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Machine Learning II

Individual Project

Introduction

In this project, we applied CNN to the Animal Image Dataset to classify 12 classes of animals including Panda, Squirrel, Dog,etc. We implemented Resnet50, VGG19 and a customized model in Tensorflow to classify the dataset , and Resnet50 has achieved highest accuracy. We can use this technology in different fields such as animal management to help diffierciate animals automatically and efficiently to cut the cost of human labors. We can also use this technology to help kids to have a better understanding of different animals.

Individual Contribution:

1. Code
    - Helped building the pretrained model and customized model
    - Came up with the idea to freeze the pre-trained layer to achieve better accuracy
    - Came up with the idea add one more dense layer to achieve better accuracy
    - Build a basic tensorflow skeleton so that my team can turn it into function and tweak the hyper-parameters.
    - Help my team to run the code on the cloud since they have technical issues which can not run the code in their machine
2. Found the appropriate dataset and approved by our teammate
3. Presentation
    - Take charge of Customized model part, Model evaluation part, and Areas of improvement part

- Presented the part that mentioned above

4. Helped revise the group proposal
5. Helped to add more details in group report

Results and Summary:

Model	Accuracy score	Cohen kappa score	Micro F1 score	Avg of Metrics
VGG	0.91	0.90	0.91	0.91
Resnet	0.93	0.92	0.93	0.93
Customized	0.26	0.19	0.26	0.23

From the result table, we can see that VGG19 and Resnet perform reasonably well and Resnet is slightly better than VGG19. However, the Customized model's metrics are rather low, which still have some space to improve in the future. Above all, the Resnet50 is the best model in our dataset.

There are still some areas that we can improve in the future. Firstly, we can build the model with more memories so that it will not get out of memory error. Secondly, we should test various hyperparameter settings to optimize the customized model to get a better result. Lastly, We could try different pre-trained models such as GoogleNet to compare with different models to get optimal results.

Percent of Code:

15 percent of Code from tensorflow official document and from Professor's github

Citation:

https://www.tensorflow.org/tutorials/images/classification

https://github.com/amir-jafari/Deep-Learning/blob/master/Tensorflow_Basic/CNN/1_ImageClassification/example_MNIST.py

https://www.tensorflow.org/api_docs/python/tf/keras/applications/vgg19/VGG19

https://www.tensorflow.org/api_docs/python/tf/keras/applications/resnet50/ResNet50