IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

SMART FASHION RECOMMENDATION SYSTEM USING CNN RES-NET 50

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Abstract : A fashion recommender system is a methodology that is based on Artificial intelligence usually associated with machine learning that suggests clothing items to users based on their preferences and previous shopping behavior. A recommender is used to predict the preference and ratings of the user for an item based on the profile and the search history of the user. It is a powerful technique in terms of business because Google, Facebook and e-commerce websites use recommender systems to expand their business. There are mainly two types of recommender system that exists. First, Content-based filtering is based on the profile of the user and the featurization of items, and Second, Collaborative filtering involves the user's past behavior and the user's previous utility with the different items. Our proposed system aims to develop a fashion recommender system using a pre-trained Res-Net 50 CNN model. We strive to build a fashion recommender system that is programmed to recommend the predicted clothing images or items from a large set of collected images. Our proposed system is implemented using collaborative filtering techniques and also considers the privacy and security concerns related to collecting and storing user data. Our proposed system is expected to provide accurate and diverse recommendations to users, thereby assisting them in their clothing choices.

IndexTerms - Res-Net 50, CNN (Convolutional Neural Network), Collaborative Filtering, Privacy, AI, Image Classification.

I. INTRODUCTION

Machine learning is a subfield of Artificial Intelligence that involves the development of algorithms and statistical models that can learn from data and make predictions without the need for explicit instructions. One of the primary applications of machine learning is in building recommendation systems, which use big data and user behavior to provide personalized recommendations to users.

There are two main types of recommendation systems: Content-Based Filtering and Collaborative Filtering. Content-Based Filtering relies on user profiles and product descriptions to generate recommendations, while Collaborative Filtering looks for patterns in user behavior to generate recommendations. A hybrid filtering approach that combines both methods can create a more diverse and personalized set of recommendations. Generally, there are two types of recommended system. Namely, Content Based Filtering that is based on the profile of the user and Collaborative Recommended system aggregates ratings, recognize similarity between the users on the basis of the ratings and recommend new item to the user.

AI web scraping increases the speedof data extraction, and is able to classify data in a matter of hours, which can take weeks if collected manually. Web Scrapingis the act of programmatically retrieving data from the internet. Web Scraping in its most basic form lacks any sort of generalizing capabilities, when a website isaltered, even slightly, the scraper breaks. The basic principles of Web Scraping are tocreate a program that in an automated fashion retrieves unstructured data from a website and adds structure to it.

From the last few years, with the increase of online platform such as Amazon, Netflix and other E-commerce website, Recommendation system plays a major role in our day-to-day life. Switching from offline shopping to online shopping, recommended system are inevitable in our virtual life.

The three types of recommender systems are:

- Content Based Filtering technique depends on the description of the product and user profile. Comparatively, this method is superior for the situation where there is known data of the various users such as name, age, location and description but not the user. Content based recommendation system learns the likes and dislikes of a usedbased on featurization. This technique involves analysing the content of items to generate recommendations
- Collaborative filtering: This technique involves finding patterns in user behavior and generating recommendations based on those patterns. It does not require access to thecontent of the items being recommended. One of the problems thatthese systems

face is the cold start problem in which when there is a new user/item in the system with no background so no neighbour can be found for user/item.

- Hybrid filtering: This technique combines collaborative and content-based filtering to generate recommendations. By using a combination of techniques, you can create a more personalized and diverse set of recommendations without relyingsolely on the content of the items.

II. RELATED WORK

In this study we develop a clothrecommendation system with only a single photo. We show that how our system recommends a cloth option without using previous shopping history. In this paper Convolutional Neural Network is used for prediction and Feed Forward Neural Network for Recommendation. In this study there is an accuracy on colour prediction, 86% accuracy on gender and clothes pattern predictions and 75% accuracy on cloth recommendation. As another result after the each training phase there isan accuracy of 80% using proposed inception based Deep CNN architecture. They also use transfer learning method on CNN for classification [1].

\In this paper, Convolutional Neural Network(CNN) -based fashion recommendation is developed, which automatically recommended the matching clothes to the user in general, feature vector of fashion item coneys style and category.
Experimental result show that the proposed method predicts thefashion product liked by the user, which is a performance measure of a stylish match. As a simple CNN layer, it is expected that the proposed SFE layer Is compatible with all popular CNN architecture [2]. The vast amountof information and users on the internet make itchallenging to efficiently and accurately identify the user's intent. This issue results in an overwhelming abundance of information, which is commonly referred to as information overload. Consequently, this problem leads to alow utilization of information [3].
A stacked CNN was utilized to recommendsimilar images as a means of evaluating the effectiveness of deep learning for style recoveryand its applicability in fashion decision- making. This final test aimed to determine the level of development achieved in the field of deep learning for style recovery [5].

III. SYSTEM DESIGN

3.1 System Architecture

The proposed system is dividedinto four parts:

- Image pre-processing
- Recommendation Engine
- Web scraping
- Web application.

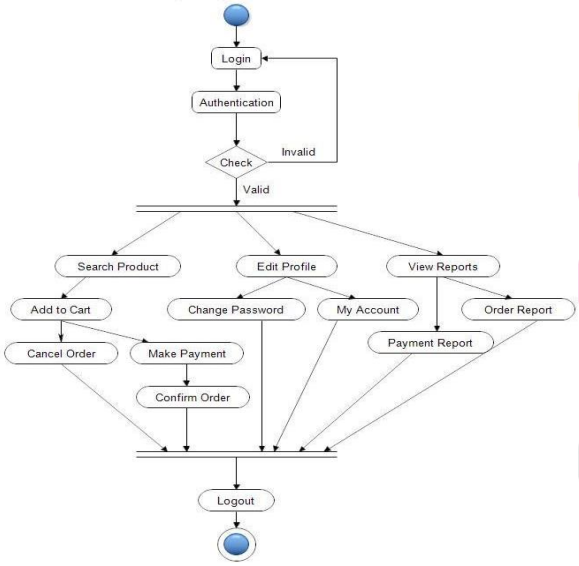

Fig 3.1 User Interaction diagram

Steps in the User Interaction

1. The user logs in to the fashion recommendation system.

2. The system prompts the user to select their preferences, such as clothing style, color, and price range.

3. Based on the user's preferences, the system recommends items from its database. The user selects an item of interest and views its details, such as size, price, and availability.

4. The user adds the item to their cart and proceeds to checkout or continues browsing. If the user decides to checkout, the system prompts the user to enter their shipping and payment information.

5. The user submits their order and the system confirms the purchase.

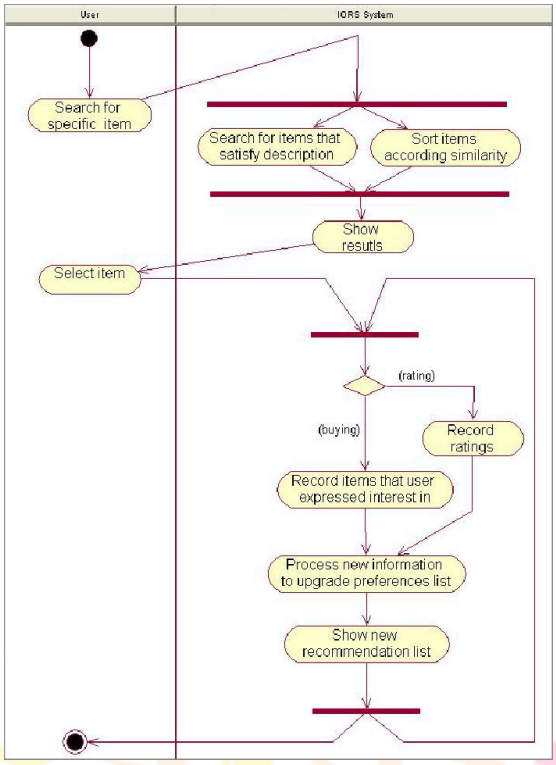

Fig 3.2 Recommendation EngineActivity Diagram.

A recommendation engine is a system that uses data on user behaviour and preferencesto suggest products, services, or content that may be of interest to them. The procedure for building a recommendation engine involves several key steps. The firststep is to collect and pre-process data on user behaviour and preferences. This data must be cleaned and normalized to make itsuitable for analysis. Next, data analysis is conducted to identify patterns and relationships. Various techniques such as collaborative filtering, content-basedfiltering, and matrix factorization can be used. The third step is to train the recommendation model using the analyzeddata. Machine learning algorithms like neural networks, decision trees are used.

IV. PROPOSED SYSTEM

4.1 Image Pre-Processing

Image processing is a field that aims to improve the quality of images and extract useful information from them. It has numerousapplications in various fields such as computervision, medical imaging, meteorology, astronomy, and remote sensing. To performimage processing, different tools can be used, including image editing software like Adobe Photoshop and GIMP, programming languagessuch as MATLAB and Python with associated libraries like OpenCV and NumPy, image processing libraries like SciPy and ImageJ, hardware devices like digital cameras and scanners, and image processing algorithms likeedge detection, segmentation, feature extraction, and object recognition.

The working of recommendation engine is asfollows:

1. **Data Collection:**

The first and most important step for creatinga recommendation engine is to gather data. There are two main types of data to be collected:

- **Implicit Data:** This includes information collected from activities such as web search history, clicks, cart events, search log, and order history.
- **Explicit Data:** This is informationgathered from customer input, such as reviews and ratings, likes and dislikes, andproduct comments**.**

2. **Data storage:**

Once the data is gathered, it needs to be stored. Over time, the amount of data will grow to be vast. This means ample, scalable storage must be available. Depending on the type ofdata you collect, different types of storage are available.

3. **Data analysis:**

To be used, the data must then be drilled down into and analyzed. There are several different ways in which youcan analyze data. This include:

Real-time analysis: Data is processed as it is created.

Batch analysis: Data is processed periodically.

Near-real-time analysis: Data is processed in minutes instead ofseconds when you don't need it immediately.

4. **Data filtering:**

The final step is filtering. Different matrixes or mathematical rules and formulas are applied to the data depending on whether collaborative, content-based, or hybrid modelrecommendation filtering is being used. The outcome of this filtering is the recommendations.

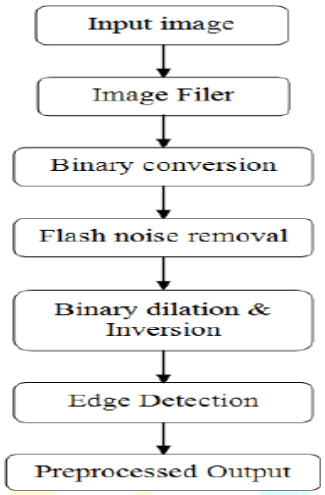

Fig 4.1 Image Pre-Processing

4.2 Dataset Collection

The utilized data set used in the gender detection, feature extraction and suggestion is Fashion Product Images (Small) from Kaggle site. This database contains 44,000 images of different types of products. 50% of the images in this database are related to men's products, 42% belongs to women and the remaining 8% belongs to Unisex, Girls, and Boys. 48% of images are related to Apparel, 52% belong to Accessories and the remaining 26% belong to other categories. In this paper, we have only used images related to Apparel. The total number of categories in this database is 143.

Article type	Counts
Waistcoat	15
Stocking	32
Skirts	128
Jackets	258
Track pants	304
Dresses	464
Trousers	530
Shorts	547
Jeans	608
Tops	1761
Shirts	3215
T-Shirts	7060
Pants	466

4.3 Recommendation Engine

A recommendation engine is a tool that analyses user behavior and suggests items that a user may like, based on their past interactionsand preferences. There are several benefits to using a recommendation engine. Firstly, recommendation engines provide personalized suggestions, leading to increased user engagement and retention. Secondly, they can help businesses increase their conversion rates by suggesting products or services that are mostlikely to appeal to users. Thirdly, recommendation engines can help reduce decision fatigue by presenting users with a limited number of options. Fourthly, they can enhance the overall customer experience byproviding a personalized and seamless experience. In summary, recommendation engines are a powerful tool for businesses and platforms to provide a more personalized and engaging experience for their users, leading to increased user satisfaction and loyalty.

A recommendation engine is a type of data filtering tool using machine learning algorithmsto recommend the most relevant items to aparticular user or customer.

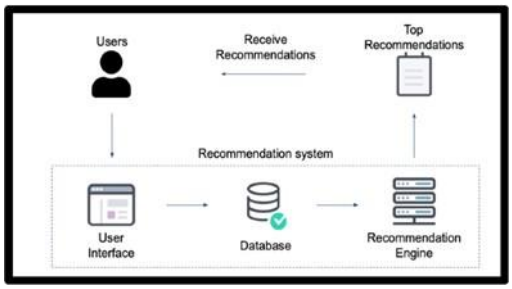

Fig.4.2: Recommendation Engine

4.4 Web Scraping

Web scraping is a technique that allowsusers to extract and process a vast amount of data from the internet quickly. It is a valuable tool for gathering data, and Pythonis a popular language for performing web scraping due to its vast collection of libraries and tools. The data that is scrapedcan be transformed into a useful format, enabling it to be analysed.

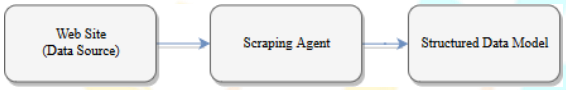

Fig.4.3. Web Scraping workflow.

4.5 Web Application

Web applications are software programs that operate on web servers and can be accessed using a web browser. Theyare typically used to present data to users, which is retrieved from a database. By functioning as an interface between the userand the database, web applications enable the user to interact with data in an intuitiveand easy-to-use manner. Web applications can also facilitate the collection and storage of user input in a database.

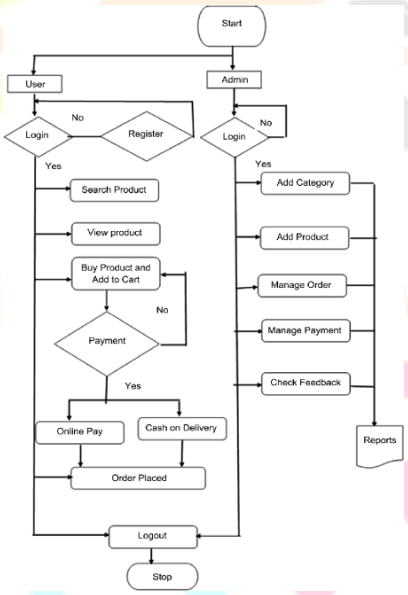

Fig.4.4 Web Application workflow.

V. RESULT

This web application enables users to find products by uploading images. It offers a user-friendly interface that helps users findvisually appealing products by simplyclicking and uploading an image of the product. The model then presents products that are similar to the uploaded image. If theuser desires, they can purchase the productsfrom the respective e-commerce websites.

VI. CONCLUSION

Product recommendation engines leverage machine learning, manual curation, and specific algorithms to provide customers with relevant product suggestions, improving their overall user experience. Such engines enable marketers to offer real- time product recommendations, which can be populated onto various channels such as websites, apps, call centers, or emails. By using specialized algorithms and filters, these engines can support even large product catalogs while intelligently selecting which algorithm and filter to apply for a given individual shopper.

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