CECS 456 Project

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Github: https://github.com/peaktwins/CECS-456-project/tree/main

Introduction

This project's main focus was the ability to group various images into specific categories by using Tensorflow and other frameworks and libraries to create a deep learning model. Since this project was about grouping images into specific categories, the project is based on multiclass classification on images.

Dataset and related work

The dataset consisted of one large folder with over 6000 images and each of the images belonged to a specific subfolder related to the category. All the images were a .jpg file and had various size dimensions and color schemes. The subfolders were how the images were organized. There were 8 total subfolders: airplane, car, cat, dog, flower, fruit, motorbike, and person. All the photos in each subfolder had different orientations and the quality of the images from all the subfolders had a range of clear, high-quality photos to low quality and gritty photos. Some of the photos were tight-framed while other images had background space around the main focal point of the image.

Methodology

In order to help categorize each image from the dataset folder, a convolutional neural network was needed. I retrieved the dataset from utilizing the API key and saved the path to the dataset folder. Once the file path of the dataset was saved, I split the dataset into 3 sets: the training set, validation set, and the training set. The dataset was split into 3 sets by using a validation ratio, so that the majority of the dataset belonged to the training set while the rest of the dataset was split and saved to the validation set and the testing set. After the dataset was split into 3 parts, preprocessing and normalization of the data was applied to the dataset in order to achieve a more uniform, consistent, usable datasets for the application. After the data sets had been transformed, I used a VGG model. I chose to use the VGG model because it works well with trying to achieve classification of various images and because VGG is a convolutional neural network. I thought it would be better to use a VGG model because it would help achieve better results as opposed to using a decision tree for example. The ReLU activation function and the Softmax function were applied onto the model since this project was focused on categorizing images into specific subsets.

Results analysis

After evaluating the model, the model shows approximately above a 90 percent in terms of accuracy and approximately a 15 percent in the context of loss on the datasets.

Conclusion

The results of the loss test and the accuracy test show that the model should present accurate results, but the prediction results shows that there are inconsistencies within the methodology. In hindsight, I could improve the model by applying more preprocessing and normalization of the dataset to remove inconsistencies. I can also

improve the model by trying out various combinations of the number of neurons used in the activation functions and the number of layers being used in the model. I believe not downloading the dataset as a zip file has created many setbacks when trying to design and train a deep learning model. I had to try out various Tensorflow functions to split the dataset and apply the operation retaining to creating a deep learning model but I ran out of RAM so I had to try out multiple methods on trying to achieve the similar functions to what we have learned in
class.