Capston Project 3

Fashion Product Images Classification

CONTEXT

The Image classification of commercial products is a branch of the wider fields of object detection and, in particular, it is an important step in the creative workflow in fashion industries. Classifying fashion product features is fundamental in order to for companies to organize marketing campaigns, avoid duplicates, categorize apparel products for e-commerce purposes, and so on. There are many different techniques for image classification, ranging from standard image processing to machine learning approaches. Among them, deep neural network classifiers have gained popularity thanks to their good performance. In my study, I would like to experiment a convolution neural network classifier combining with transfer learning for fashion products classification task.

Here we have a large dataset/images (44.4k products) obtained from Kaggle. Each product is identified by an ID like 12345. A map to all the products can be found in styles.csv. From here, we can fetch the image for this product from images/12345.jpg, the key product categories and it's display name in styles.csv.

CRITERIA FOR SUCCESS

In the scope of this machine learning capstone project, we would like to achieve the following objectives:

- Build an image classifier. Use the masterCategory column from styles.csv as the target feature and train a convolution neural network classifier.
- Build a visual similarity search system, so that when given an image, the system can suggest other similar images.

SCOPE OF STUDY

- I will look into the distribution of fashion products across the 7 categories listed under the target feature 'masterCategory'. For under-represented classes I will apply the ImageDataGenerator method (in python tensorflow module) to generate new variations of images which will then be combined with the originals, to bring up representation of the minority classes
- To build the classification model, I will start with the per-trained VGG16 model as the base model. Then two more dense layers and an output layer will be added onto the base model to build the classifier. Performance of the model will be evaluated with appropriate metrics and visually examined with plots.

- To build a content-based recommendation system, a similar approach will be applied. I will start with the per-trained VGG16 model for feature extraction. Then cosine similarity scores among products will be calculated based the extracted features. For a given product image, products that are with the top 5 highest similarity scores will be recommended. In the end the recommendation system will be evaluated using precision-recall metrics. Without

CONSTRAITS

- The fashion product label attributes were manually entered while cataloging. The quality of manual classification and labeling could compromise our classification performance.
- Instead implementing VGG16 as the base model to build our CNN model upon, other pre-trianed image classification models such as VGG19, Xception, InceptionV3, MobileNet, DenseNet, NasNet, ResNet50 should also be experimented to compare the classification performance.
- For the recommendation system, lack of labeling (i.e., "Yes" if the product was actually viewed by a user when recommended, "No" if the product was not viewed by a user when recommended) makes it hard to evaluate the system performance.
- Domain knowledge on fashion products maybe needed to combine with machine learning algorithms to build a practical, robust and yet good qualified classification model.

DATA SOURCES

- www.kaggle.com/datasets/paramaggarwal/fashion-product-images-dataset?resource=download