Image Based Product Recommendation

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Abstract: Over the last few years, virtual shopping has become an immense rate worldwide. Virtual shopping mainly depends on a search engine and is dependent on a knowledge base and use keyword matching as their search strategy to find the most likely product what consumers want to buy. However this is a time-consuming method, so in this paper, we have proposed an image-based product for online shopping is a web-based application where A user can provide to select, click an image, and a similar image-based product will be presented to the user. To get an exact result system uses a Dimension Reduction Technique, Cosine similarity to get an appropriate result to the user. The main objective of this system is to give the exact result that the user wants.

1.Introduction

Online retail websites are rapidly evolving and their popularity is exponentially growing. Nowadays there is an increase of unprecedented usage of mobile phones . In 2020 over 60% of smartphones website visits worldwide. As there is an increase in the adoption of mobile devices, especially in regions that lack other digital infrastructure, mobile integration will continue to shape the shopping experience to a new level in the future. So it will be easy to search what product users want and just have to click the picture with the help of an Image-Based product Recommendation. Due to the large number of companies moving to online businesses the product is exponentially increasing . On the one hand business growth is increasing , but on the other hand, it creates a problem for the user to accurately and optimally buy the desired item.

2 .Related Work

In 2017[1], Vinayak Arannil proposed a Research paper that Recommended a system using image similarity that focuses to get a similar image of what users want on the recommendation systems. which are implemented using traditional machine learning algorithms like matrix factorization, collaborative filtering. Algorithms like 'Nearest Neighbour' provide an easy way to implement recommendations based on image similarity.

In 2018[2], ROBERTO REIF proposed a Research paper that focuses on product recommendation systems based on image similarity. which used an unsupervised learning technique to extract 20 shoe clusters. This recommendation system was performed using only the images of the product. It is possible to also include the product metadata such as brand, gender, size, dimensions, etc. for each shoe, and use it to improve the recommendations.

In 2019[2], FARHAN ULLAH, BOFENG ZHANG, and REHAN ULLAH KHAN proposed a Research paper that basically focuses on image-based product recommendation using the RF Approach. Where users can select the image to find a similar product.In this paper, the new system has been developed image-based service Recommendation System using the RF approach.The proposed approach creates a model of products using Machine Learning (ML).

3. Proposed system

A best recommendation system will always boost your sales. Image-based product recommendation system. Is a system that basically uses input as an image of a certain product and compares it with the dataset for a recommendation of a product based on the image. The system will use the K-means algorithm for clustering and dimensionality reduction technique to reduce dimensions of higher-dimensional images. The basic concept here is to take an image and transform it using the transformations available in the TensorFlow, Each image is converted into a tensor (vector), a tensor in PyTorch is the same as that of an array, there can be an n-dimensional array. Our image is transformed into 256X256 tensor(array).This tensor is then passed to the model to evaluate and the out output obtained is 1000 element long tensor, each value representing the affinity of the current image towards 1000 available image classes. We have tried out some research using some of the good existing models and got amazing results for image recommended tasks. We have explored transfer learning techniques along with distance calculations of feature vectors and obtained perfect results for multiple classes.

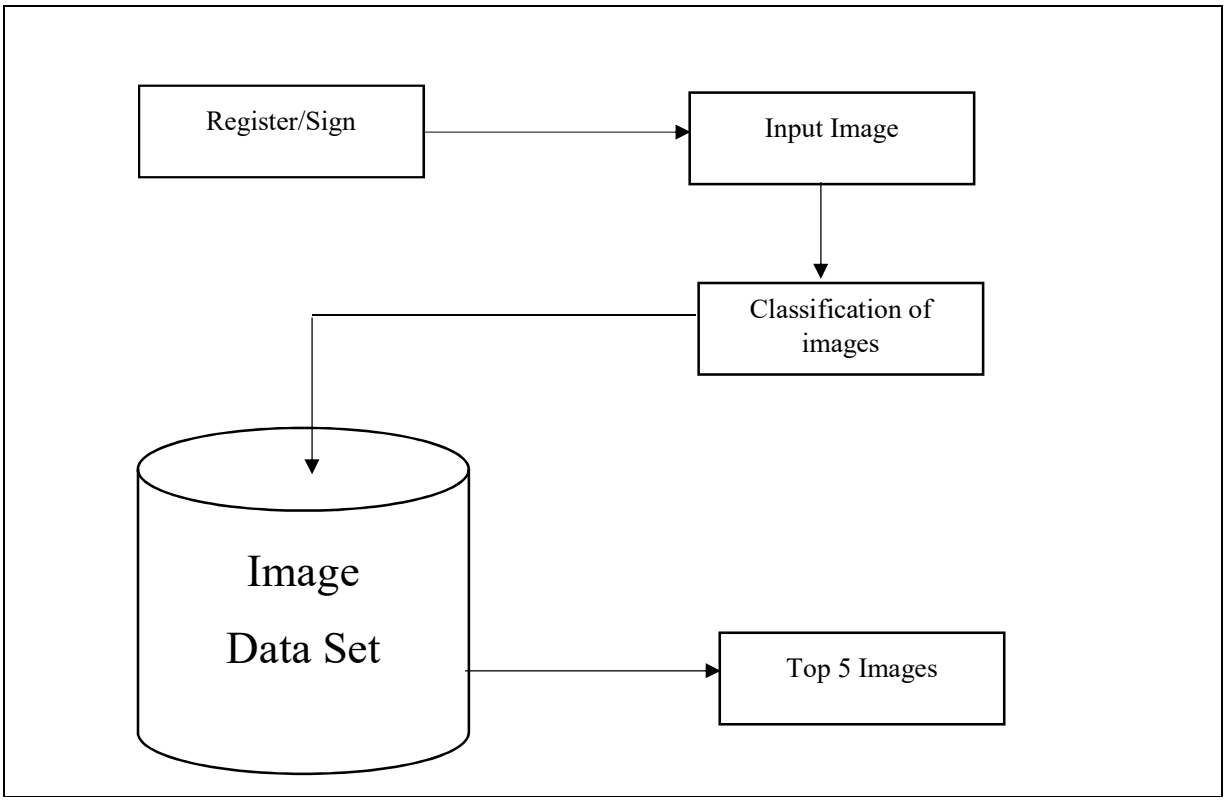

Fig3.1:-Proposed System architecture of Image based product recommendation

This model uses machine learning algorithms namely Alexnet of Deep convolution network (CNN).
The Prediction of the image is as follows

3.1 Alexnet (CNN):-

AlexNet is the name of a convolutional neural network that has a large impact on the field of machine learning, specifically in the application of deep learning to machine vision.It famously won the 2012 ImageNet LSVRC-2012 competition by a large margin (15.3% VS 26.2% (second place) error rates). The network had a very similar architecture as LeNet by Yann LeCun et al but was deeper, with more filters per layer, and with stacked convolutional layers. It consisted of 11×11, 5×5,3×3, convolutions, max pooling, dropout, data augmentation, ReLU activations, SGD with momentum. It attached ReLU activations after every convolutional and fully connected layer. AlexNet was trained for 6 days simultaneously on two Nvidia Geforce GTX 580 GPUs which is the reason why their network is split into two pipelines.

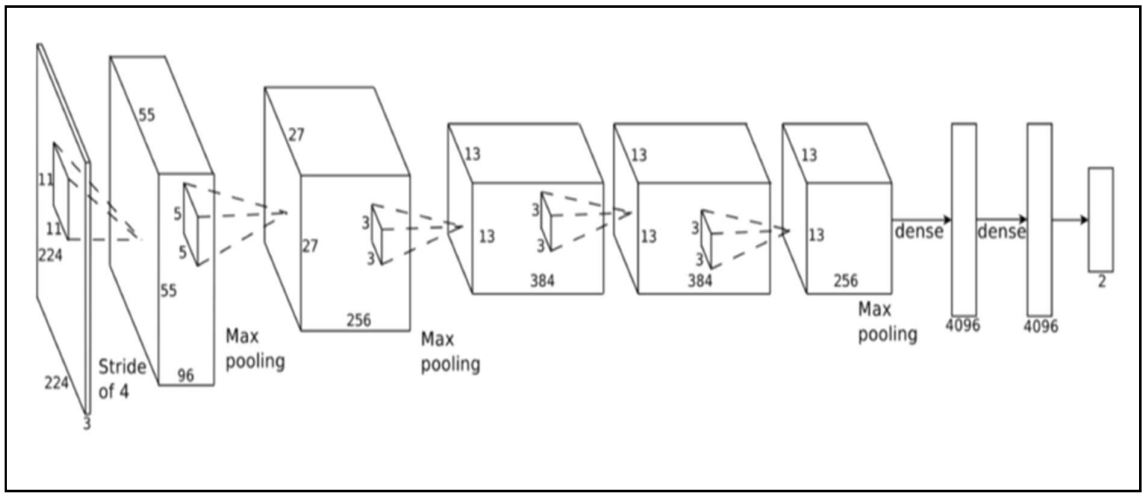

Fig3.2Working model of Alexnet CNN algorithm

Training:-

AlexNet takes 90 epochs which were trained for 6 days simultaneously on two Nvidia Geforce GTX 580 GPUs which is the reason for why their network is split into two pipelines. SGD with learning rate 0.01, momentum 0.9 and weight decay 0.0005 is used. Learning rate is divided by 10 once the accuracy plateaus. The learning rate is decreased 3 times during the training process.

$$v_{i+1} := 0.9 \cdot v_i - 0.0005 \cdot \epsilon \cdot w_i - \epsilon \cdot \left\langle \frac{\partial L}{\partial w}\Big|_{w_i} \right\rangle_{D_i}$$

$$w_{i+1} := w_i + v_{i+1}$$

4.Experimental Result

The raw images to need pre-processing before being used as inputs of the classification models. An original image is first resized into the standard input size of either the VGG model (224 × 224) or the AlexNet model (227 × 227). Then it is demeaned in each channel the pair of similar images. We build a user interactive Web for our recommendation system. On this UI, we can upload images and get the recommendation from our models as shown in Figure 2. For the Recommendation Of the data set, we have taken the dataset from Kaggle of accessories like (shoe, t-shirt, etc) as shown in Figure 1

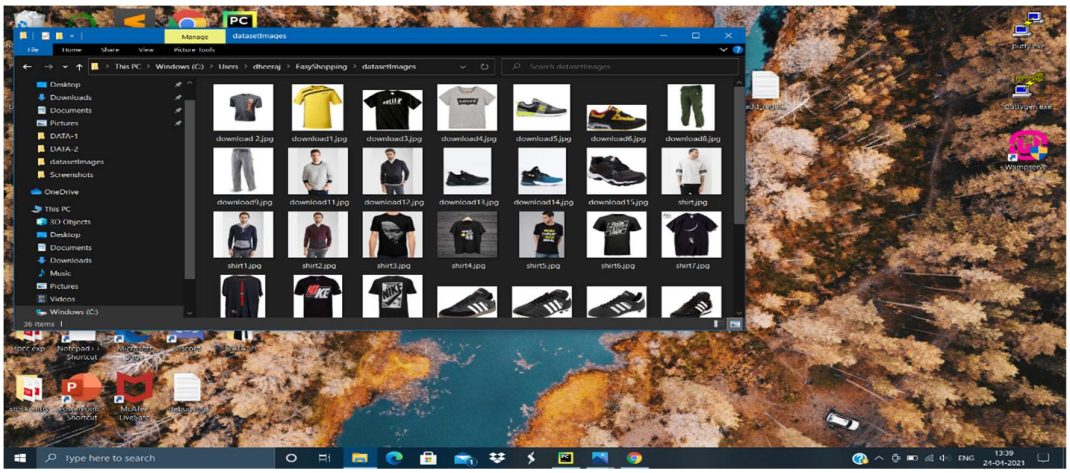

Figure 4.1:- Image data Set

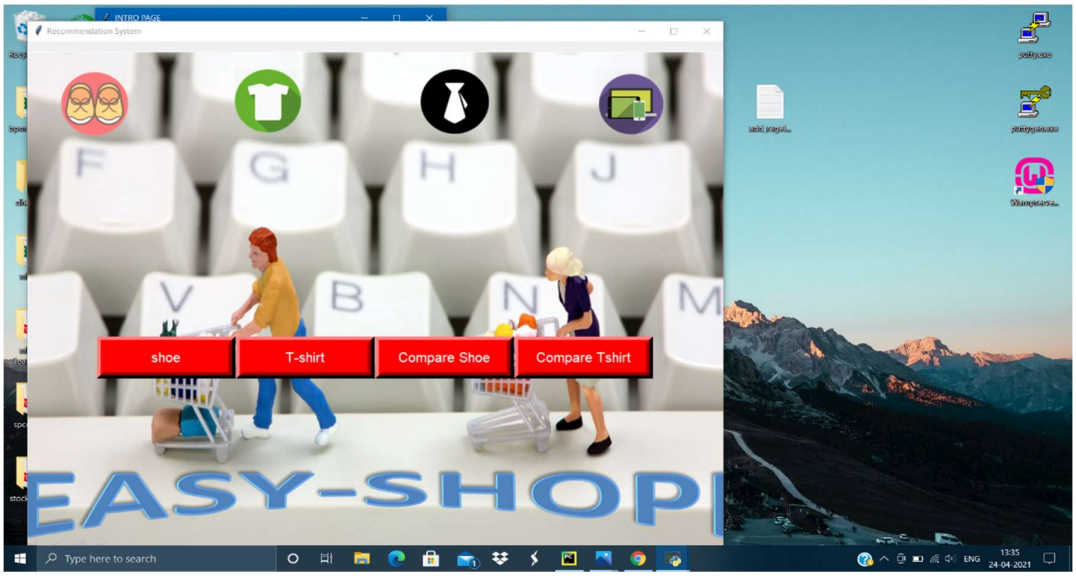

Figure 4.2:- UI For Recommendation Model

In order to get the recommendend image the user want Click on the upload button and upload the image and as shown in fig 4.2 . As user click on the compare User will get the recommended 5 image

Figure 4.3 Input and Output

5. Conclusion and Future work

In this project we build an Image based product recommendation. We tried out different Alexnet CNN models for image classification and different ways to find the similarity between two images. We are able to achieve a classification accuracy of 0.5 and recommend products with similarity score higher than 0.5. There is over-fitting issue in our model, which can be one of the things to do in future work.As shown we have huge dataset of more than 3 million we have only try with 1000 data set.In next step we will try to train this web application on large scale.

6. References

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