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Original Article

An Organized Recommender System for Nigerian Fashion using Machine Learning

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Abstract *- Recommender systems are everywhere. If any computer user has ever looked for books on Amazon or browsed through posts on Facebook, then that user has used a recommendation system without even knowing it. A major problem facing the Nigerian Fashion Industry is the unavailability of an Organized Recommender System that is enabled by Machine Learning. This technique is needed to enable fashion clients to customize the system in order to extract specific and preferred fashion products and services. Secondly, the lack of the system has also contributed to poor-decision processes among clients of the fashion industry. In this work, we developed an Organized Recommender Systems for Nigeria Fashion Industry using Machine Learning Techniques. We adopted Structured System Analysis and Design Methodology (SSADM) in his approach and further implemented with JAVA Programming Language, JavaScript and MySQL Relational Database Management System as our backend. Our results show that the role of Machine Learning in Organized Recommender Systems encompasses the supervision of transactions beyond human capabilities. In addition, this work could be of great benefit to the Fashion Entrepreneurs and to Clients in Diaspora as the work will provide them with useful information on how they can customize the system and extract specific and preferred fashion products and services.*

Keywords *- Fashion, Machine Learning, Nigerian, Organized, Recommender System.*

I. INTRODUCTION

A. Statement of the Problem

A major problem facing the Nigerian Fashion Industry is the unavailability of an Organized Recommender System Technique that is enabled by Machine Learning. This technique is needed to enable fashion clients to customize the system in order to extract specific and preferred fashion products and services. In addition, the lack of the system has also contributed to poor-decision processes among clients of the fashion industry.

B. Aim and Objectives of the Study

The aim of this study is to develop an Organized Recommender System for Nigerian Fashion Industry. The specific objectives of the study include to:

- design an improved web-based information system for Fashion using Machine Learning techniques.
- implement the proposed system with JAVA, JavaScript programming languages, and MySQL database as backend
- compare our results with the present fashion recommender system in Nigeria

C. The Nigerian Fashion Industry: A Brief Overview

The creative industry in Nigeria is gaining unprecedented international exposure. It's been seen as an alternative to the nation's dwindling oil fortunes as the nation is looking into alternate sources to boost the economy. There have been questions as to just what the nation produces as it relies more on imports. But the creative industry has stood out as a bankable offering, potentially profitable and authentically Nigerian. One part of the creative industry is Fashion, and that has caught international attention, and it's attracting private sector participation.

Fig. 1.1 Sample Pictures of Fashion Stakeholders

Figure 1.1 shows sample pictures of Nigeria's Fashion Industry. Secondly, with no precise data on the size of the Nigerian market, the apparel and footwear market in Sub-Saharan Africa is estimated to be worth thirty-one billion dollars, with the global apparel market valued at 3 Trillion dollars. Nigeria currently hosts about half a dozen fashion

week events annually. And the rate at which these shows have mushroomed and their quality reflects the improvement going through the fashion industry [2].

More Nigerian designers are showing at international fashion events with their designs gracing events in Milan, New York, Johannesburg and the likes. The level of attention that the Nigerian fashion industry is enjoying today is a result of the hard work of some individual designers whose works caught the world's attention. One of such designers is Deola Sagoe, who has been in the fashion industry for over twenty-five years. Her blend of African Fabrics and western aesthetics got her international acclaim in 2000 when she won the MNET/Anglo Gold African designers to show at New York fashion week. The inclusion of African designers attracted the international fashion community. Furthermore, the level of professionalism in the industry also accounts for the industry's success. There was much change and growth over the past years. Fashion designers are now being recognized outside Nigeria. A lot of people are learning the trade, and the professionalism they are bringing is also helping. While the creativity of the fashion industry is established and a number of platforms are emerging to promote these designers to a mass market, the question of how local industry will tap into the global market force in the process is being asked. And that's alluding to the lack of infrastructure and capacity to fully commercialize its vast creative talent. Also, scaling up production and distribution has proven difficult and has hindered the growth of a potentially lucrative industry.

Fashion is a breath of freedom, comfort, style and confidence. Before anyone thinks of delving into the fashion sector, that individual must have the idea that there are certain structures and sectors that makes up a fashion industry. According to a notable fashion and style writer, Zanaib Alhassan, the fashion industry is divided into creative and sales function, which includes design and production on the one hand and sales/distribution on the other. Presently, we know that there are great fashions experts in Nigeria with excellent ideas that can get a style out of nothing. However, the platform for sales promotions and function are lacking. Although the entertainment industry is seen as the creative industry, the fashion industry is not left out as it has emerged to be one that determines a country's economy and as well the driving force. The complete fashion industry is made up of several personnel such as fashion designers, fashion retailers, photographers, models, modelling agencies, fashion editors, fashion magazines, promoters etc. However, there are several challenges, threats and opportunities, especially in this modern society where the fashion trend is recognized. Nowadays, we realize that fashion designers have broadened their knowledge and have kicked off the idea of just being called 'dressmakers'. Although we have stylists who do the style combination, the fashion designer is also faced with the responsibility of combining styles starting from the outfit to the shoes, makeover, hairdo, accessories etc. Most fashion 'suckers' prefer patronizing this set of fashion designers with such skill rather than contacting personnel for each adornment. To buttress this point, we are not saying that all designers must acquire such skills, but as the fashion world changes and improves, there should be an avenue for new ideas to spring up in this industry not only to satisfy the customers but to improve the brand and make a profit.

D. Analysis of Recommender Systems and its role in the Fashion Industry

Recommenders are being used in many applications and circumstances to make ease of social life by generating categorized and personalized recommendations to the individuals. These categories may be chosen by the users to get recommendations for movies, songs, products and various services etc. One of the challenges of a recommender system is to generate recommendations in real-time for many people by analysing a huge amount of data. Recommendation systems are the type of information retrieval mechanisms used to predict users' interest in a given context on an item. Recommendation system found its applications in news personalization, product/item recommendations, in E-commerce websites, Songs and movie recommendation in online streaming websites and friend recommendation in social networking sites. The process of making recommendations involves two steps which include: the learning of data, also known as model building step or offline step, and the generation predictions, also known as execution or online step. In many cases, Recommendations should be real-time, so the offline step should be able to scale up a massive amount of data and help to generate real-time recommendations. The challenge of recommendation systems is to mainly understand the user's requirement and recommend items that are related to a users' interest which he may not know but like when recommended. The recommendation system uses many parameters to generate recommendations. The history of recommender systems ranges from Google Page rank system, Pandora music streaming website, CDnow, to Amazon.com. These websites use recommendation engines to provide valid recommendations in real-time.

a) Types of Recommender Systems

Recommender Systems are of two types, namely:

- Non-Personalized Recommender System
- Personalized Recommender System

Non-personalized recommenders never consider users' interests into account to provide recommendations. These types of recommenders are highly beneficial. For example, in a news recommender system, even if a user is not interested in politics, it is essential to recommend major political news like the new president-elect of the country to all users. On the other hand, personalized recommenders customize recommendations according to a user's taste. Non-personalized recommender system gives common recommendations to all users. The simple formula used by earlier non-personalized recommender systems like Zagat is:

Score = (mean (ratings)) * 10 (1.1)

The rating values are between 1 and 5, and the mean is multiplied by ten to make it non-decimal. Some non-

personalized recommender systems like Conda Nast used the formula to calculate Rating Prediction Ru as Ru = (∑i = i * ri / ∑i = Iri) * 100 (1.2)

where ∑urui is a number of people with good ratings for item i. And I am the total number of ratings for that item. Non-personalized recommenders are used to provide a new review. For example, the average rating of a new movie in blogs has nothing to do with a user's interest. In cases of fewer ratings, the mean can be misleading. So the mean ratings are modified by: Ru = ∑urui + kμ / n + k (1.3)

where ∑u is the sum of user ratings for item i, n is the total number of ratings, k is the strength of evidence required to overcome the global mean, and μ is the average rating of item i. The advantages of a non-personalized recommender system are less time complexity, less space complexity and can generate recommendations for even new users. And the draw-back of non-personalized Recommender is that it never considers the user's interest. Furthermore, the research results from most related works on recommender systems show that most industries still operate the Non-personalized recommender system model. The utility matrix is considered as input to make recommendations. Secondly, this matrix has rows as users and columns as items. The intersection is the vector of ratings given by a user on an item. The main agenda of content-based filtering is to find similar items to items the user is looking for. Content-based recommenders found their applications in digital documents, online articles and news portals. Collaborative filtering predicts the preference of a user on an item based on the taste of another user. The criteria here are to find a set of users similar to a user u and recommend the items consumed or preferred by these users. Memory-based collaborative filtering techniques find similarities between user/items using neighbourhood methods. The similarity is typically calculated by Pearson correlation, cosine similarity measures, and Jacquard coefficients. Here, the similarity between users/items is computed offline. There are two types of collaborative filtering techniques, user-user collaborative filtering and item-item collaborative filtering. The basic idea of user-user collaborative filtering is to let us consider a user x to find a group of users whose likes and dislikes are similar to defined user x.

E. Overview of Machine Learning for Improving Recommender System

The term machine learning means to enable machines to learn without programming them explicitly. The current research in machine learning focuses on computer vision, hearing, natural languages processing, image processing and pattern recognition, cognitive computing, knowledge representation, and so on. These research trends aim to provide machines with the ability to gather data through senses similar to the human senses and then process the gathered data by using computational intelligence tools and machine learning methods to conduct predictions and make decisions at the same level as humans. There are basically four general machine learning methods which include supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning methods. Machines are, by nature, not intelligent. Initially, machines were designed to perform specific tasks, such as running on the railway, controlling the traffic flow, digging deep holes, travelling into space, and shooting at moving objects. Machines do their tasks much faster with a higher level of precision compared to humans. They have made our lives easy and smooth. The fundamental difference between humans and machines in performing their work is intelligence. The human brain receives data gathered by the five senses: vision, hearing, smell, taste, and tactility. These gathered data are sent to the human brain via the neural system for perception and taking action. In the perception process, the data is organized, recognized by comparing it to previous experiences that were stored in the memory, and interpreted

III. RELATED WORKS

According to Peis et al. [3], one of the main challenges confronted by information systems is the effective management of large volumes of documents they store to easily and swiftly facilitate information consumers´ access to resources that satisfy their needs. This need becomes even more pressing in today's society where the user's demand continues to grow. Traditionally, filtering and recommender systems were classified into three categories relative to the filtering technique used social-based recommender systems, content-based recommender systems and economic factor-based recommender systems. Let us look at each one in greater detail. The social filtering systems, also known as collaborative filtering, use the information provided by users with similar characteristics to generate recommendations, removing content from the resources (this is based exclusively on the valuations received from the users).

Asanov [4] researched Collaborative Filtering Recommender Systems, Foundations and Trends in Human-Computer Interaction. From his system, users are often grouped into specific categories or stereotypes that characterize them through a series of default preferences values and which represent the group's common information needs and search habits. This type of system tends to offer poor results when little information is available to the users or when they have heterogeneous tastes. The content-based filtering systems generate recommendations comparing user preferences (expressed implicitly or explicitly) with the metadata or characteristics used in representing the resources or products, ignoring the information concerning other users. These systems, just like the social-based systems, are not very reliable when little user information is available. Economic factor-based recommender systems are those that generate recommendations based on cost. For example, the relationship between the service cost and the benefit reported by the client or the relationship between the bandwidth and size of the file to be downloaded.

Richardson [5] analysed An Enhanced Machine Learning Algorithm Technique for improving Recommender Systems. He illustrated that Recommenders are being used in many applications and circumstances to

make ease of social life by generating categorized and personalized recommendations to the individuals. These categories may be chosen by the users to get recommendations for movies, songs, products and various services etc. One of the challenges of a recommender system is to generate recommendations in real-time for many people by analysing a huge amount of data. In this paper, the authors considered traditional Recommender and hybrid recommender techniques to generate recommendations.

Alexander [6] looked at Context-Aware Recommender System for Personalized Places in Mobile Application. According to him, the term machine learning refers to the automated detection of meaningful patterns in data. In the past couple of decades, it has become a common tool in almost any task that requires information extraction from large data sets. We are surrounded by a machine learning-based technology: search engines learn how our email messages and credit card transactions are secured by software that learns how to detect frauds. Digital cameras learn to detect faces and intelligent personal assistance applications on smartphones learn to recognize voice commands. Cars are equipped with accident prevention systems that are built using machine learning algorithms. However, the use of this type of system today is still uncommon. The current trend is to develop hybrid filtering systems that combine characteristics of the content-based and collaborative based systems to minimize the disadvantages of each of them and thus improve the overall efficiency of the system's performance in terms of precision and comprehensiveness.

According to Gershome [7], there are other criteria that could be used to classify recommender techniques. For example, focusing on the way user preferences are obtained, we can distinguish between explicit data collection systems (when the user is asked to voluntarily provide their valuations) and implicit data collection systems (where the system user is monitored). The active systems are more complicated since they generate recommendations from the opinions of similar users.

The system designed by Raul [8] is a personalized recommender system that tries to limit the problems of collaborative recommender systems by ontologically using semantic information from the categorical characteristics of an item. The similarities between user pairs are calculated by a weighted mean method that calculates three similarity measures: the similarity of user evaluation histories

Another model used in the field of e-commerce is one presented by Cynthia [9]. The system is based on the collaborative recommender paradigm through content using product taxonomy from which the user profiles are defined (without users needing to provide explicit valuations). The active user profile is used to discover users with similar interests, whose valuations help the system generate recommendations.

James [10] also proposed a recommender system based on personal information, which they claim suits the Semantic Web context. The model is based on the representation of Web services and user profiles with RDF triples (Resource Description Framework). Each company wanting to provide Web services registers its data in the information repository, where the system converts the data into documents in RDF format. The search module extracts the repository's information and sends it to the document retrieval agent

IV. MATERIALS AND METHODS

A. Methodology

The Methodology for the Proposed System Design is Structured System Analysis and Design Methodology (SSADM). Structured Systems Analysis and Design Methodology is a systems approach to the analysis and design of information systems. SSADM was produced for the UK government office concerned with the use of technology in government from 1980 onwards. System design methods are a discipline within the software development industry which seeks to provide a framework for activity and the capture, storage, transformation and dissemination of information so as to enable the economic development of computer systems that are fit for purpose. SSADM is a waterfall method by which an Information Systems design can be arrived at; SSADM can be thought to represent a pinnacle of the rigorous document-led approach to system design and contrasts with more contemporary Rapid Application Development methods.

B. Analysis of the Existing System

The fashion industry of Nigeria uses the Non-

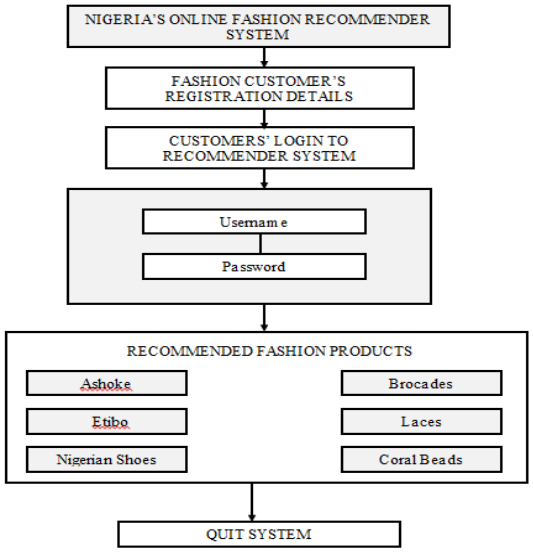

Fig. 3.1 Structure of a Non-Organized Fashion Recommender System *(Existing System) (Source: [3])*

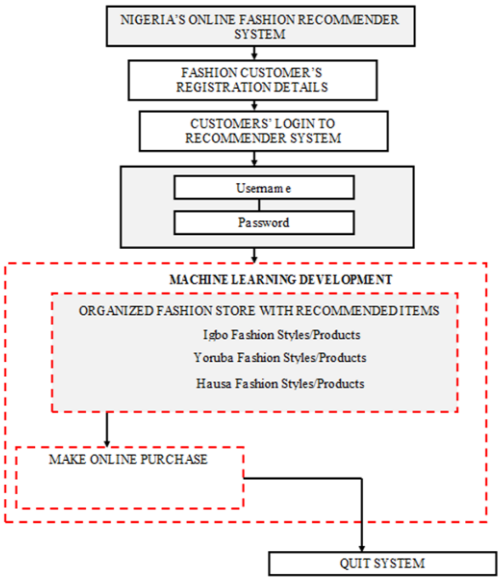

Fig. 3.2 Proposed System Structure of an Organized Fashion Recommender System

Personalized recommender systems are the simplest type of recommender systems. As suggested by the name, these types of recommender systems do not take into account the personal preferences of the users. The recommendations produced by these systems are identical for each customer. In the case of E-Commerce websites, the recommendations can either be manually selected by the online retailer based on the popularity of items, or the recommendations can be the top-new products. For example, if we go to amazon.com as an anonymous user, it shows items that are currently viewed by other members. These systems recommend items to consumers based on what other consumers have said about the items or rated them on average. As seen earlier, recommendations are simply suggestions or lists of items that users might like, and these recommendations are independent of the consumer (see figure 3.1).

Non-personalized recommender systems mainly use two types of algorithms: Aggregated opinion recommender and Basic product association recommender. Non-personalized product association recommenders can provide useful non-personalized recommendations in a context. The majority of the online shopping websites such as amazon.com or flip-art make use of product association recommenders by providing the people who bought item1 also bought item2 feature. Such recommendations are based on what is present in the user's cart. That is, recommendations may not be necessarily specific to the user but specific to what the user is currently doing (viewing/buying). Using the taxonomy of recommender systems, we can view product association recommender systems are ephemerally personalized recommender systems. The basic idea for these systems is: People who did some X also did Y. The simple computation of this ranking can be: Percentage of X-buyers who also bought Y. Secondly, the Existing System also supports collaborative filtering approach. The collaborative filtering approaches build a model from a user's past behaviour as well as similar decisions made by other users; then use that model to predict items(or ratings for items) that the user may have an interest in. One of the most common examples of collaborative filtering is the fashion service website. Here the user can view the most popular movies which have been rated by other users. The user can rate services based on his/her personal tastes, and then subsequently, the user can receive a list of recommended services for him/her based on the user's taste (which service has been rated what). This feature is extremely beneficial for the users as well as the website because a movie that seems excellent to one person may seem dull for another. This is known as user-based collaborative filtering. It basically tries to find users who are similar to the current user. There are many algorithms to calculate the similarity between the two users in Collaborative Filtering systems. We are going to concentrate on the Pearson Correlation Algorithm. It is the most chosen algorithm to use in Collaborative Filtering systems. Pearson correlation only computes the similarity between the two users who rate the same item. The Pearson Correlation Score is a measure of how well two sets of data fit on a straight line. One interesting aspect of the Pearson Score is that it corrects for grade inflation. That is, if one product has consistently higher scores than another, it will be very important.

C. Explanation of the Existing System Components

The following components of the Existing System are:

a) The Startup Screen

The startup screen is the platform of the system that welcomes the user and also provides the necessary navigation links.

b)Fashion Customer's Registration Details

This component enables the customers to register with the system in order to obtain a unique username and password. Secondly, the system is not open source; hence there is a need for the customer's validation before the usage of the system.

c)Login Platform

This component enables the validation of the Fashion customer after obtaining the unique username and password.

d) Recommended Fashion Products

This component is very important as it recommends varieties of fashion products to customers. Once the client enters this platform, different fashion products such as laces, brocades, ties, senators, etibos, braids, bata shoes, etc., each these components enables the system user to perform an online survey of each preferred online fashion product chosen by the user.

e)Quit System Platform

This platform enables the user to quit the current task and return to the system's homepage.

D. Disadvantages of the Existing System

The following disadvantages of the Existing System include the:

a) unavailability of a Personalized Recommender System Technique that is enabled by Machine Learning. This technique is needed to enable the fashion client to customize the system in order to extract specific and preferred fashion products and services.

b) difficulty in understanding the graphical user interface of the Existing System. This can also generate confusion among the clients that use the system.

c) Login Platform

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- Unavailability of a Personalized Recommender System Technique that is enabled by Machine Learning. This technique is needed to enable the fashion client to customize the system in order to extract specific and preferred fashion products and services.
- Difficulty in understanding the graphical user interface of the Existing System. This can also generate confusion among the clients that use the system.

F. Analysis of the Proposed System

The Proposed System for Machine Learning development in Nigeria's Fashion Industry is an Organized Recommender System. The personalized recommendation takes into consideration users' previous history for rating and predicting items. On the other hand, non-personalized recommendation systems recommend what is popular and relevant to all the users, which can be a list of top-10 items for every new user. One of the most important techniques in Recommender Systems is information filtering. The filtering techniques can be mainly classified into two categories viz. Collaborative Filtering and Content-Based Filtering. A recommender system is a type of web intelligence technique that can make daily information filtering for users. Recommender systems aim to predict users' ratings on items and suggest certain items to users that they are most likely to be interested in. In recent years there has been a lot of interest in developing recommender systems, especially personalized recommender systems, to provide personalized services and increase conversion rates in commerce (see figure 3.2).

Organized Recommender Systems identify every individual's preferences through the analysis of users' behaviour and sometimes also analyzing user and item feature information. Existing recommender system methods typically ignore the correlations between ratings given by a user. However, based on our observation, the correlations can be strong. Furthermore, we also suggested a new personalized recommender system method that takes into account the correlation structure of ratings by a user. General precision matrices are estimated for the ratings of each user and clustered among users by supervised clustering. Moreover, in the proposed model, we utilize user and item feature information, such as the demographic information of users and genres of movies. Individual preferences are estimated and grouped over users and items to check for similar individuals that are close in nature. Computationally, we designed an algorithm applying the convex method and the alternating direction method of multipliers to deal with the non-convexity of the loss function and the fusion type penalty, respectively. The theoretical rate of convergence is investigated for our new method. We also show theoretically that incorporating the correlation structure gives higher asymptotic importance to the estimators compared to ignoring it. Both simulation studies and data indicate that our method outperforms existing competitive recommender system methods. It means a personalization approach for giving learning resources for active learners in the Machine-Learning system. This system recommends some learning resources based on the learner's profile, level of knowledge, and some other learner's activities. Also, the system provides the ability to track learner achievement based on practical tests and exercises and observe the learner's performance in order to supervise and support the learners. Also, a personalized web content recommendation system is proposed to encourage the learners to be pro-actively interested in a Machine learning environment to improve fashion products and services. This system also used web mining techniques such as web content and usage mining. Web content mining was applied to identify important web contents and specifically web usage mining was used to identify e-Learners navigational patterns, which could help to identify interests and weaknesses of Machine Learning, and frequently visited web contents and to predict performances of Machine learning algorithm; then the recommendation system could give an efficient, effective and personalized web contents. Hence, the recommendation systems are one of the best tools to deal with the problem of overload information which will assist users in finding optimal interesting items.

G. Explanation of the Proposed System Components

The following components of the Proposed System are:

a)The Machine Learning Development Platform:

This component enables the user to personalize the system by searching the system in order to filter out the queried fashion product.

b) Recommended Fashion Products:

This component is very important as it recommends varieties of fashion products to customers in order to make an online purchase.

c) Purchase Order Page:

This component enables the system used to create an online purchase order for any of the preferred online fashion products chosen by the user.

H. Advantages of the Proposed System

The following advantages of the Proposed System are:

- awareness creation on available, authentic and current fashion products to potential clients, especially those in Diaspora, as they can easily use their Smartphones and browse the system.
- development of a marketing platform for fashion entrepreneurs to recommend better fashion products and services to their clients.
- provision of a Machine Learning platform that enables fashion clients to customize the system and extract specific and preferred fashion products and services.
- automation without human supervision such as password generation and an improved graphical user interface that enables the client to fully understand the system.

I. Existing System Algorithm

Step 1: Start
Step 2: Declare all variables
Step 3: RD, L, UN, PW, RFP, PO, QS. Where RD is Registration Details, L is login, UN is Username, PW is
Password, RFP is recommended fashion product, PO is Purchase Order and QS is Quit System
Step 4: Initiate L
Step 5:
L = UN + PW
Step 6: Launch RFP
Step 7: Activate PO
Step 8: Proceed to QS
Step 9: Stop

J. Proposed System Algorithm

Step 1: Start
Step 2: Declare all variables
Step 3: RD, L, UN, PW, RFP, PO, QS, MLT, OFS, FPSB Where RD is Registration Details, L is login, UN is
Username, PW is Password, RFP is recommended fashion product, PO is Purchase Order, MLT is Machine
Learning Technique, OFS is Organized Fashion Store, FPSB is Fashion Product Search Bar, and QS is Quit
System
Step 4: Initiate L
Step 5:
L = UN + PW
Step 6: Activate MLT and enter OFS
Step 7: Input details for FPSB
Step 8: Launch RFP
Step 9: Activate PO
Step 10: Enter PO details and make a payment transaction
Step 11: Proceed to QS
Step 12: Stop

IV. RESULTS AND DISCUSSION

A. Choice and Justification of Programming Language used

We implemented the Proposed System design with PHP, JavaScript Programming Language, Hypertext Markup Language, Cascading Style Sheet and MySQL Relational Database Management System. JavaScript is a server-side scripting language that is used for making web pages interactive. It is supported by all major web browsers. This is a programming language that is used by web developers for the creation of content that communicates with databases. Secondly, PHP can be used for the development of web-based applications system function performance; HTML is an acronym for Hypertext Markup Language and is used for structuring web pages. It consists of tags and is also supported by all major web browsers. Cascading Style Sheet (CSS) is web development content that is used for styling and beautifying web pages. MySQL is the world's most popular open-source database. With its proven performance, reliability and ease-of-use, MySQL has become the leading database choice for web-based applications, used by high profile web properties including Facebook, Twitter, YouTube, Yahoo and many more. Oracle drives MySQL innovation, delivering new capabilities to power next-generation web, cloud, mobile and embedded applications.

B. Discussion of Results

Once the Online Fashion System is launched, the user must register with the system in order to obtain a unique username and password for further login to the system (see figure 4.1). We saw the need for fashion clients to key in their details on the system, which will promote mutual benefits for the long term. Product recommendations are a powerful e-Commerce tool the user can leverage to drive significant returns

Fig. 4.1 Fashion Recommender System: Startup Page

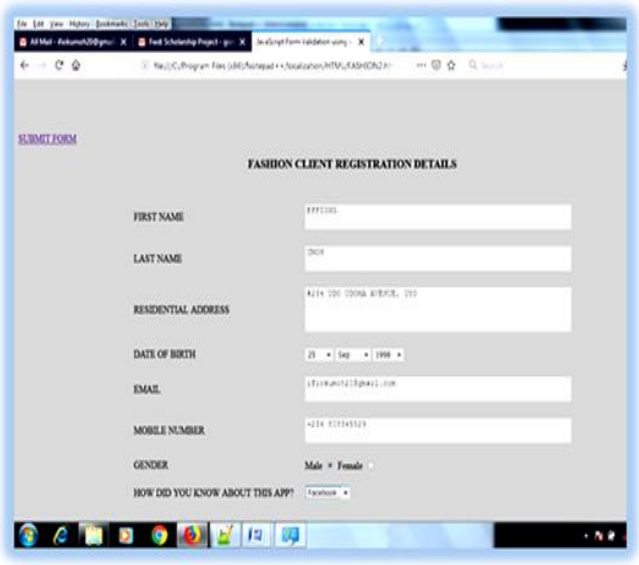

Fig. 4.2 Fashion Recommender System: Client Registration Form

Fig. 4.3 Login Page

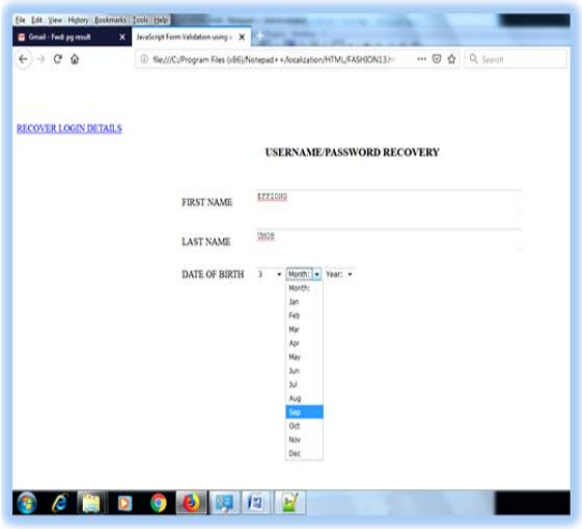

Fig. 4.4 Password Recovery Page

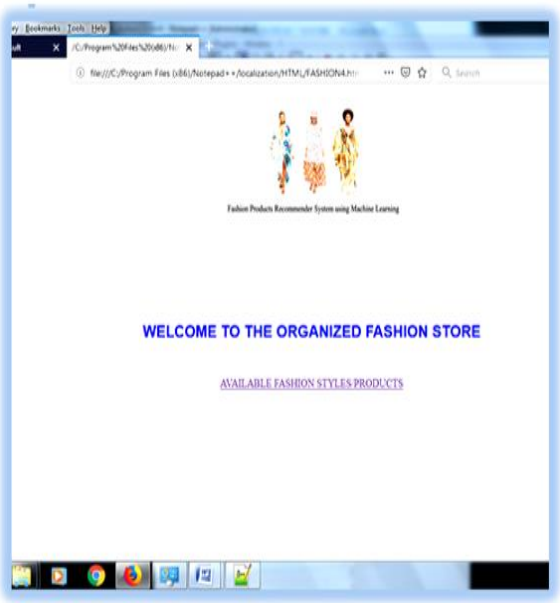

Fig. 4.5 Fashion Recommender System; Fashion Store Welcome Page

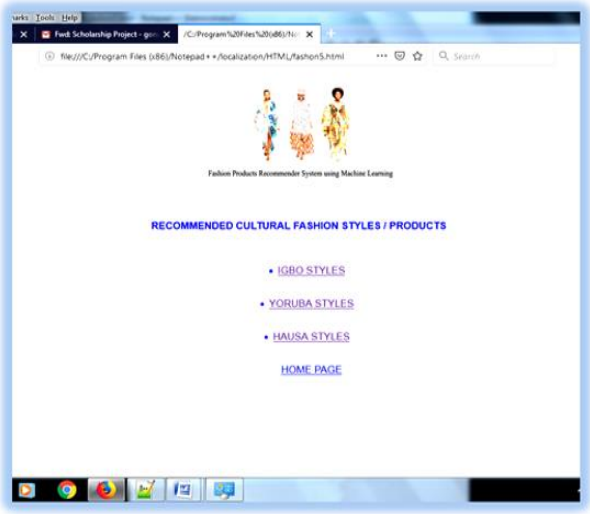

Fig. 4.6 Fashion Recommender System: Recommended Fashion Styles/Products

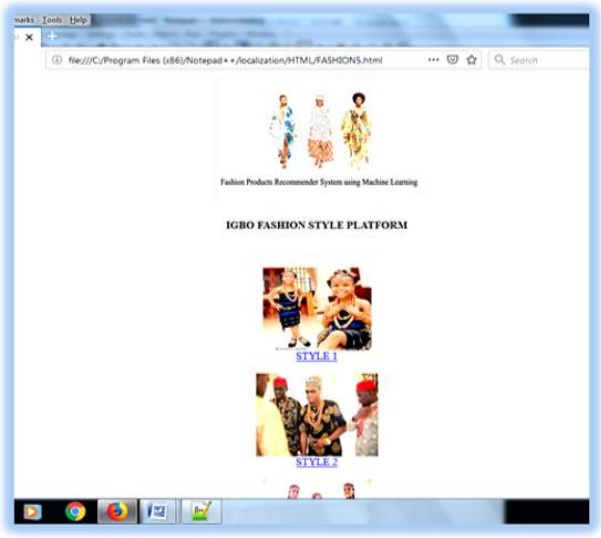

Fig. 4.7 Igbo Fashion Style Platform

Fig. 4.8 Igbo Style Purchase Order

Does it encourage users to spend more time on a site and engage with more products, but it also fosters a better user experience. Some of the biggest names in tech have differentiated themselves in the market thanks to their sophisticated product recommendation algorithms. It is the recommender system that is considered one of the most powerful tools in the present digital world. Explanations are usually provided by it to their recommendations so that web users are helped to find its products, people and also their friends who are missing in social communities.

In the field of recommender systems, there are various methods and approaches which have been implemented. There are two approaches that are most widely used. They are content-based and collaborative approaches. These personalized approaches should be studied so that the best recommendations are provided to the end-users. Originally, we defined Recommender systems as ones where ‘‘recommendations are provided by people as inputs, which are then aggregated and directed to appropriate recipients by the system’’. The clear main purpose of the current recommender systems is to guide the user to useful/interesting objects. Due to this, evaluation of recommender systems shows to what extent this goal has been achieved. Explanations of its recommendations are usually provided by the Recommender system so that users are helped better to choose products, activities or even friends. It is the task of recommender systems to turn data on users and their preferences into predictions of possible future likes and interests of the users. When an explanation is received by a user, a recommendation can be accepted more easily since transparency is provided by the system to its recommendations (which follows most recommender algorithms). The Human Style, Feature Style and Item Style approaches are followed by the most traditional approaches. Even this simple approach can be realized in various ways. Figure 4.8 shows the registration form for the fashion client. The form involves the following fields such as the name of the client, the phone number of the client, the residential address of the client, email, gender etc. After submitting the field form, the system provides the user with a unique username and password for proper login to the system, as illustrated in figure 4.3. From Figure 4.3, one approach to the design of recommender systems that has wide use in Fashion is collaborative filtering. Collaborative filtering methods are based on collecting and analyzing a large amount of information on users’ behaviours, activities or preferences and predicting what users will like based on their similarity to other users. A key advantage of the collaborative filtering approach is that it does not rely on analyzable machine content, and therefore it is capable of accurately recommending complex items such as movies without requiring an understanding of the item itself. Many algorithms have been used in measuring user similarity or item similarity in recommender systems. Recommender systems are one of the most successful and widespread applications of machine learning technologies in business.

Online fashion store knows about the system user past book purchases and the ratings that the system user gave them. Based on that historical information, it tries to

predict how the system user will rate every product in its library. Using these predicted ratings, the fashion store will show the system using the products that it thinks the system user enjoy the most. These are also the books that the system user is most likely to purchase. Recommendation systems enhance the user experience while providing more exposure to a larger part. Many e-commerce and retail companies are leveraging the power of data and boosting sales by implementing recommender systems on their websites. In short, these systems aim to predict users' interests and recommend items that quite likely are interesting for them. Data required for recommender systems stems from explicit user ratings after ordering a product, from implicit search engine queries and purchase histories, or from other knowledge about the users/items themselves.

The system also supports an information filtering technology, commonly used on e-commerce Web sites that uses collaborative filtering to present information on items and products that are likely to be of interest to the reader. In presenting the recommendations, the recommender system will use details of the registered user's profile and opinions and habits of their whole community of users and compare the information to reference characteristics to present the recommendations. Companies using recommender systems focus on increasing sales as a result of very personalized offers and an enhanced customer experience. Recommendations typically speed up searches and make it easier for users to access the content they're interested in and surprise them with offers they would have never searched for.

When an explanation is received by a user, a recommendation can be accepted more easily since transparency is provided by the system to its recommendations (which follows most recommender algorithms).

C. Performance Evaluation

Assessment Variables

- E = Excellent = 5.0
- G = Good = 4.0
- F = Fair = 3.0
- P = Poor = 2.0
- VP = Very poor = 1.0

Table 1. Peis et al. algorithm on Semantic Recommender Systems

SN	PERFORMANCE AREA	VARIABLE	PERFORMANCE POINT
1	Datasets Used = Varchar, Numeric and Date	E	5.0
2	System's Database Storage Capacity = 30 GB	F	3.0
3.	Processing Speed of the System = 10 Kilobytes per second	P	2.0
4.	Quick Response time of the system = 12 minutes, 30 seconds	VP	1.0
5.	Open-Source Ability = None (Offline)	VP	1.0
6.	GUI friendliness	F	3.0
	TOTAL PERFORMANCE POINTS		15.0

Table 2. Richardson algorithm on Enhanced Machine Learning Algorithm Technique

SN	PERFORMANCE AREA	VARIABLE	PERFORMANCE POINT
1	Datasets Used = OLE Objects	E	5.0
2	System's Database Storage Capacity = 18.5GB	G	4.0
3.	Processing Speed of the System = 1.7 Kilobytes per second	VP	1.0
4.	Quick Response time of the system = 40 minutes	VP	1.0
5.	Open-Source Ability = Enabled (Online)	G	4.0
6.	GUI friendliness	F	3.0
	TOTAL PERFORMANCE POINT		18.0

Table 3. Proposed System algorithm on developing Machine Learning for Nigeria Fashion using Organized Recommender System

SN	PERFORMANCE AREA	VARIABLE	PERFORMANCE POINT
1	Datasets Used = Varchar, Numeric and Date	E	5.0
2	System's Database Storage Capacity = 200 GB (MySQL-Based)	E	5.0
3.	Processing Speed of the System = 200 Kilobytes per second	E	1.0
4.	Quick Response time of the system = 10 seconds	G	4.0
5.	Open-Source Ability = Enabled (Online/Offline)	E	5.0
6.	GUI friendliness	E	5.0
	TOTAL PERFORMANCE POINT		25.0

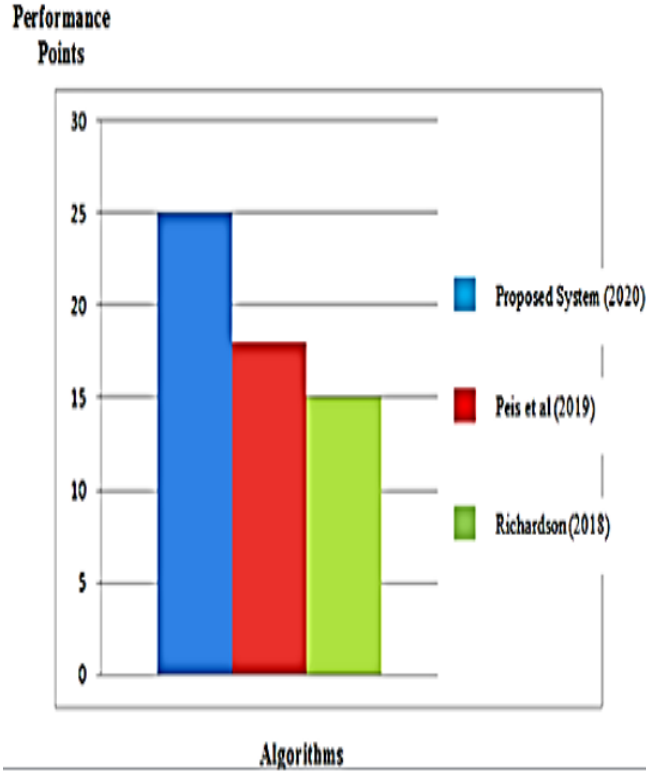

Fig. 4.9 Performance Evaluation Chart

Table 4. Summary of Algorithm Performance

ALGORITHM	RESEARCH AREA AND DEPLOYMENT	GENERAL PERFORMANCE POINT
Peis et al (2019)	Semantic Recommender Systems	15
Richardson (2018)	Enhanced Machine Learning Algorithm Technique	18
Proposed System (2020)	Machine Learning for Nigerian Fashion using an Organized Recommender System	25

V. CONCLUSION

In this study, we have developed an Organized Recommender System for Nigerian Fashion using Machine Learning. Furthermore, Machine Learning will continue to play a big role in Recommender Systems, especially in the fashion industry of Nigeria. Recommender systems play an important role in such highly rated Internet sites as Amazon.com, YouTube, Netflix, Yahoo, Trip-advisor, Last. fm, and Midi. Moreover, many media companies are now developing and deploying recommender systems as part of the services they provide to their subscribers. The benefit of this study encompasses the role of Machine Learning in improving the Existing Non-Personalized Recommender System of Nigeria's Fashion Industry. We, therefore, recommend this study to stakeholders in the Fashion Industry of Nigeria. Secondly, we also crave the indulgence of the government to enable an ICT-based approach in the Fashion business.

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