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Fashion Recommendation System Using CNN

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ABSTRACT: The fashion industry has been relatively slow on the uptake when it comes to robust recommendation systems, but for good reason. The main objective of this research work is preparing a fashion recommendation system that will suggest people similar clothing items from the dataset using reverse image search. Backbone of this recommendation system is the CNN (convolution neural network) model that will compare the images based on characteristics that it has already developed during the training phase. The data for this project work has been downloaded from Kaggle and it consist of 44,444 images of clothing items, accessories and foot wear. This model will be capable of providing higher degree of accuracy compared to already existing literature work. Authors have checked their result with the existing approaches and found satisfactory.

KEYWORDS: Fashion Recommendation System, Reverse Image Search, Transfer Learning, Convolution Neural Network, Deep Learning.

I. INTRODUCTION

Fashion recommendation system is well built system that is capable of predicting the future preferable items (cloths, accessories, foot wear etc.) from a large dataset. It suggests items either by taking preference from the end users or by selecting items liked by majority users. The toughest part in creating a Fashion Recommendation System is that it is a very dynamic industry. Fashion keeps on changing every now and then. It changes with seasons, festivals, pandemic conditions like corona virus and many more. Thus, the dynamic nature of this fashion industry becomes the main challenge for building a fashion recommendation system. Businesses such as Spotify and Netflix have been trailblazers in the recommendation systems world. Even more than eighty percent of the television shows that people watch on OTT platform like Netflix are discovered through the platform's recommendation system and Discover Weekly playlists boasted 40 million unique users just a year after it launched in July 2015.

The Fashion industry has been relatively slow in the development of a strong recommendation systems, but for good reason. In this research topic, Fashion Recommendation System Using CNN, authors have designed a recommendation system based on CNN model that suggests similar clothing items from the dataset using reverse image search. This topic has been selected by the authors as they want to implement an artificial intelligence technology, which is a cutting-edge technology, in the domain of fashion industry. This recommendation system can easily be integrated with the e-commerce websites of top fashion brands like Nayaka, Mynta, Urbanic etc.

The combination of AI and ML has made this possible. It has efficient algorithms like Artificial Neural Network, Convolution Neural Network, LSTM, etc. The backbone of this project is CNN (Convolution Neural Network) and transfer Learning Technique that will compare the images based on characteristics that it has already developed during the training phase. Convolution Neural Networks (CNN) is a type of Neural Network which are primarily used to deal with problems based on image/video data. This technology uses Jupyter Notebook of Anaconda Navigator as Python IDE. This recommendation system will work in following manner-

- The end user will upload an image on the website.
- The model will figure out the key feature of the image using CNN.
- Finally, system will display 5 most similar images from the dataset by using K-Nearest-Neighbour.

II. RELATED WORK

Several people have given proposals in the market on Cancer Prediction models. Some of these proposed models are mentioned below-

An insightful customized Fashion Recommendation System by Qingqing Tu, LeDong [1], an exploration that gives another space proposal framework and interactive media mining. This model is hard to develop as to find the information of a gathering of transporters with their own decisions accessible. This model depends on various datasets distributed with an extremely low exactness and high measure of mistakes. Kai Xin Thia [2], have proposed

an examination work on Building a Personalized Real-Time Fashion Collection Recommender where they have taken picture dataset from UCI store and have anticipated the most seen designs. This examination work contains arrangement strategies of AI and is an overall report on the execution of models utilizing Logistic Regression, Support Vector Machine (SVM) and K Nearest Neighbor (KNN). The best precision is given by SVM model with 92% exactness. HyunwooHwangboYang, SokKimKyung, JinCha [3], have arranged an examination paper on Recommendation framework advancement for design retail e-commerce. In this exploration work, was done to assembled a real-time style recommender for a huge Korean company. This research paper is a rundown of all the present investigates being completed utilizing the exceptionally productive information mining strategies which will adjust and assess the outcomes. Si Liu, Luoqi Liu Shuicheng Yan [4], have done an examination paper on Magic Mirror: An Intelligent Fashion Recommendation System where the creators have shown how helpful and proficient AI calculations can be, with regards to design expectation. They directed a huge overview affecting large number of individuals from around the world and reviewed pretty much every one of the sorts of AI strategies which are followed, the kinds of datasets which are utilized and coordinated and the consequences of the multitude of techniques utilized in examining example and proposal. Subsequent to studying the very best outcomes and the current works, it is plainly shown that AI calculations can be followed to work on the proficiency of models up to 15-20% for anticipating design sense. Lin Yu-Chu, YuusukeKawakita, Etsuko Suzuki, Haruhisa Ichikawa [5], have accomplished an examination work on Personalized Clothing-Recommendation System Based on a Modified Bayesian Network involving information mining strategies in which the creators have used AI calculation Naïve Bayes to foster a model to anticipate comparable pictures utilizing a tremendous measure of dataset. The dataset comprises of 683 traits. The outcomes projected that the model of Naive Bayes is the best model indicator with 97.36% exactness on the dataset utilized.

III. PROPOSED ALGORITHM

Neural Networks very first proposed in 1944, however, it could not receive much importance for around the last 70 years. The rise of Artificial Intelligence has given new life into them. These days Neural Network have been given a new name, Deep Learning. Today some of the world's leading AI systems are based on Deep Learning. Neural Networks comprise mainly 3 layers: Input layer, Hidden layer and, Output layer. Each of these layers is made of several nodes and each of these nodes connects to another and a weight and bias value is attached to it. The data outputted by the node is then, in turn, passed into an activation function which decides whether the values will be passed to the next layer or not. Convolution Neural Networks (CNN) is a type of Neural Network which are primarily used to deal with problems based on image/video data. These networks require relatively very little pre-processing if compared to other image classification algorithms, this indicates that after enough time the network is able to adjust its filter parameters to able identify different objects or patterns. CNNs are composed of mainly 3 types of layers: Convolution layer, Pooling layer, Fully Connected layer. Some of CNN's most popular architectures are AlexNet, VGGNet, GoogLeNet, ResNet, MobileNet, and Dense Net.

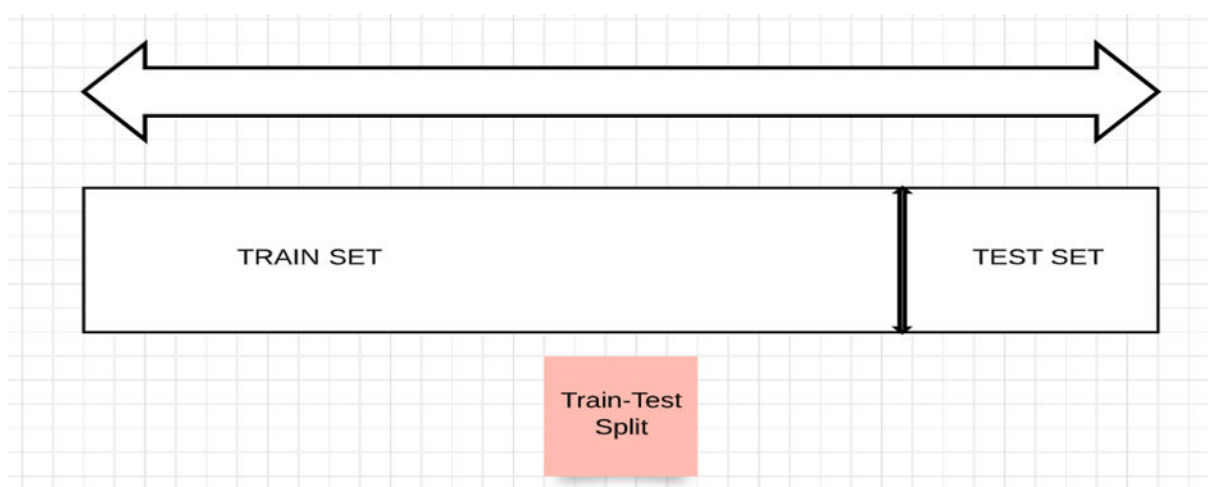


Figure-1: Training And Testing of Data

The problem statement is to develop a model to generate fashion recommendation according to clothing image uploaded by the end user. To rectify this problem, we will be using a combination of Convolution Neural Networks and K-Nearest Neighbor algorithm. We have used the Neural Network to generate a feature vector which will represent each item in the database in a vector space, then whenever end-user uploads an image, we will then generate a feature vector for that image and compare it with the products already present in the database. Then we can return a number of products whose vector representation matches with that of the uploaded image. This approach will help us to generate recommendation results in near real time.

IV. IMPLEMENTATION

With the help of TensorFlow and Keras framework we have leveraged the power of transfer learning. We have loaded the ResNet50 model which has been pre-trained on the ImageNet dataset which has over 14 million images. This is a state-of-the-art model which provides high accuracy. We have used this model to generate a feature vector of length 2048 for each image present in our dataset. We have used stream lit to develop a web application, which provides a UI for the user to upload their images and see generated recommendations. Whenever an image is uploaded, we use the ReNet50 model to generate a vector representation for that image then we use the K-Nearest Neighbor algorithm to find 5 products from our database whose vector representation is closest to the uploaded image. Then we display those 5 images as recommendation results to the end-user.

V. RESULTS

From the below images it is visible that the model is recommending similar products for the uploaded image. Figure 2 is for the uploaded image and Figure 3 is for their respective Recommendations made by our model.

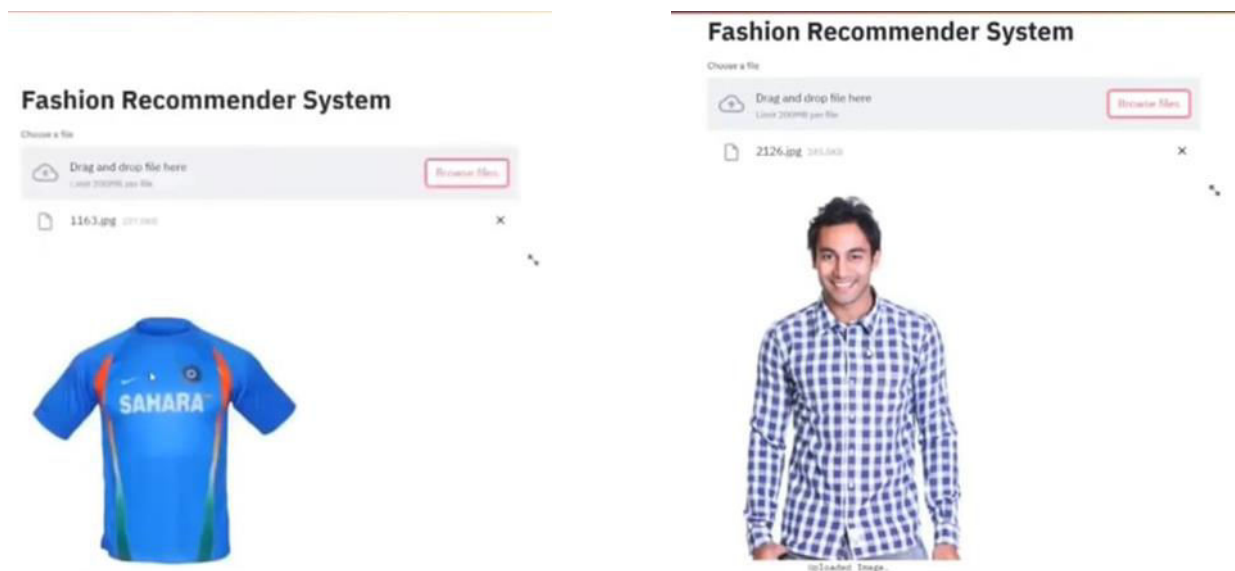


Figure-2: Input for Trained Data Set



Figure-3: Recommended Output

VI. CONCLUSION

Today, Artificial Intelligence is becoming a booming topic in the IT sector. Algorithms and models are vastly in use to solve real time problems from this domain. Highly advance and efficient algorithms of Deep learning make the system learn on its own after which it becomes capable of predicting the outcomes. It is also widely used in Data warehousing. For large datasets machine learning model works less efficiently. That is when deep learning models and algorithm comes into picture. CNN model in deep learning is very efficient in handling multimedia dataset. CNN works efficiently with the multimedia data set and provides similar recommendations.

This kind of recommendation system can be integrated with e-commerce platforms to provide a better user experience like Myntra, lenskart etc. with the help of these user can perform reserve image search. In future we can also integrate it with features where it will keep collecting data that client searches for and then implement machine learning algorithms on it and provide a trending search column to the new users.

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