T-SHIRT PATTERN CLASSIFICATION USING DEEP LEARNING

COURSE ASSESSMENT 2 – PATTERN RECOGNITION SYSTEMS

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1. BUSINESS PROBLEM BACKGROUND

Humans have always had the innate ability to recognize and distinguish between clothing. Now computers are able to do the same. This opens up tons of applications.

Shirt clothing classification can be used to help retail companies to distinguish between different types of shirt designs and tag them automatically.

In this project, we have scraped around 1400 images for each class to create our database. Post this, we have created a classification algorithm using deep learning to classify the T-shirts according to the class which they belong in.

The problem scope is limitless, we just demonstrated for 2 types of T-shirt patterns because of time constraint. It can be done for trousers, shirts, jackets and so on. So, when ever an image of new product is added to fashion retail website our algorithm can tag the it directly. For example, if an Solid pattern shirt is added it can tag the T-shirt as solid, whenever a consumer searches for solid pattern T-shirts the tags images can be displayed.

2. OBJECTIVES AND SUCCESS MEASUREMENTS

2.1 OBJECTIVES

The objective of this project is to create a T-shirt classification model that is able to accurately predict the pattern of T-shirt (Solid, Typography, etc.) based on image.

2.2 SUCCESS MEASUREMENTS

It is vital to understand the success of the model based on a few measures.

There are a few key measures of our model:

1. Whether the model was able to provide a good accuracy
2. Whether the model was not error prone
3. Whether the model could be tweaked easily for improvement

3. IMPLEMENTATION

3.1 TOOLS USED

For this project, we have used Python 3 as our code benchmark.

3.2 TECHNIQUES

Dataset Creation:

To create the dataset for the prediction algorithm, we have scraped images from e-commerce websites like Jabong, Flipkart, Myntra– websites where one can buy T-shirts from.

Data Pre-Processing:

After initially obtaining the scraped images, we initially excluded images based on whether the image had any kind of text or watermark written on it. We spent most of the time on collecting good images. In pre-processing we resized the images to 256x256 resolution for faster computations. After that we normalized the pixel values for better results.

Modelling Techniques:

InceptionV3:

Inception v3 is a widely used image recognition model that has been shown to attain greater than 78.1% accuracy on the ImageNet dataset. The model is the culmination of many ideas developed by multiple researchers over the years.

We used the InceptionV3 model for better and fast results. We tried different approaches like freezing the layers of Inception, different learning rates and with multiple optimizers like SGD and Adam.

Custom Convolutional Neural Network(CNN):

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.

We have built a custom neural network but the performance is not as good as InceptionV3.

Hyperparameter tuning:

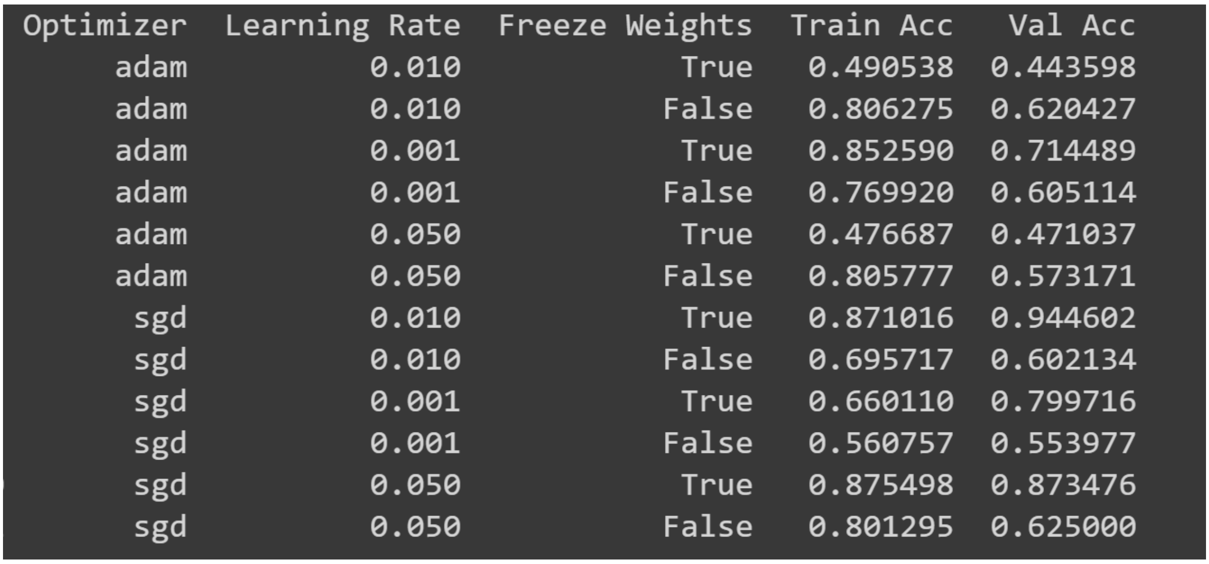
We have also developed a function to tune the parameters like learning rate, optimizers and freezing layers. We have created a total of 12 different possibilities.

We have also used data augmentation to create more robust data. The data augmentation has features such as rotate, flip, zoom etc.

Performance of the Model:

Using Inception V3, we have obtained an accuracy on test data of 91%

Results obtained during Hyper tuning



```
Optimizer  Learning Rate  Freeze Weights  Train Acc   Val Acc
     adam          0.010            True   0.490538  0.443598
     adam          0.010           False   0.806275  0.620427
     adam          0.001            True   0.852590  0.714489
     adam          0.001           False   0.769920  0.605114
     adam          0.050            True   0.476687  0.471037
     adam          0.050           False   0.805777  0.573171
      sgd          0.010            True   0.871016  0.944602
      sgd          0.010           False   0.695717  0.602134
      sgd          0.001            True   0.660110  0.799716
      sgd          0.001           False   0.560757  0.553977
      sgd          0.050            True   0.875498  0.873476
      sgd          0.050           False   0.801295  0.625000
```

The best model is the first one in the above images using “sgd” optimiser, learning rate of 0.010, Freeze weights as “True”, Train Acc 0.87, Val Acc 0.94.

4. CONCLUSION

In conclusion we have tried different approached to T-shirt classification and obtained a satisfactory result of 93% using the best model mentioned in the previous section. This can be useful for online merchants selling T-shirts.

5. REFERENCES

1. Fashion and Apparel Classification using Convolutional Neural Networks - https://arxiv.org/pdf/1811.04374.pdf

2. Fashion Apparel website - https://www.jabong.com/

3. Fashion Apparel website - https://www.flipkart.com/