Fashion Recommendation System

. Objective

With an increase in the standard of living, peoples' attention gradually moved towards fashion that is concerned to be a popular aesthetic expression. Humans are inevitably drawn towards something that is visually more attractive. This tendency of humans has led to the development of the fashion industry over the course of time. However, given too many options of garments on the e-commerce websites, has presented new challenges to the customers in identifying their correct outfit.

Thus, in this project, we proposed a personalized Fashion Recommender system that generates recommendations for the user based on an input given. Unlike the conventional systems that rely on the user's previous purchases and history, this project aims at using an image of a product given as input by the user to generate recommendations since many-a-time people see something that they are interested in and tend to look for products that are similar to that.

We use neural networks to process the images from Fashion Product Images Dataset and the Nearest neighbour backed recommender to generate the final recommendations.

.Model summary

1 Methodology

In this project, we propose a model that uses Convolutional Neural Network and the Nearest neighbour backed recommender. As shown in the figure Initially, the neural networks are trained and then an inventory is selected for generating recommendations and a database is created for the items in inventory. The nearest neighbour's algorithm is used to find the most relevant products based on the input image and recommendations are generated.

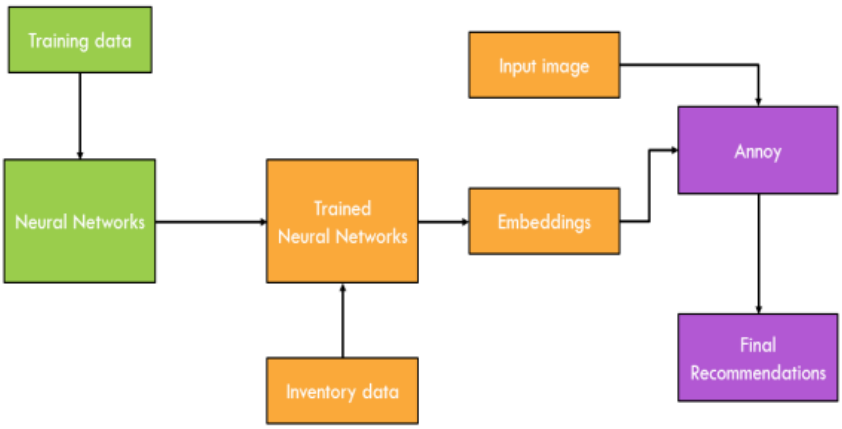

Figure 1. Block diagram of proposed system

2. Training the neural networks

Once the data is pre-processed, the neural networks are trained, utilizing transfer learning from ResNet50. More additional layers are added in the last layers that replace the architecture and weights from ResNet50 in order to fine-tune the network model to serve the current issue. The figure shows the ResNet50 architecture.

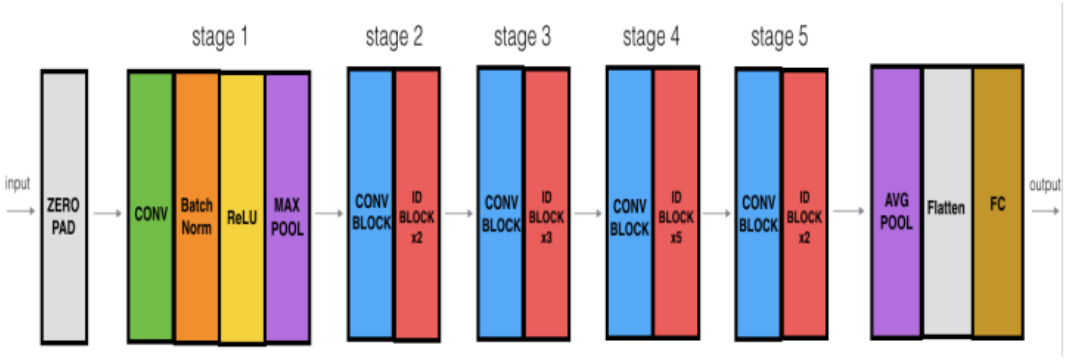

Figure 2. ResNet50 architecture

We have fine-tuned the model by freezing all but stage5 block and trained it to improve accuracy of classifying the training images.

3. Getting the inventory

The images from Kaggle Fashion Product Images Dataset. The inventory is then run through the neural networks to classify and generate embeddings and the output is then used to generate recommendations. The Figure shows a sample set of inventory data

Figure 3. Sample inventory data

4. Recommendation generation

To generate recommendations, our proposed approach uses sklearn Nearest neighbours Oh Yeah. This allows us to find the nearest neighbours for the given input image. The similarity measure used in this Project is the Cosine Similarity measure. The top 5 recommendations are extracted from the database and their images are displayed

• Results

The concept of Transfer learning is used to overcome the issues of the small size Fashion dataset. Therefore we pre-train the classification models on the DeepFashion dataset that consists of 44,441 garment images. The networks are trained and validated on the dataset taken. The training results show a great accuracy of the model with low error, loss and good binary_accuracy.

• Inference

In this project, we have presented a novel framework for fashion recommendation that is driven by data, visually related and simple effective recommendation systems for generating fashion product images.

The proposed approach uses a two-stage phase.

Initially, our proposed approach extracts the features of the image using CNN classifier ie., for instance allowing the customers to upload any random fashion image from any E-commerce website.

Later generating similar images to the uploaded image based on the features and texture of the input image.

It is imperative that such research goes forward to facilitate greater recommendation accuracy and improve the overall experience of fashion exploration for direct and indirect consumers alike.

This can be further extended to other fields of work like recommending songs, viedios, movies, webpages etc. which are already being used by Giant Companies like Google, Netflix, Amazon, Flipkart etc. to improve user experience.

References

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- https://www.youtube.com/watch?v=glmowUlqoYw&t=1882s
- https://machinelearningmastery.com/check-point-deep-learning-models-keras/#:~:text=Checkpointing%20is%20set%20up%20to,2f%7D.
- https://debuggercafe.com/multi-label-fashion-item-classification-using-deep-learning-and-pytorch/

Other comments

 # about my own resnet attempt

- Tried to train a **Residual Network** of 50 layers from scratch on my train data.
- As the train data was too large to load it into **RAM** at a time , fed them to the model in batches using **ImageDataGenerator**. Also created a separate class to generate my images in batches along with cleaning my data.

- *I applied **Data Augmentation** technique to improve training accuracy.*
- *Used three label columns for this project, namely “gender", "masterCategory", "subCategory". I’ve used **Multi Label Binarizer** to One hot encode my class labels to binary.*
- *As the training was taking a ton lot of time, I used **checkpoints** to save my progress after training for one epoch. Then I would use these weights to start a new training with the previous loss.*