems , no current research presents recent advances in research on fashion recommendation systems. Therefore, the purpose of this paper is to present an integrative review of the research related to fashion recommendation systems. Moreover, Guan et al. cited research published until 2015. Therefore, the first objective of this paper is to review the most recent research published on this topic from 2010 to 2020. The previous study did not provide an in-depth analysis of the computational methods or algorithms

corresponding to the fashion recommendation systems. This review study aims to fulfill this research gap and rigorously study the principles underlying, the methods used by, and the performance of the state-of-the-art fashion recommendation systems. To the best of our knowledge, this in-depth study is first of its kind. It includes research articles related to image parsing, clothing and body shape identification, and fashion attribute recognition, which are critical parts of fashion recommendation systems (FRSs). This review paper also provides a guideline for a research methodology to be used by future researchers in this field. The first section of this review discusses the history and background of FRSs. The second section presents a concise history and overview of recommendation systems. The third section aims to integrate the scholarly articles related to FRSs published in the last decade. The fourth section defines the metrics that are used by researchers to present and discuss recommendation results. The fifth section forms the major part of this review and focuses on various FRSs followed by different computational algorithmic models and recommendation filtering techniques used in fashion recommendation research. It will help researchers to understand these crucial parts of a FRS. The final section highlighted the existing challenges of using state-of-the-art recommendation systems followed by providing recommendations to overcome them and proposing a novel FRS based on the research findings discussed in section five. The study of the existing literature revealed that fashion recommendation systems have a huge impact on consumers' buying decisions. Hence, fashion retailers and researchers are exploring and developing state-of-the-art recommendation models to improve the accessibility, navigability and consumers' overall purchasing experience. One of the prime elements that has been continuously researched in these articles was the improvement of existing and the development of new algorithms relevant to the filtering techniques . This review paper has identified state-of-the art algorithms and filtering techniques that have high potential to become more popular in the future. The sections of this paper are arranged in the order of the important FRS components, so that the reader can gain a substantial understanding of components such as algorithmic models before moving to other important components such as filtering techniques.

2.1Project Overview

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.

2.2Purpose

The purpose of this report is to provide a better understanding of the key challenges and needs that fashion designers, start-ups and SMEs encounter at different stages of developing or transforming their sustainable fashion business. As the focus of our research lies on start-ups and SMEs from the fashion industry pursuing a circular business model, the conclusions and recommendations of this report primarily account for this specific stakeholder group.Start-ups are characterised by a higher level of risk-taking and innovation than SMEs and are usually younger than 10 years, but most enterprises listed are innovative and many start-ups are run by designers . The OECD distinguishes between young businesses (0-5 years old) and mature firms (6+ years old). Start-ups are a subset of young businesses in their first three years of operation. In practice, the distinction between start-ups and established companies is not always that sharp. What characterizes circular start-ups is a business model that aims to maximise value retention and resource efficiency, for example through reducing, reusing, recycling, recovering and/or regenerating required resources while valuing social and societal aspects.The basis of this analysis is the results of a mapping exercise bringing together more than a hundred relevant industry players and their respective solutions, such as networks, best practices, tools, guidelines, certifications, training, and events .1 Part of the pooling exercise is to qualify these solutions by level of utilisation and recommendation by selected industry players and to match them with the most significant obstacles, challenges and needs encountered by circularity-driven fashion designers, start-ups and SMEs. Findings from this report will be made available on the Knowledge Hub and be integrated in the methodology for the Fashion For Change Growth Programme (WP 2) and the policy recommendations of WP 4.

The Online Fashion Store (OFS) web application is intended to provide complete solutions for vendors as well as customers through a single gateway using the internet as the sole medium. It will enable vendors to setup online fashion shops (garments, accessories etc.), customer to browse through the shop and purchase them online without having to visit the shop physically. The administration module will enable a system administrator to approve and reject requests for new shops and maintain various lists of shop category. This document is meant to discuss the features of OFS, so as to serve as a guide to the developers on one hand and a software validation document for the prospective client on the other.

3.LITERATURE SURVEY

To put this survey in context, we identified and present related review andsurvey articles to explain in which ways our article differs from and extendsearlier work. In a recent work, a survey of fashion recommender application, i.e.,visual, audio, and/or

textual features. The domains studied in this survey include various ones such as media streaming for audio and video recommendation, e-commerce for recommending different products including fashion items, news,and information recommendation, social media, and so forth. While fashion RS were also discussed, the authors only included a small portion of the topics and papers in this domain. Here, we discuss and present a comprehensive survey of significant tasks, challenges, and types of content used in the fashion RS field. We have also identified surveys where the authors present a literature review of techniques at the intersection of fashion and computer vision (CV) and/or natural language processing (NLP). While we find these works relevant to this article, they remain largely different from the review presented here as those systems are not focused on RS but on other aspects of the fashion domain, such as text generation from images or pose estimation. Moreover, as another point of difference, we also provide recent techniques dealing with item visual and textual content representation exploited by RS approaches. Perhaps the most relevant work to our current survey is a recent book chapter by Jaradat et al on fashion RS. This chapter focuses on discussing the state of the art of fashion recommendation systems; in particular, the authors affirm that deep learning represented a turning point with respect to the canonical approaches and therefore the authors examined four different tasks that use this new approach. Additionally they provided examples and possible problems and their evaluation. In particular, the authors focused their review on tasks related to social media and the size recommendation problem. In our survey, in addition to analyzing the state of the art of the most commonly used algorithms in a wide range of tasks, we went in depth to understand which are the main features used by the more modern fashion recommender systems. In fact, an extensive discussion is held on how both the user and the items, with their characteristics, can be a source for the definition of models with accurate recommendations.

3.1EXISTING PROBLEM

In this section we will describe the major challenges faced by recommender systems in the fashion domain.

Fashion item representation: Traditional recommender systems such as Collaborative Filtering or Content-Based Filtering have difficulties in the fashion domain due to the sparsity of purchase data, or the insufficient detail about the visual appearance of the product in category names . Instead, more recent literature has leveraged models that capture a rich representation of fashion items through product images , text descriptions or customer reviews or videos which are often learned through surrogate tasks like classification or product retrieval. However, learning product representations from such input data requires large datasets to generalize well across different image (or text) styles, attribute variations, etc. Furthermore, constructing a representation that learns which product features customers take most into account when evaluating fashion products is still an open research problem.

Fashion item compatibility: Training a model that is able to predict if two fashion items 'go together,' or directly combine several products into an outfit, is a challenging task. Different item compatibility signals studied in recent literature include co-purchase data, outfits composed by professional fashion designers , or combinations found by analyzing what people wear in social media pictures. From this compatibility information, associated image and text data is then used to learn to generalize to stylistically similar products. Some works explicitly model the latent style types. An additional underexplored difficulty for compatibility prediction is the dependency on trends, seasonality, location or social group. Current approaches usually leverage image and text information.

Personalization and fit: The best fashion product to recommend depends on factors such as the location where the outfit will be used , the season or occasion, or the cultural and social background of the customer . A challenging task in fashion recommendation systems is how to discover and integrate these disparate factors . Current research often tackles these tasks by utilizing large-scale social media data. As discussed earlier, a personalization dimension very particular to the fashion domain is that of fit. In addition to predicting what size of a product will be more comfortable to wear, body shape can influence stylistic choices.

Interepretability and Explanation: Most of the existing fashion recommender systems in the literature focus on improving predictive performance, treating the model as a black box. However, deploying accountable and interpretable systems able to explain their recommendations can foster user loyalty in the long term and improve the shopping experience. Current models generally offer explanations through highlighted image regions and attributes or keywords

Discovering Trends: Being able to forecast consumer preferences is valuable for fashion designers and retailers in order to optimize product-to-market fit, logistics and advertising. Many factors are confounded in what features are considered 'fashionable' or 'trendy', like seasonality, geographical influence , historical events or style dynamics . Again, social media is a useful resource leveraged by researchers .

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3.3PROBLEM STATEMENT DEFINITION

Creativity has been regarded as a type of problem solving (Matlin, 2002). Work in computers helped to bring cognitive psychology to a heightened level of examination in the 1950's and 1960's (Evans in French and Coleman 1995)."Computers are general purpose information processing systems… Once you equate thinking with information processing, then the task of the modern cognitive psychologist is clear: understanding thought is the problem of discovering the software of the human brain" (Evans in French and Coleman 1995, p. 60). According to Ömer Akin (1989), the study of design problems arises out of Simon's (1944) work in decision making and Newell et al's (1957) work in 'heuristics'. Problem-solving theories with regard to design problems date from the end of the nineteenth century (Rowe 1991). Psychologists have distinguished between different types of mental processes involved in problem solving. Deterministic mental processes at no stage call for choices to be made (e.g. numbers used to multiply with determine the outcome of long multiplication). Design problems require mental processes that involve choice andfreedom of will (Johnson-Laird in Sternberg 1988). Characteristics of design problems are that they are constrained, difficult to define and are interrelated with the solution.Constraints on the design problem are two-fold: problem-orientated (external) and related to the problem itself, they are imposed by the clients, the user, legislation, etc. as well as autonomous or independent (internal) and are imposed by the designer(Simon 1970, 1973, Lawson 1990). These constraints serve the functions of ensuring that a design solution meets the requirements of the problem, whether practical, or symbolic. Design problems are difficult to define and have been classified according to the level of definition. The "well-defined" (Newell, Shaw and Simon 1967), or "tame" (Rittel 1972) problems are those where goals are already prescribed and apparent (Rowe, 1991), e.g., algebraic equations with two unknown values,crossword puzzles, chess moves, space-planning problems in architecture. Rowe (1991) described the "ill-defined" problems as the typical architecture problem.Newell,Shaw and Simon (1967) and Bazjanac (1974) (in Rowe 1991) described it as where the solution is an unknown quantity and a lot of time is spent in clarifying the problem with the client. Reflecting on this, Lawson felt that it

suggested that "... design involves finding and identifying problems as much as solving them." (Lawson, p.136, 1994).Lawson (1990) reasoned that the very difficulty of stating the problem implied many solutions to the same problem, i.e. the interrelated state of the design problem and solution. The final type of problem is also ill-defined but so much so that they defy full definition and further questions about the problem can always be asked leading to "continual reformulation" (Rowe 1991,p.41). These problems have no stopping rule, there are no right or wrong solutions and they are called "wicked problems"(Churchman 1967, Rittel 1972, Bazjanac 1974 in Rowe 1991).As the products of fashion design are consumer items, they are a means of constructing and communicating identity.Fashion sign values do not have any meaning in the form itself, only in relation to each other (Baudrillard 1981, Wilson 1987 and Davis 1994). The fashion design problem (what to design) appears to be as much about the intended consumer as it is about the product (the design solution) itself,implying that the fashion design problem and solution are interrelated. It would also appear that the intended consumer (part of the design problem) defies full definition because of the constant changes in society, styles and tastes. Fashion social psychologists and marketers have been increasingly using personal identity construction and generating and communication of sign values to understand consumer-buying behavior (Williams 1981, Engel et. al, 1990, Kotler and Armstrong, 1990, Kaiser et al, 1995). It appears to be appropriate to understand the fashion design problem as a "wicked one" (Churchman 1967, Rittel 1972, Bazjanac 1974 in Rowe 1991).

4.IDEATION & PROPOSED SOLUTION

When the Sustainable Fashion Bridges ideation toolkit was conceived, it was intended to be used by professional fashion and textile designers and highly engaged users(co-designers) in setting the design brief; the making process would be controlled by designers. However, it has since become apparent that the tool can be used in some other ways. Although this paper is concerned with utilising the toolkit in co-design, it can also be used solely by professional designers to develop more sustainable solutions in the ideation phase. However, the more innovative uses are in a co-design scenario where designers and users work together in the ideation phase, either on an individual or group basis. Sanders and Stappers (2008) pointed out that users can become co-designers, but the two terms are not interchangeable; whether a user can make the transition to a co-designer is dependent on one‟s levels of expertise, desire and creativity. The following scenarios provide ways in which the ideation toolkit can be used on various levels by users.Beginner users have the opportunity to

be aware of sustainable design issues and increase their knowledge of sustainable fashion design. They can follow the practices suggested on the ideation cards. Intermediate users can combine at least two or three different ideation cards and personalise their own thinking and ideas to develop

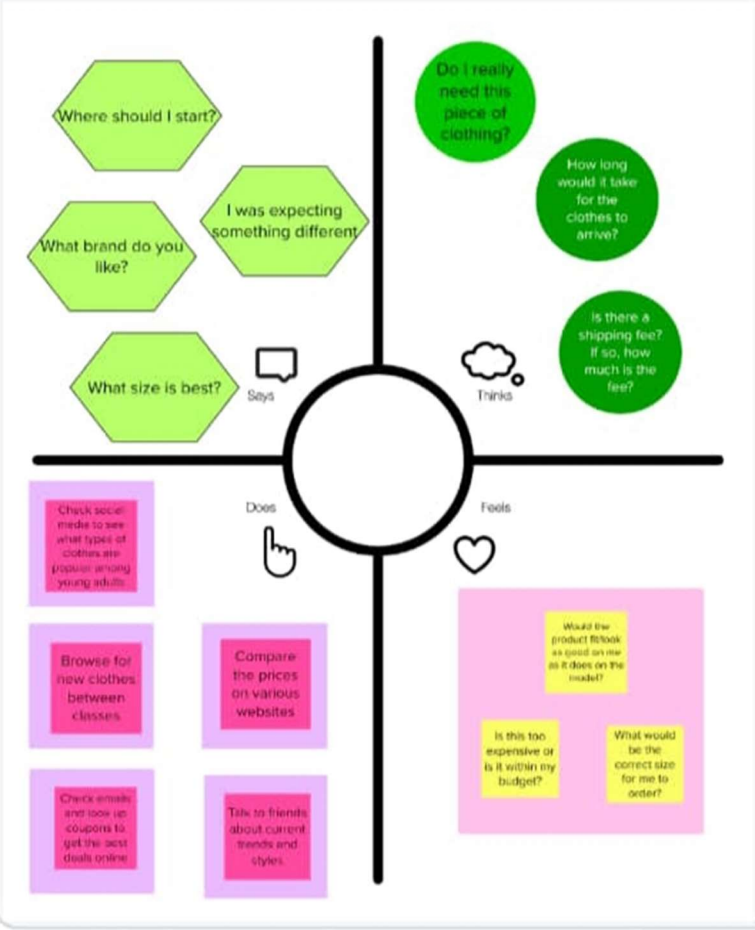
concepts which better fit their personal beliefs, interests and motivations. Advanced users can address sustainable design concepts at a deeper engagement level and investigate more closely the synthesis of social, enviromental and economic issues, using the questions on the ideation cards as a stimulus. Through co-design workshops, users can share and expand their knowledge with their peer group (in the case of community-level workshops) but the guidance of professional designers is essential. Expert users can practice sustainable fashion and textile design in more innovative ways. Using the ideation cards, they can continuously reflect on their actions and consider short,medium and long-term impacts, based on their broader knowledge of sustainable design issues.Users can express their creativity supported by professional designers at the creating level where users have the deepest engagement, greatest understanding of sustainable design.

4.1EMPATHY MAP CANVAS

Empathy Map

SMART FASHION RECOMMENDER APPLICATION

Build empathy and keep your focus on the user by putting yourself in their shoes



Developing a strong sense of empathy can help you to truly understand the needs, fears, and desires of your users, customers, and clients. And when it comes to designing a great product, you must develop a deep understanding of the people who will use it.
In this article, we'll introduce you to a tool called an empathy map, and share how it can help you as a product designer learn about your end users, figure out what they care about, and help your products succeed.

Empathy is the human ability to identify and understand another person's situation, including the emotions that they are experiencing. As the name suggests, an empathy map is a tool that can help you build empathy with your end users by helping you to understand, visualize, and then to articulate what a product team knows about its users. It helps the team find answers to the "Why?" questions (such as, "Why do users do what they do?").

The tool was initially created by Dave Gray, the author of Gamestorming: A Playbook For Innovators, Rulebreakers, And Changemakers, who also created something called an empathy map canvas.
The canvas is divided into several sections, and the user (the person who will use your product; the one you want to understand and empathize with) is located at the center of the canvas.

Each area explores the user's mindset, as well as what happens in their environment while interacting with your product. Here are some essential areas of an empathy map:

- **Think and feel. This section contains information about the user's emotional state. What would the user be thinking and feeling while using your product? All too often, product designers tend to focus only on positive thoughts, but negative thoughts are equally important. Aspects of your product that make the user feel bad can hurt long-term user retention.**
- **Hear. What would people around the user say while the user is trying your product? Consider personal connections with other people (like family, friends, and teammates) because they have a tremendous impact on how users think about your product. If the user hears a lot of great things about your product from the people they trust, this will create a positive impression even before they actually start using it.**
- **See. What the user sees while using your product. For example, you can describe what people around the user might do while the user experiences a product, or if the user might be seeing something in the environment around them.**
- **Say and do. What might the user be saying and/or physically doing while using your product? You should collect the actual phrases that the user says out loud while interacting with a product. These phrases can be collected during usability testing.**

- **Pain. What are some of the user's pain points when using a product? Try to capture challenges and obstacles that stand in the user's way.**
- **Gain. What does the user stand to gain from using your product? Think about what success looks like for the user—what dreams or goals do they have? A simple framework will help you summarize these gains: "The user wants _____ because _____." Focus on the second blank, because it's directly related to user motivation.**

While there are no strict rules about what order to fill in your canvas for your empathy mapping exercise, it's worth starting with the see, hear, say, and do sections because they are easier to fill out, and will help you create a foundation for your map.
It's also important not to exaggerate the role of your product in the life of users. Build your empathy map around realistic scenarios, and don't assume that it will be life changing if that's not the actual case.

4.2IDEATION & BRAINSTORMING

In the Ideation stage, design thinkers spark off ideas — in the form of questions and solutions — through creative and curious activities such as Brainstorms and Worst Possible Idea. In this article, we'll introduce you to some of the best Ideation methods and guidelines that help facilitate successful Ideation sessions and encourage active participation from members.

When facilitated in a successful way, Ideation is an exciting process. The goal is to generate a large number of ideas — ideas that potentially inspire newer, better ideas — that the team can then cut down into the best, most practical and innovative ones.

> **"Ideation is the mode of the design process in which you concentrate on idea generation. Mentally it represents a process of "going wide" in terms of concepts and outcomes. Ideation provides both the fuel and also the source material for building prototypes and getting innovative solutions into the hands of your users."**
>
> **– d.school, An Introduction to Design Thinking PROCESS GUIDE**

The main aim of the Ideation stage is to use creativity and innovation in order to develop solutions. By expanding the solution space, the design team will be able to

look beyond the usual methods of solving problems in order to find better, more elegant, and satisfying solutions to problems that affect a user's experience of a product.

In the Design Thinking process, the Ideation stage often follows the first two stages, which are the Empathise stage and Define stage. There is a significant overlap between the Define and Ideation stages of a typical Design Thinking process. Interpreting information and defining the problem(s) and ideation both drive the generation of problem solutions. This overlap is represented in the types of methods design teams employ during these two stages. For example, Bodystorm and "How Might We" questions are often used in both of these stages.Although many of us may have previously participated in a Brainstorm session, it is not always easy to facilitate a truly fruitful ideation session, which may be the reason why many of us have had negative experiences in the past. However, Ideation sessions *can* indeed be fun and exciting, but they demand a lot of preparation and team member concentration in order to be fruitful. To sit the team down with a blank piece of paper and ask them to come up with ideas will likely result in failure. Likewise, to have everyone shout out their own ideas is likely to result in failure.

People need guidance, inspiration and activities, in a physical and cognitive manner, in order to get the process started. Ideation is a creative and concentrated process; those involved should be provided with an environment that facilitates free, open, and the non-judgemental sharing of ideas.

In Ideation sessions, it's important to create the right type of environment to help create a creative work culture with a curious, courageous, and concentrated atmosphere. Instead of using a boardroom with the CEO sitting at the head of the table, Design Thinking and Ideation sessions require a space in which everyone is equal. The Ideation room must have sufficient space for people to feel comfortable, but the atmosphere shouldn't be sterile, and team members shouldn't have to shout in order to be heard. You should also designate someone to take down contributors' ideas and draw/write them on the whiteboard/wall/poster. If the process begins to slow down and people seem to be running into a dead-end, the facilitator should impose constraints, such as: "what if there was no top-level navigation bar?" or "How-might-we go about the task if we were 8 years old?" Alternatively, you might want to set targets, such as filling a brainstorming sheet within ten minutes. To start understanding what it takes to facilitate a successful Ideation session, we'll take a closer look at the best Brainstorming rules

At its most basic level, a Brainstorm session involves sprouting related points from a central idea. Brainstorming is one of the primary methods employed during the Ideation stage of a typical Design Thinking process. Brainstorming is a great way to generate many ideas by leveraging the collective thinking of the group, engaging with each other, listening, and building on other ideas. This method involves focusing on one problem or challenge at a time, while team members build on each other's responses and ideas with the aim of generating as many potential solutions as possible. These can then be refined and narrowed down to the best solution(s).

Participants must then select the best, the most practical, or the most innovative ideas from the options they've come up with.

We've summarised the best practices and brainstorming rules from the Institute of Design at Stanford (d.school) and the successful design company, IDEO who celebrates Design Thinking.

1. **Set a time limit**
2. **Start with a problem statement, point of view, possible questions, a plan, or a goal and stay focused on the topic: Identify the core subject or the main aim of the exercise. For example, what are you trying to achieve? Are you trying to improve a certain feature? Are you focusing on ways to improve the overall experience? Condense the main issue into a problem statement and condense it into a short "How Might We" sentence. You may even be able to synthesise this into single word. Your ideas should always branch off from this central headline.**
3. **Stay on Topic: It is easy to veer off and take lots of different directions during brainstorming sessions, especially when you are trying to be open-minded and unconstrained in your efforts to come up with ideas. It is important that members stay on topic. Focus is essential; otherwise, the process can become confusing, or ideas can become muddled and cross between solutions for other problems. Every effort should be made by the facilitator to keep members on the central theme and goal. You might even want to designate a particular**

brainstormer to maintain the thread and prevent team members veering off course.

4. **Defer judgement or criticism, including non-verbal: The brainstorming environment is not the time to argue or for questioning other members' ideas; each member has a responsibility to foster relations that advance the session. For this reason, judgement comes later so rather than blocking an idea, you and your other team members are encouraged to come up with your own ideas that sprout off from those provided by the other members of your team.**
5. **Encourage weird, wacky and wild ideas: Once again, as brainstorming is a creative activity, each member should try to encourage other members and create an environment in which they feel comfortable verbalising their ideas. Free thinking may produce some ideas that are wide off the mark, but brainstorming is about drawing up as many ideas as possible which are then whittled down until the best possible option remains.**
6. **Aim for quantity: Brainstorming is effectively a creative exercise, in which design thinkers are encouraged to let their imaginations run wild. The emphasis is on quantity, rather than quality at this stage.**
7. **Build on each others' ideas: One idea typically leads on from another; by considering the thoughts, opinions, and ideas of other team members during the brainstorming session, new insights and perspectives can be achieved, which then inform one's own ideas. Thus, the team will continue to build ideas**

which hopefully become progressively more refined and targeted towards the central issue.

8. **Be visual: The physical act of writing something down or drawing an image in order to bring an idea to life can help people think up new ideas or view the same ideas in a different way. The brainstorming session is more likely to evolve if team members visualize and bring ideas to life rather than rely on discussion alone.**
9. **One conversation at a time: Design thinkers (or brainstormers) should focus on one point or conversation at a time so as not to muddy their thinking and lose sight of the thread or current objective.**

4.3PROPOSED SOLUTION

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	Customers feels difficult when they search many websites to find any fashion clothes and accessories.
2.	Idea / Solution description	Customers directly make online shopping based on customer choice without any search.
3.	Novelty / Uniqueness	The customer will talk to Chat Bot regarding products. Perfection of the image presentation.
4.	Social Impact / Customer Satisfaction	User friendly interface, Assistants should form the chat bot finding dress which makes the customer satisfied. It should be customer modification.
5.	Business Model (Revenue Model)	Safe and secure identity to the user which modify the confidence to the customer. Customers buy our products and generate revenue.
6.	Scalability of the Solution	We can easily scalable our applications by increases the items and products, so we can satisfy all the customer's vision.

If your calling is to be a fashion entrepreneur in today's digital age, you will need specific tools in your arsenal capable of taking your creative renderings from paper to product. You must have access to fashion design software developed to make your ideas and sketches a tangible reality. But which software should you be using to produce the digital blueprint of your designs? Well, the tools of the trade include fashion design software and apparel manufacturing CAD systems. Fashion designers,

clothing line startups, textile designers, apparel manufacturers, and even fashion students utilize CAD software.

At the moment, many fashion entrepreneurs are most likely using Adobe Illustrator to take their designs into the digital space. Still, the good news is that there is more than one software solution available to help you start your clothing line. When it comes to choosing which one is best for you, it is a good idea to base your decision on what will work for your business in the long run. Think about whether you want a one-time lifetime license or subscription-based model. Also, bear in mind that using more than one software solution to create digital fashion sketches, digital samples, and develop prototypes is also a viable option.

Fashion design software is a computer-aided design (CAD) tool that allows users to create 2D and 3D sketches, illustrations, and tech packs with callouts to specific design functions. The goal of leveraging fashion design software is to simplify communicating design ideas for accurate samples and production runs later in the supply chain. Once the designs are approved, they become the only source of truth for those constructing the garment.

Expert digital fashion sketches are necessary throughout the apparel manufacturing process; therefore, fashion entrepreneurs should initially determine which software is right for them by first acknowledging for what purpose they intend to use the technology. Doing so will make it easier for them to understand the product features they should be looking for because each solution offers different things. Determining whether you need software dedicated to design or have a design feature integrated into a broader supply chain solution is the first step. Solutions like the GRID can offer end-to-end visibility with the ability to build CADs and tech packs directly in the software.

Another point is that you should consider things like customizable clothing templates, technical support, and free e-training. Make sure you know what the system requirements are, whether it requires the internet, and what exactly you can design with it. If you are already familiar with fashion design software, then the solution you choose will depend on your level of training. True, that in most cases, drawing skills aren't required to use fashion design software, but for those who have no experience or just have basic knowledge, opting for software that comes with free training and technical support will make using the technology easier. The more advanced user should bear in mind that knowing how to create digital fashion sketches differs from creating patterns. This is because pattern making is something most people are formally trained to do first before they can use the software.

The next step in your decision process is which route do you want to go down, 2D fashion flats, or 3D garment design. It can be tempting to lean towards 3D, but it is worth noting that 2D fashion flats are still the standard industry format because pattern makers do not cut in 3D. That said, 3D can help give pattern cutters an

enhanced idea of how the design looks from all angles, although some people argue that this is achievable with 2D flats.

Various logistics software for fashion solutions is available to you when you start your clothing line.

4.4PROBLEM SOLUTION FIT

I know that when we look at a critical lens, that fashion is full of problems. A while back I fell into the trap of looking at and seeing so much clothing, that I wondered why it would be worth making yet another item and adding it to the pile. I banned myself from going to department stores and looking at the racks of unworn clothing. The overwhelm of how many things get made, compounded with the overwhelm of frustration that a lot of it will be wasted and never worn, used to make me spin out.I was also in graduate school at the time earning my masters degree in Fiber and Material Studies and I was asked a critical question "why make another dress? What is the purpose in you making a garment that has already been made a million times before?

Phew. Just writing about that time in my life makes me so relieved I moved past my feelings of overwhelm when it comes to making clothing.

And my teacher wasn't being mean and critical. What he was asking of me was to find my own voice and create compelling work that will stand out amongst all of the simulacra and iterations of clothing that is continuously being made.

I arrived at many avenues of expression in the garment by slowing down and getting very specific. You must learn intentionality and specificity with clothing design, because that level of consideration we know is NOT being given in mass fast fashion. I focused on many paths, surface design, color theory, and story telling. When I started to design the original Fair Fit project, I used problem solving to improve my design, and create an interesting conversation with my project.

With the first Fair Fit Installation, I wanted to learn how to make a democratic dress, and use the garment pieces to enable participants to piece together garments that were customized toward how they wanted them to ideally fit. As a designer, I know and hear all the problems with fit! So this installation was a way to encourage conversation and empower the audience to make their own decisions. What I learned still informs my design, patternmaking and client work today.

As you learn how to sew, pattern, and construct clothing, you will soon figure out how much time, energy, money, and effort goes into it. If you are interested in pursuing a career in fashion design, or learning how to sew with more design and intention, this

post will teach beginners an introduction to this design methodology and how to use it in your own work. And if you are a sewing enthusiast, if you are going to make a significant investment of your personal time, then you definitely want to design and construct successful garments.
Solving a problem is a successful action! And I will to show you how to prioritize your sewing through consideration of your idea and thoughtful planning so that the garments you sew have a successful and functional design.

What makes a good garment is really hard to define because what I think is good for me, might have absolutely no purpose for you. However, when you decide that your work is going to be purposeful, and the clothing that you sew will have many functions, ultimately you will be adding trememdous value to the item for yourself, or the people you hope are going to purchase and wear the garment.
So lets get to it! Are you ready for some creative direction? Get ready to learn another inspiring design process that you can apply to your own home sewing or fashion design practice.

First we are going to make a list where problems occur in clothing. This list is going to help you analyze solutions and encourage you to consider new directions in your sewing and design. By brainstorming this list, you may find areas of your own work that you want to address and develop. If you love the idea of a capsule wardrobe, and want to learn how to build a capsule wardrobe, then this list will help inform that process as well.

PROBLEMS IN FASHION DESIGN AND THEIR SOLUTIONS

1. FIT

Pretty much for me, a fit issue will make or break a garment. And in terms of the business of fashion, if it doesn't fit right, then you lose a sale. People don't only want to be stylish, but they want to be comfortable and feel confident wearing the garment. Lets break it down. Go to page one in your workbook.

If you are sewing a project, then lets consider, what do you define as comfortable? What are the elements of the item, for example pants, that if they don't fit right, you are never going to wear them. If this is an item from your closet, lets give it the same consideration. What about the fit of this garment do you love? What do you hate, and what would you improve to change the fit? How can you improve the fit of your clothing overall? Do you have certain styles you know you just love, and others that you should avoid?

2. USABILITY- HOW MANY TIMES AND IN HOW MANY WAYS CAN I WEAR THIS?

One of the bigger design pitfalls I face is falling in love with the idea of the garment, but not really considering how often it will really be used. I've designed entire collections that were basically one-use statement dresses. Guess what- they were

celebrated for innovation, but did not sell. So I learned my lesson as a designer to consider how often this garment will be worn. And in my own closet, same issue. I had many pieces I loved, but were only able to wear for a few times a year. I needed to create and design clothing that I can actually use for daily wear, and wear multiple times. Go to the workbook, and fill out the questions. In this exercise, we are also tackling problems of waste and sustainability. Yes!!

3. VERSATILITY = GREATER VALUE.

We want to get a good value from what we purchase. How versatile is the item? If you are going to sew, how many different ways, through how many different seasons, will you wear this? I know my clients appreciate versatility, and that will be the determining factor in the reasoning of whether or not to by a garment.

4. QUALITY CONSTRUCTION- WILL THIS PIECE WORK AS AN INVESTMENT?

Oh, I could rant!! The money I have wasted on cheap, poorly made clothing. I regret mostly everything I bought in my 20s. Lets consider this from a design perspective. Look at the pattern, how can you improve the construction? What will you do to make it an investment piece? What will you do to ensure it will last? You may choose to use french seams instead of serging, or you may decide to chain stitch the flat felled seams on a shirt. When you are sewing, if you consider this before you sew, you can plan out your construction better, and make your time more efficient. Go to the workbook and make a plan!

5. SUITABILITY- HOW AND WHERE IS THIS GARMENT WORN?

Here's another problem I have had in my wardrobe and sewing- I like the idea of something, I sew it, but then, really don't know when I'm going to wear it. And when it comes time to find something that I really need, then I don't have anything to wear! What will you do to your design to create a specific intention for the occasion its worn?

6. COMFORT- IF I WEAR THIS, WILL I BE THINKING ABOUT IT ALL DAY LONG?

This is what happened to me and my jeans. I sold every pair of jeans I had recently because I was sick of them being low waisted and cutting into my stomach. Fit problems as I have said, make or break the garment. How can you improve upon the pattern? Can you measure to make sure this is going to be comforatable and have enough ease to drape well?

7. SEASONAL AND CLIMATE CONSIDERATIONS - IS THIS APPROPRIATE FOR WHERE I LIVE?

Are you making this in the right fabric? How about the construction, will you need a lining, or can you get by without? Really thinking about the climate and what the garment is worn with will help you avoid functional mistakes. I know some of you live in areas of the country that have 4 seasons, but I live in the south where its 50% of the

year summer. I have no business investing huge chunk of resources and time sewing a mega warm winter coat. Go to the workbook and learn how to analyze the seasonal use of your design.

8. AESTHETICS- IS THIS DESIGN HOW I WANT TO SEE MYSELF?

How is this design speaking to me, what story does it tell? What character would wear this? I saw a post on Instagram today of a 90's button up jean skirt, and laughed out loud because the fashion blogger was saying, I want to wear this, but it reminds me too much of my past life in the sorority house. Sometimes we can appreciate an item for its nostalgia, or the kind of character you would be if you wear it, but that doesn't mean you should buy that item and have it take up space in your world. If you are sewing, you want to get some actual use out of your creation.

WHY DO DESIGNERS GO TO ALL OF THIS TROUBLE? WHY SO MUCH ANALYSIS AND WHY DO I HAVE TO HAVE AN ANSWER TO SO MANY QUESTIONS?

Think about this. If it solves your problem, then it probably will solve another person's problem. That's how fashion design can create a thoughtful exchange. I want you to save and use this workbook for future use in your projects. By being more thoughtful and intentional about every project, you will not only create more items that you will love, but you also begin to create more successful fashion design that is meaningful to other people as well.

I'd love to hear how it goes!

5.REQUIREMENT ANALYSIS

FR.NO	FUNCTIONAL REQUIREMENTS(EPIC)	SUB REQUIREMENTS(STORY/SUB-TASK)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through Mobile number Registration through Linkedin.
FR-2	User confirmation	Confirmation via Email Confirmation via OTP.
FR-3	Advanced Search Capabilities	Sorting and filtering options.
FR-4	Checking item availability	Item availability in specific locations.
FR-5	Shopping cart	My cart button Add-to-cart button Remove-from-cart button.
FR-6	Super-fast checkout	Online transfer Credit card payment Paying with mobile wallets.
FR-7	Checking the shipping status	Option to easily check the shipping status of items ordered in the store.

5.1FUNCTIONAL REQUIREMENT

1. Administrator:

• Database Management: Control the database and keep track of all records of customers and employee details.

• Contact and Giving Permission to Vendors:
Contact with the vendors and give permission to sell their product under the site after testing the product's quality.

• View all details: View the details of all employees and control the whole site.

• Advertising the Site: Responsible for making advertisements for the site.

2. Customers:

• Login: Customers must have a valid login id to enter into the site.

• Registration: New users can sign up by creating new ID.

• View and edit Own Details: Can view/edit his personal details, payment details, and details about services provided.

• Choosing and comparing products: Can view all available products and can compare them and make a choice for purchasing products.

• Purchasing: Can purchase any product through valid credit card.

• Giving Feedback to Customer Care: Can give feedback to the 24X7 Customer Care Service center about their impression for the site and services.
• Logout: Customer must logout of the site after purchasing products.
3. Visitors:
• Visiting the Site: Can only visit the site without registration.
• Register
4. Shop Owner:
• Taking Permission from Administrator:
Vendors must take permission from the Administrator for selling their products under the site. Administrator will test product's quality according to its market price to permit vendor for selling purpose.
• Consulting with Administrator: Can consultwith the Administrator regarding product's quality and advertisements.
• Advertising Vendor's Own Products:
Responsible for making advertisements of his products, but the site will not be responsible for any kind of advertisements about products.
5. Sales Manager:

• View customer details: View the personal details of the customer.
• Managing Sales to Customers: Responsible for properly allocating the selected product according to the customer's choice and delivering product to the customer.
• View Product Stocks: Keep track of each product item's stocks for selling purpose.
• Contacting with Administrator: Responsible for informing administrator when any product item's stock goes under the minimum level.
6. Purchase Manager:
• Consulting with Administrator: Taking permission from the Administrator for the product to be purchased from vendor.
• Product Stock Management: Responsible for managing stocks of each product items.
7. Accounts Manager:

• Regulating Payments: Keep track of all the payment transactions made by the customers and update the payment information.
• Consulting with Banks: Responsible for contacting the banks for the validation of the a/c number provided by the customer while purchasing and make the transaction from the given a/c.
• Consulting with Administrator: Consult with the Administrator about the payment details of the customers for the updating of the database.
8. Customer Care:
• Getting Feedback from the Customers:
Responsible for receiving complaints, queries and feedback from the customers.
• Providing Solutions to Customers: Provide feasible solutions to the customers on their

complaints and queries.
It is the primary requirements that are fulfilled by our web site .It's allowing the users, customers to use our website at the level of ease .The purpose of our website is to provide the full information that is required to the user. Here is the following requirement that is fulfilled by our system.

User

User Login

This feature used by the user/admin to login into system. A user/admin must login with his user name and password to The Boutique, Garments and Clothes Shop Management System after registration. If they are invalid, the user not allowed entering The Boutique, Garments and Clothes Shop Management System.

Username and password will be provided after user registration is confirmed.

Password should be hidden from others while typing it in the field

Register New User

A new user will have to register in The Boutique, Garments and Clothes Shop Management System by providing essential details in order to view the The Boutique, Garments and Clothes Shop Management System as a products in The Boutique, Garments and Clothes Shop Management System. The admin must accept a new user by unblocking him.

System must be able to verify and validate information.

The Boutique, Garments and Clothes Shop Management System must encrypt the password of the customer to provide security.

Add to Cart

The user can add the desired The Boutique, Garments and Clothes Shop Management System as a product into his cart by clicking add to cart option on the The Boutique, Garments and Clothes Shop Management System as a product. He can view his cart by clicking on the cart button. All The Boutique, Garments and Clothes Shop Management System as a products added by cart can be viewed in the cart. User can remove an item from the cart by clicking remove. After confirming the items in the cart the user can submit the cart by providing a delivery address. On successful submitting the cart will become empty.

System must ensure that, only a registered customer can purchase items.

Search The Boutique, Garments and Clothes Shop Management System as a product

The user can search the desired The Boutique, Garments and Clothes Shop Management System as a product. He can view description of The Boutique, Garments and Clothes Shop Management System as a product. After confirming the items in the search user can select it into cart by providing a delivery address.

Upload Requirements

The user can upload the requirements as we are allowing customer to avail facility of customizing its dress or customer can provide their own designs to be made by us.

Admin

Manage user

The administrator can add user, delete user, view user.

Manage The Boutique, Garments and Clothes Shop Management System as a products

The administrator can add The Boutique, Garments and Clothes Shop Management System as a product, delete The Boutique, Garments and Clothes Shop Management System as a product, hide The Boutique, Garments and Clothes Shop Management System as a product and view The Boutique, Garments and Clothes Shop Management System as a product.

Manage Orders

The administrator can view orders and delete orders.

The Boutique, Garments and Clothes Shop Management System must identify the login of the admin.

Admin account should be secured so that only owner of the shop can access that account.

5.2NON-FUNCTIONAL REQUIREMENTS

Efficiency Requirement

When an online ladies dresses home delivery system implemented customer can purchase The Boutique, Garments and Clothes Shop Management System as a product in an efficient manner, without going to market.

Reliability Requirement

The Boutique, Garments and Clothes Shop Management System should provide a reliable environment to both customers and owner. All orders should be reaching at the admin without any errors.

Usability Requirement

The web site is designed for user friendly environment and ease of use.

Implementation Requirement

IManagement System using CSS, AJAX, ASP and html in front end with mplementation of The Boutique, Garments and Clothes Shop Microsoft C# as back end and it will be used for database connectivity. And the database part is developed by sql. Responsive web designing is used for making the website compatible for any type of screen.

Delivery Requirement

The whole system is expected to be delivered in four months of time with weekly evaluation by the project guide.

Database Security

Unauthorized person cannot access the panel and database, do not read and write the information.

Availability

The Boutique, Garments and Clothes Shop Management System will be available24 hours a day and customer can make any order at any time.

Performance Requirements

- **The system shall accommodate high number of items and users without any fault.**

- **Responses to view information shall take no longer than 5 seconds to appear on the screen.**

Safety Requirements

- **System use shall not cause any harm to human users.**

Security Requirements

- **System will use secured database**
- **Normal users can just read information but they cannot edit or modify anything except their personal and some other information.**

- **System will have different types of users and every user has access constraints.**

Error handling

OFS shall handle expected and non expected errorsin ways that prevent loss in information and long downtime period.

6.PROJECT DESIGN

6.1DATA FLOW DIAGRAMS

Online Fashion Store Data flow diagram is often used as a preliminary step to create an overview of the Fashion Store without going into great detail, which can later be elaborated.it normally consists of overall application dataflow and processes of the Fashion Store process. It contains all of the userflow and their entities such all the flow of Product, Category, Sales, Customer, Payment, Bill, Shiping. All of the below diagrams has been used for the visualization of data processing and structured design of the Fashion Store process and working flow.

Zero Level Data Flow Diagram(0 Level DFD) Of Online Fashion Store :

This is the Zero Level DFD of Online Fashion Store, where we have eloborated the high level process of Fashion Store. It's a basic overview of the whole Online Fashion Store or process being analyzed or modeled. It's designed to be an at-a-glance view of Payment,Bill and Shiping showing the system as a single high-level process, with its relationship to external entities of Product, Category and Sales. It should be easily understood by a wide audience, including Product,Sales and Payment In zero leve DFD of Online Fashion Store, we have described the high level flow of the Fashion Store system.

High Level Entities and proccess flow of Online Fashion Store:

Managing all the Product

Managing all the Category

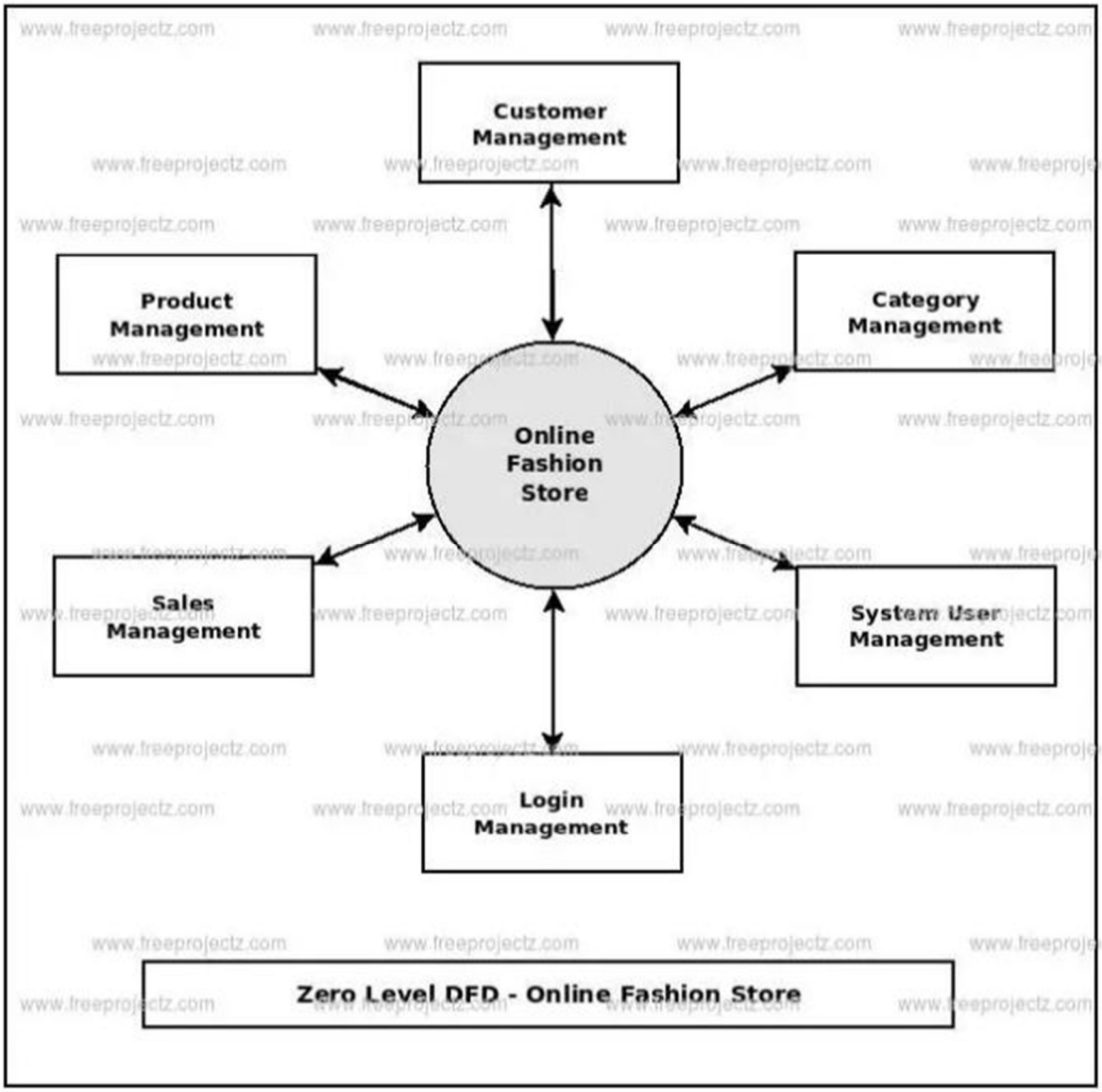
Managing all the Sales Managing all the Customer

Managing all the Customer

Managing all the Payment

Managing all the Bill

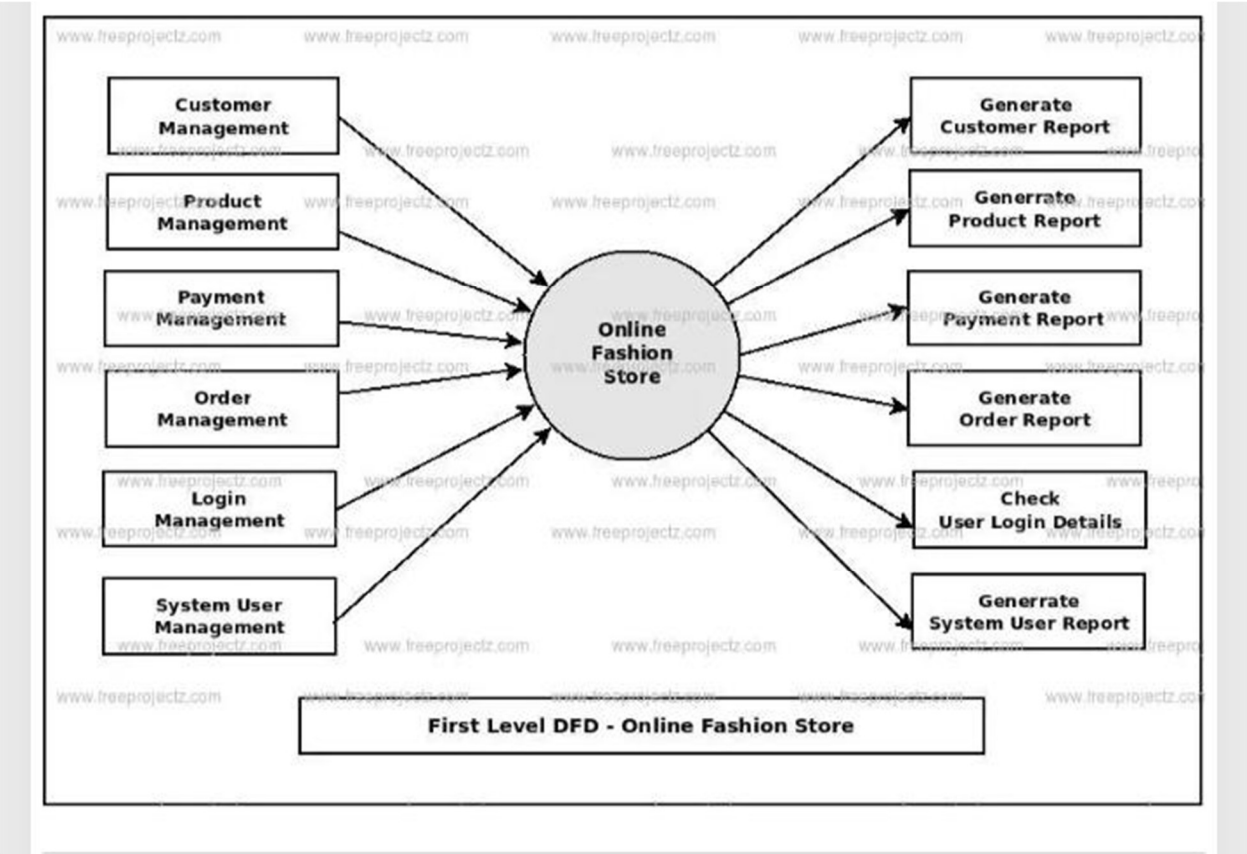
Managing all the Shiping



First Level DFD (1st Level) of Online Fashion Store shows how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the Online Fashion Store system as a whole. It also identifies internal data stores of Shiping, Bill, Payment, Customer, Sales that must be present in order for the Fashion Store system to do its job, and shows the flow of data between the various parts of Product, Sales, Bill, Shiping, Payment of the system. DFD Level 1 provides a more detailed breakout of pieces of the 1st level DFD. You will highlight the main functionalities of Fashion Store.

Main entities and output of First Level DFD (1st Level DFD):

- **Processing Product records and generate report of all Product**
- **Processing Category records and generate report of all Category**
- **Processing Sales records and generate report of all Sales**
- **Processing Customer records and generate report of all Customer**
- **Processing Payment records and generate report of all Payment**
- **Processing Bill records and generate report of all Bill**
- **Processing Shiping records and generate report of all Shiping**



Second Level Data Flow Diagram(2nd Level DFD) Of Online Fashion Store :

DFD Level 2 then goes one step deeper into parts of Level 1 of Fashion Store. It may require more functionalities of Fashion Store to reach the necessary level of detail about the Fashion Store functioning. First Level DFD (1st Level)of Online Fashion Store shows how the system is divided DFD Level 2 then goes one step deeper into parts of

Level 1 of Fashion Store. It may require more functionalities of Fashion Store to reach the necessary level of detail about the Fashion Store functioning. First Level DFD (1st Level) of Online Fashion Store shows how the system is divided intosubsystems (processes).The 2nd Level DFD contains more details of Shiping, Bill, Payment, Customer,Sales, Category, Product.Low level functionalities of Online Fashion Store

• Admin logins to the system and manage all the functionalities of Online Fashion Store

• Admin can add, edit, delete and view the records of Product, Sales, Payment, Shiping

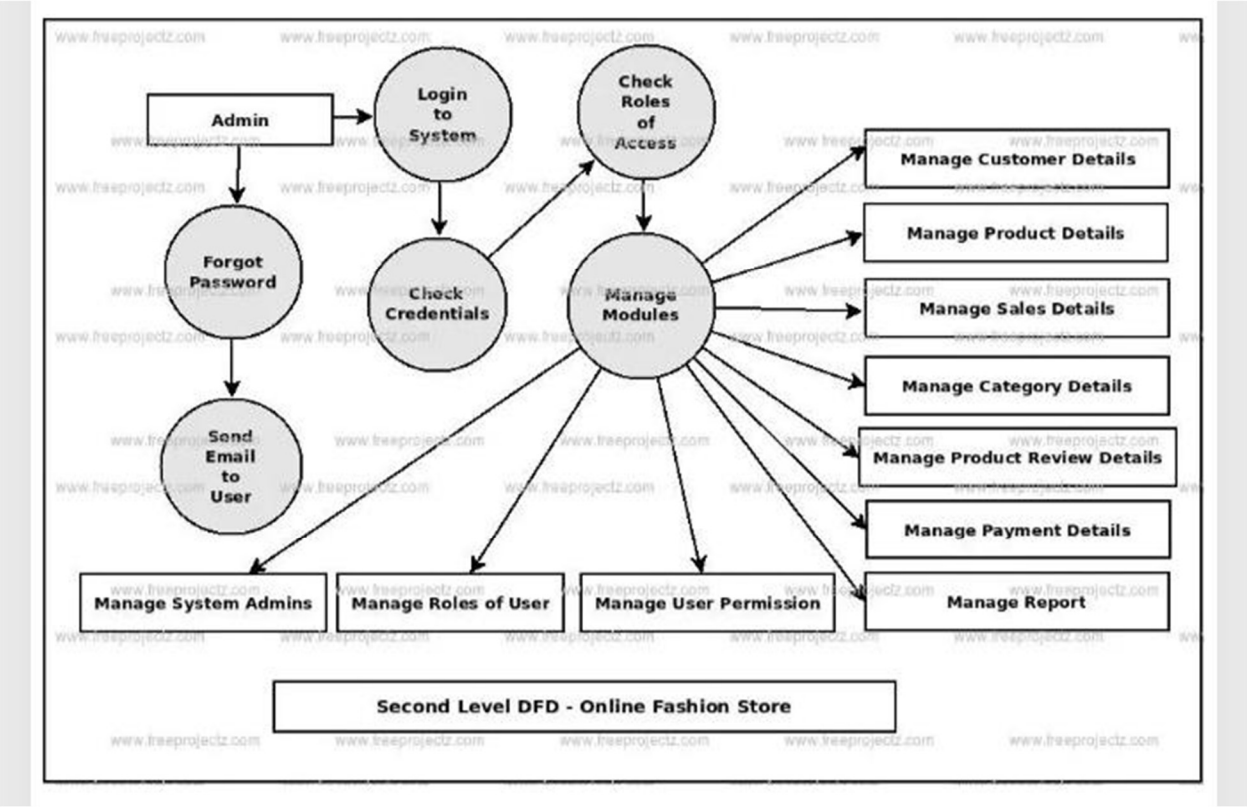
• Admin can manage all the details of Category, Customer, Bill

• Admin can also generate reports of Product, Category,Sales, Customer, Payment, Bill

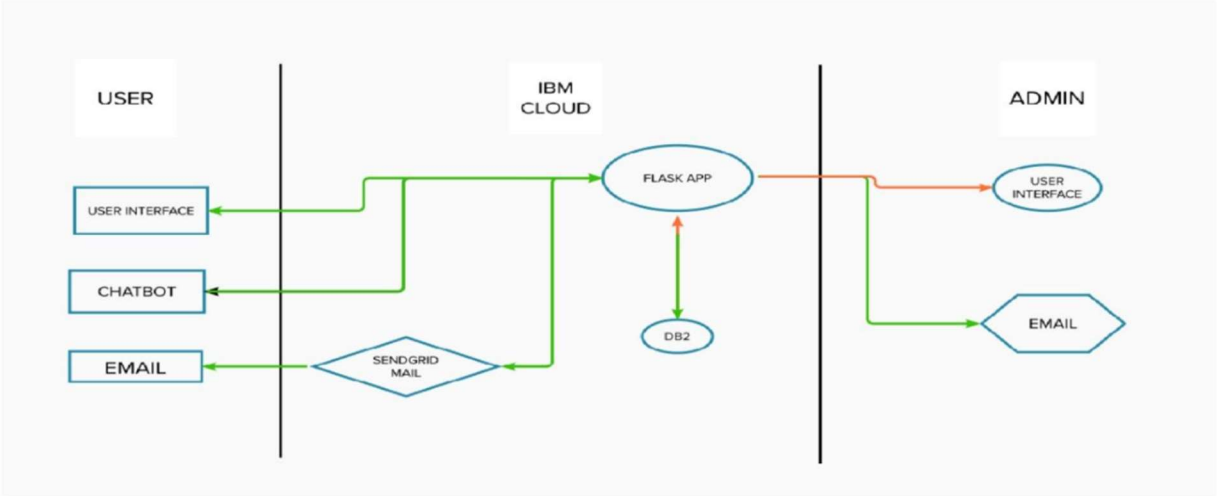
• Admin can search the details of Category, Payment, Bill

• Admin can apply different level of filters on report of Product, Customer, Payment

• Admin can tracks the detailed information of Category, Sales, Customer,, Payment



6.2SOLUTION & TECHNICAL ARCHITECTURE



6.3USER STORIES

As a fashion designer ,I Want to promote the latest trends in the fashion industry so that it provides satisfaction as it will be a bit useful for the customers who wants to be trendy in their fashion.

As a fashion designer ,I want to design the latest trendy designs so that it creates an atmosphere of creativeness and Job satisfaction.

As a Fashion designer ,I want to provide the customer satisfaction regarding the

upcoming trends so that it meets my passion.

7.PROJECT PLANNING & SCHEDULING

7.1SPRINT PLANNING & ESTIMATION

Project Planning Phase
Project Planning (Milestones & Activity List)

Date	28 October 2022
Team ID	PNT2022TMID50909
Project Name	Project - Smart Fashion Recommender Application

Remaining tasks (Milestones & Activities) to be completed

Milestones	Activities	Description
Project Development Phase	Delivery of Sprint – 1,2,3,4	To develop the code and submit the developed code by testing it
Setting up App environment	Create IBM Cloud account	Signup for an IBM Cloud account
	Create flask project	Getting started with Flask to create project
	Install IBM Cloud CLI	Install IBM Command Line Interface
	Docker CLI Installation	Installing Docker CLI on laptop
	Create an account in send grid	Create an account in send grid. Use the service as email integration to our application for sending emails
Implementing web Application	Create UI to interact with Application	Create UI 1. Registration page 2. Login page 3. View products page 4. Add products page
	Create IBM DB2 & connect with python	Create IBM DB2 service in IBM Cloud and connect with python code with DB
Integrating send grid service	Send grid integration with python	To send emails form the application we need to integrate the Send grid service
Developing a chatbot	Building a chatbot and Integrate to application	Build the chatbot and Integrate it to the flask application
Deployment of App in IBM Cloud	Containerize the App	Create a docker image of your application and push it to the IBM container registry
	Upload image to IBM container registry	Upload the image to IBM container registry
	Deploy in kubernetes cluster	Once the image is uploaded to IBM Container registry deploy the image to IBM Kebernetes cluster

Finished tasks (Milestones & Activities)

Milestones	Activities	Description
Ideation Phase	Literature Survey	Literature survey on the selected project & information gathering

	Empathy Map	Prepare Empathy map to capture the user Panis & Gains, prepare list of problem statement
	Ideation	Organizing the brainstroming session and prioritise the top 3 ideas based on feasibility & Importance
Project Design Phase I	Proposed Solution	Prepare proposed solution document which includes novelty, feasibility of ideas, business model, social impact, Scalability of solution
	Problem Solution Fit	Prepare problem solution fit document
	Solution Architecture	Prepare solution architecture document
Project Design Phase II	Customer Journey	Prepare customer journey map to understand the user interactions & experience with the application
	Functional requirement	Prepare functional & non functional requirement document
	Data Flow Diagram	Prepare Data Flow Diagram and user stories
	Technology architecture	Draw the technology architecture diagram
Project Planning Phase	Milestones & Activity list	Prepare milestones and activity list of the project
	Sprint Delivery Plan	Prepare sprint delivery plan

7.2SPRINT DELIVERY SCHEDULE

Project Planning Phase
Project Planning Template
(Product Backlog, Sprint Planning, Stories, Storypoints)

Date	27 October 2022

Team ID	PNT2022TMID50909
Project Name	Project -Smart Fashion Recommender Application
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

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	Amala Mary Shathika J Anusiya P Durga S Devi Kala P
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	Amala Mary Shathika J Anusiya P Durga S Devi Kala P
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	Amala Mary Shathika J Anusiya P Durga S Devi Kala P
Sprint-4	final delivery	USN-4	Create the documentation and final submit the application	20	High	Amala Mary Shathika J Anusiya P Durga S Devi Kala P

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

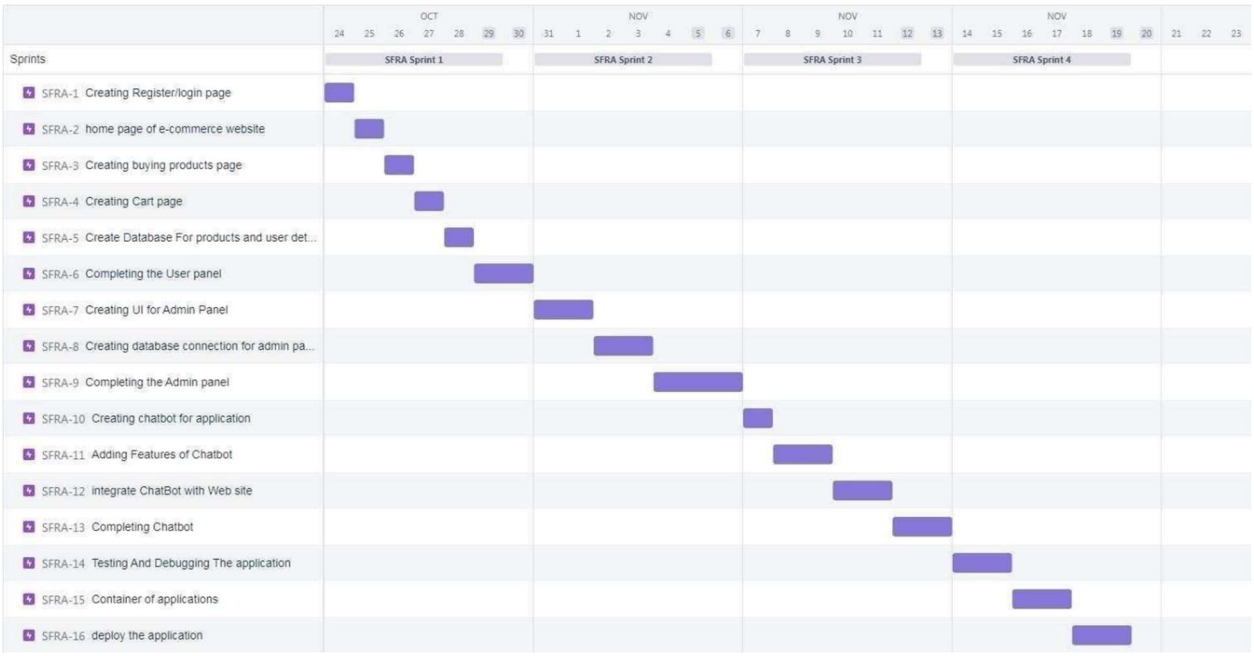
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

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	30 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)

Burndown Chart:



TESTING

Tests can be carried out on items ranging from fabric samples to finished products, including active-wear, apparel for adults and children such as sweaters, sleepwear, outerwear and jeans.

Footwear and fashion accessories such as scarves, belts and bags are also tested. Lest we forget fastenings such as buttons and zips as even these have to be quality and safety assured in order to ensure they’re fit for purpose. These tests are carried out in adherence to a set of Standards which are derived from the combined wisdom of experts in their field.

In every major consumer market, an ever-increasing range of stringent regulations and restrictions for textiles and apparel products are being imposed or are under negotiation. Your products are required to comply with local statutory laws and regulations if you want to sell in a particular market.

Furthermore, fashion product testing enables the reduction of risks such as product recalls, helps protect your brand and gain the trust of the consumer.

TEST CASES

Breaking Strength test

What: The breaking strength test is multidirectional and is predominantly used on woven fabrics. Breaking strength is expressed in pounds and elongation is expressed as a percentage. In both cases, a number of warp and weft tests are performed.

Why: This test is used on garments to check the effects of sunlight, wear and tear and laundering.

Bursting Strength test

What: This test determines the amount of pressure that is required to rupture a fabric. It is used on non-woven fabrics such as knits, lace and felt. The bursting strength is expressed in pounds.

Why: Another method of testing fabric strength, particularly applicable for performance wear such as sportswear and uniforms.

Pilling tests

What: Fabrics and clothing regularly come into contact with surfaces that can damage their appearance. Regular wear and washing can cause pilling on the top layer *(A pill, colloquially known as a bobble, fuzzball, or lint ball is a small ball of fibres that forms on a piece of cloth. Pilling is a surface defect of textiles caused by wear, and is considered unsightly to some.).*

Evaluation should be made by considering the size, number and visibility of the piling as well as the type and degree of other surface change. After the tests, each specimen is evaluated on a 5-4-3-2-1 piling scale with the colour change and degree of fuzz on the surface appearance noted.

Why: Mostly performed on knitted textiles, these tests give ideas as to the end quality of the material and potential customer returns.

Abrasion resistance

What: When materials rub against each other abrasion resistance occurs. Garments that are made from fibres that possess both high breaking strength and abrasion resistance, such as nylon, can be worn regularly before signs of physical wear appear.

Fabrics such as acetate, which is used extensively for lining garments, has poor abrasion resistance so doesn't last very long.

Why: Customer satisfaction and return rates related test.

Colourfast testing

What: This is used to determine the resistance to colour change, under various conditions, of dyed or printed fabrics. A cloth material that is brighter with deeper colours tends to be affected more than fabrics in lighter shades.

Certain elements determine whether textile colours will be affected. These include exposure to sunlight, pollution, perspiration, crocking, washing and dry cleaning.

Why: Customer satisfaction and return rates related test.

AATCC Colourfast Test Methods and Standards

The American Association of textile chemists and colourists has a set of test methods and standards that are used in industry to test materials and garments. These tests run into the hundreds and can be purchased through their website for £30 to members and £50 to non-members (prices are correct at time of publishing this article), per test and can then be carried out on your premises. The test methods are delivered via a link in your emailed receipt. The basic tests include the following:

- **Colourfastness to Light T16.1**

This test method provides the general principles and procedures for determining the colourfastness to light of textile materials outdoors under glass. The test options described are applicable to textile materials of all kinds and for colourants, finishes and treatments applied to textile materials.

- **Colourfastness to Crocking: Crock metre Method TM008**

This test was originally developed in the 1930's and revised in 2016.

Crocking is the transfer of dye from the surface of a dyed or printed fabric onto another surface by rubbing. The more colour is transferred, the more the fabric "crocks". Crocking determines the amount of colour transferred from the surface of coloured textile materials to other surfaces by rubbing.

Dye crocking is the result of colour loss by mechanical actions such as friction and abrasion. Crocking can be the result of a lack of penetration of the dyeing agent, the use of incorrect dyes or dyeing procedures, or the lack of proper washing procedures

and finishing treatments after the dyeing process. If the textile dying or printing process is not done properly, the rubbing-off of dye from a fabric may occur.

Test procedures employing white test cloth squares, both dry and wet with water, are supplied. Considering that washing, dry cleaning, shrinkage, ironing, finishing, etc., may affect the degree of colour transfer from a material, the test may be made before, after, or before and after any such treatment. The testing method includes the rubbing of a coloured test specimen with a white crock test cloth under controlled conditions. Any colour that is transferred to the white test cloth is assessed by a comparison with the Gray Scale for Staining or the Chromatic Transference Scale and a grade is assigned.

Leather Goods Tests

Leather goods testing is necessary to ensure that products made in this durable material are genuine, free of hazardous chemicals and can withstand everyday use. Testing methods and Leather Standards are similar to those set for the testing of textile garments.

The ASTM has formulated a set of standards for testing leather and leather goods. Each standard costs £30 and can be downloaded from their website The basic tests used for the fashion product testing of leather goods include the following:

Tear Strength test

What: The Baumann method was developed specially for testing leather garments. A defined shape is cut out of each leather specimen. Specialist jaws are fitted to a tensile testing machine which allows a load to be applied pulling across the cut-out in the leather sample. Two tears are generally produced- one from each end of the cut-out.

The Lastometer (Standard Test Method for Bursting Strength of Leather by the Ball Method ASTM D2207) test method was formulated to measure the bursting strength of leather shoe uppers by measuring the force required to introduce a spherical ended plunger through a piece of leather. The bursting load and extension will be proportional to the plunger diameter. The ball test method can be used to test a large variety of leathers and products and is applicable to light and medium weight leathers.

Why: These are"fit for purpose" performance and safety-related tests. They also relate to customer satisfaction and return rates.

Standard Test Method for Resistance of Coloured Leather to Bleeding

ASTM D5552

What: Bleed resistance is an important characteristic in leather and this test is used to determine whether any colour bleeds will occur from the surface of the leather when it comes into contact with water. The test method is intended for use on finished articles such as shoes and handbags.

Why: Customer satisfaction and return rates related test.

Lightfastness test

What: Fading is one of the main causes of damage to leather objects.

Aniline-coloured porous leathers tend to fade faster than more engineered pigmented leather. The light fastness of leather – as well as with textiles – is measured by means of the so-called blue scale test. Eight blue wool strips of descending light fastness are placed together with a sample of the leather to be tested in ultraviolet light. A part of the sample surface and a part of the wool strip surface is covered and compared after the exposure. The Xenon test simulates sunlight and is used to measure the fading sensitivity of leather.

Why: Customer satisfaction and return rates related test. It is important to know how a material will perform before you invest in it being made into a final product. For example, for more expensive leather goods like handbags that will be exposed daily to sunlight, knowing that they will not discolour quickly and lead to customer dissatisfaction and high return rates is of utmost importance.

Wet and Dry Rub Fastness test

What: This test determines whether the colour will rub off the leather products onto other items under wet and dry conditions.

A white wool felt material would be loaded onto a machine and rubbed repeatedly over a stretched leather surface several times. The leather and felt are then tested for changes. The felt is tested for colour transference from the leather and the leather is tested for damage and fading.

Why: Customer satisfaction and return rates related test. Especially with handbags worn under the arm or handheld and rubbing against clothes.

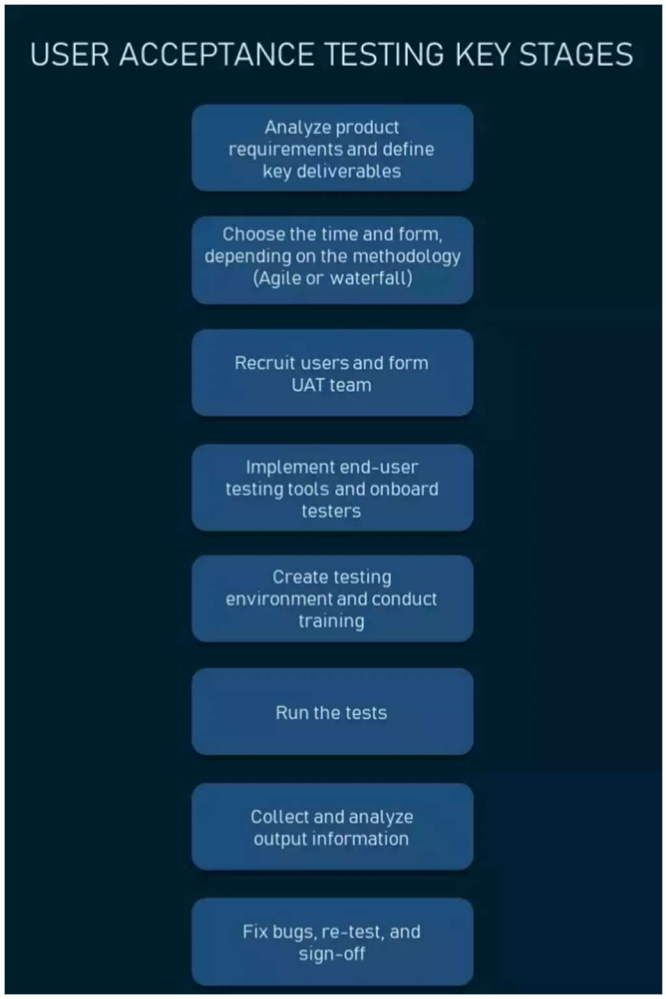
- **Acceptance criteria**

With all of the above tests, a minimum of three specimens should be tested for tolerance. All of the results should then be recorded and an average is taken from the three.

USER ACCEPTANCE TESTING

User Acceptance Testing (UAT) checks whether a product is the right one for the end users. It has other names, e.g., *end-user testing, operational, application, beta testing*, or *validation* but they describe the same thing. In quality assurance, it's important to distinguish between *validation* and *verification*.

Verification refers to general QA processes aimed at testing the technical aspects of a product to ensure it actually works. Validation (or user acceptance testing) is conducted to make sure that the product corresponds with business requirements and can be used by the end user.



Validation activity can be divided into two types of testing.

Alpha testing is the initial stage of acceptance testing, typically performed by internal testers, to ensure that the product functions correctly and meets business requirements.

Beta testing, the second type of acceptance testing, aims at meeting user acceptance criteria. UAT can be performed by

- **the actual users of an existing product,**
- **users of a previous version of a product,**
- **stakeholders involved in the development of the product, and/or**
- **business analysts as end-user specialists.**

This enables the development team to fix most of the usability problems, bugs, and unexpected issues concerning functionality, system design, business requirements, etc.

ADVANTAGES & DISADVANTAGES

Advantages

During the process of clothing network marketing, clothing product information distribution and transmission,product display, the communication with consumers and advertisement delivery is conducted by the network.

Compared to traditional marketing, its cost is lower with network . At the same time, there is no need to lease or buy brick-and-mortar stores for clothing enterprises through the implementation of network marketing. Just use the web to carry on non-store sales.It can reduce the cost of enterprises in leasing or buying stores and employee wage on the one hand. On the other hand, it reduces enterprise inventory, relieves stress from inventory and reduces enterprises' operation cost.

Own price advantage and expand clothing display scope

In the virtual network marketing, reduce channel cost because the decrease of middlemen. The decreases of channel cost and enterprises' operation cost lead to that clothing product price online is lower than that of brick-and-mortar stores, such as traditional market and brand stores . The cheap price of clothing product can cause consumers to buy online easily, beneficial for clothing enterprises to reduce inventory and increase sales. In addition, there is no limitation of area in virtual stores online; enterprises can exhibit more clothing than in the brick-and-mortar stores in the condition that they have enough clothing. Clothing types, styles and color shown can be various, providing more choices for consumers and attracting consumers' attention to buy clothing online.It's beneficial to increase consumer purchasing possibility.

Expand clothing enterprises sales market

The characteristics of network, such as wide coverage, no limitations of time and area, make clothing sales break through the limitations of time and places. Clothing network marketing enlarges the scope of products' sales area and extends open time to sale clothing for clothing enterprises. It really realizes the "24 hours" business. Through network, clothing enterprises can develop new market, expand the clothing sales market from the local market to the whole country market, and even the global market. It's very convenient for distant consumers to purchase clothing they need, no matter where they are or how far they are away from the clothing delivery area. According to present situation of clothing development, network marketing is beneficial to expand sales market for clothing enterprises.

Improve clothing enterprises' quick response ability

As epidemic strong product, clothing has a lot of characteristics, for example, rapid change and short popular cycle . According to the market and enterprise's own conditions, clothing enterprise needs to make a quick response for consumers' increasingly personalized demands. They can get feedback information from consumers in a timely manner with using BBS message and other electronic information communication methods. Based on the acquired feedback information, the enterprises can quickly adjust the allocation of clothing products, so as to cater to the market and meet the demands of consumers in clothing network market. Thus, itcan help clothing enterprises to improve quick response ability through carrying on network marketing.

Provide more promotion activities and meet consumers' personalized demands

Due to the limitations of time, space and human factors, it's almost impossible to hold on multiple promotions at the same time for one brick-and-mortar clothing store [8]. But in clothing network stores, enterprises can hold many promotions at the same time. Consumers can choose the promotional activities based on their actual demands, helping clothing enterprises attract more consumers and increase sales. In the 21st century, people pursuit individual character. People with different genders, occupations and ages have different tastes of clothing and the personalized demand for clothing has become increasingly apparent. As a kind of consumer oriented marketing mode, clothing network marketing makes customers have a great freedom in time and space. In the process of trading, the businessman communicates with

consumer and knows about consumer demands directly. Then the businessman can provide some clothing recommendations to the consumer based on his or her demands.Even some enterprise operators launch network custom service according to fashion trends and consumer

demands, let consumer with special body have fashion clothing by custom service. Through personalized on-demand customization, meet the individuality demand of consumers, at the same time, win the good reputation in the market, strengthen the customer loyalty and increase market share for clothing enterprises.

Disadvantages

Fitting problem

In traditional clothing purchase mode, consumers always need to go through a trial wear and touch fabrics before buying clothes . This way consumer can feel the clothing fabrics and look at the overall effect when they put on the clothing, so as to determine whether the clothing is suitable for their own style, temperament, color, size and other match. But network stores are virtual.Although consumers can know about the information about the style, size, color, fabric and other aspects of the clothing by browsing clothing pictures and reading text description the businessmen show and edit, consumerscan't directly contact with clothing and go through a trial wear. Even sometimes, the color, quality and other aspects of the clothing businessmen show and describe are not completely corresponding with the actual clothing.It is not suitable for the consumer actually. Due to being worried about that this situation happens,

consumers will be hesitated to purchase clothing online and even resist, in turn reduces network sales and against the development of clothing network marketing.

Quality and label problems

On the one hand, consumers couldn’t touch the clothing directly, for which some enterprises exaggerates clothing quality, affecting consumers' judgment on clothing quality. On the other side, online clothing price is too cheap to increase consumer worries about clothing. So online clothing quality can’t get guarantee in network stores,

reducing consumer confidence in online clothing enterprises, in turn affecting enterprises development. In addition, due to lack of relevant laws or regulations on online clothing label management, there is no unified label at some aspects of clothing such as size, color and fabric content. For this, consumers don’t know the clothing sizes and fabrics they chosen meet their own demands or not, thus influence consumer online shopping behavior and network marketing development.

Logistics and distribution problems

Consumers purchasing clothing online are very concerned about how long they can receive the clothing, which relates to logistics and distribution problems . According to the Chinese State Postal Bureau statistics, online shopping goods distribution increasing by 54.8% over the same period in 2012, reaches 5.685 billion pieces and the highest daily processing volume of goods is even more than 30 million pieces. However, Chinese logistics system is relatively backward compared with that of developed countries, can’t adapt to the rapid development of network marketing and

differs too much from foreign automatic distribution with the usage of computer technology. Besides, some problems block the development of clothing network marketing, for example, the logistics staff bad service attitude, high clothing transport cost, backward social distribution. These problems need to be solved.

Hinder clothing brands development

Network with the characteristics that no limitation of time and space, high efficiency and fast speed, accelerates the dissemination of products' information, and makes clothing products homogenization more and more serious.Small and medium-sized clothing enterprises can compete to imitate brand clothing, sell clothing to customers through the low price strategy, seizing brand clothing sales market. Even some businessmen without authorization of the clothing brand enterprises, directly sell clothing brand products to consumers in online stores, hindering the development of the clothing brands seriously. Thus, although network marketing brings good prospects for brand clothing enterprises, the factors such as imperfect laws and regulations for network marketing to protect clothing brands hinder the healthy development of clothing brands .

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 discussedelaborately, 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 color, trend and clothing style in order to develop an effective recommendation system.

FUTURE SCOPE

Online selling and purchasing offer innumerable benefits to both sellers and buyers, and these advantages are also the reasons for the rising scope of eCommerceWell, to put it bluntly, the scope of e-business in the near future looks to be ever-increasing and growing, because the trend has really caught on here. E-commerce giant Amazon is keen to conquer the Indian market and has already invested a great

deal, especially with its 49% stake in the Future Group.

Indian online retail giant Flipkart has already opened a few offline stores and plans more stores in smaller cities. They plan to combine online and offline stores to maximize their selling potential.Google and Tata Trust have launched a joint program ‘Saathi’ to increase internet and mobile penetration among rural women.The Government of India is also making a huge push for Ecommerce by providing numerous sops to startups, cyberparks, and so on through its Digital India program.As of now, there are close to 20,000 E-commerce companies in India, with many more expected to join the bandwagon every month.