Prediction Challenge 2 – Deep Learning Image Analysis

Description

Image classification with a Convolutional Neural Network, using tuning techniques to improve the accuracy.

Design your own Convolutional Neural Network to classify images from a reduced version of the Dogs vs Cats dataset. Use the RELU activation function and the Adam optimiser. Change the other parameters of the network and hyperparameters to achieve the best accuracy.

Data

The reduced version of the Dogs vs Cats dataset is available on Moodle in the **"Prediction Challenge 2 Data"** folder. It is a zip folder of images of cats and dogs. I recommend following the below steps for loading the data to Colab.

Go to Moodle, under the **"Prediction Challenge 2 Data"**, click on **"dogs-vs-cats-vvsmall.zip"** to download the zipped folder that contains the dataset to your computer. You need to first upload the dataset into Google Drive, then load it into Colab's runtime when building the model. Once the dataset is saved in your local machine, open your Google Drive, and click the **"New"** button on the top-left. From the drop-down list, click on **"File Upload"** and browse to the zipped file on your system, then **"Open"** it. This process will upload the dataset to your Google Drive.

Next, open a new Colab notebook and write a code to mount your Google Drive so that it's accessible to Colab's file system as shown below:

```
from google.colab import drive
drive.mount('/content/drive')
```

Colab will provide a window to authorize its access to your Google account's Drive. Navigate to the window, choose your email address, and at the bottom click on **"Allow"**. This message will be displayed: `Mounted at /content/drive`.

Next is to read the dataset into Colab's file system. Unzip the folder and extract its contents into the `/tmp` folder using the below code.

```
[ ] import zipfile
    import os

    zip_ref = zipfile.ZipFile('/content/drive/MyDrive/dogs-vs-cats-vvsmall.zip', 'r') #Opens the zip file in read mode
    zip_ref.extractall('/tmp') #Extracts the files into the /tmp folder
    zip_ref.close()
```

The contents of the .zip are extracted to the base directory /tem/dogs-vs-cats-vvsmall, which contains **train** and **validation** subdirectories for the training and validation datasets, which in turn each contains **cats** and **dogs** subdirectories. You can define the directories, then use these directories to generate the data the deep learning network requires as shown in the below code.

```
[ ]  base_dir = '/tmp/dogs-vs-cats-vvsmall'
     train_dir = os.path.join(base_dir, 'train')
     validation_dir = os.path.join(base_dir, 'validation')

     # Drectory with the train cat images
     train_cat_dir = os.path.join(train_dir, 'cats')

     # Drectory with the train dogs images
     train_dog_dir = os.path.join(train_dir, 'dogs')

     # Drectory with the validation cat images
     validation_cat_dir = os.path.join(validation_dir, 'cats')

     # Drectory with the validation dogs images
     validation_dog_dir = os.path.join(validation_dir, 'dogs')
```

Submission

Provide one Word or PDF document with the following four items:

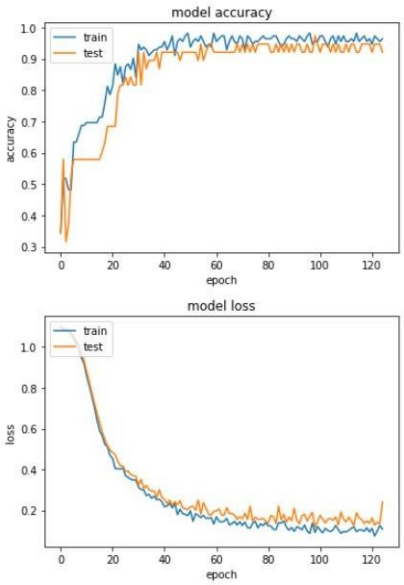
1. Validation Accuracy Number obtained from here in your training output of your model:

```
Epoch 22/25
1875/1875 [==============================] - 9s 5ms/step - loss: 0.2149 - accuracy: 0.9250 - val_loss: 0.6044 - val_accuracy: 0.8757
Epoch 23/25
1875/1875 [==============================] - 9s 5ms/step - loss: 0.2072 - accuracy: 0.9271 - val_loss: 0.6401 - val_accuracy: 0.8660
Epoch 24/25
1875/1875 [==============================] - 9s 5ms/step - loss: 0.2047 - accuracy: 0.9277 - val_loss: 0.6255 - val_accuracy: 0.8725
Epoch 25/25
1875/1875 [==============================] - 9s 5ms/step - loss: 0.1976 - accuracy: 0.9295 - val_loss: 0.7636 - val_accuracy: 0.8639
```

2. Screen print of the Keras summary of your deep learning network i.e.

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
dense_2 (Dense)              (None, 10)                50
_________________________________________________________________
dense_3 (Dense)              (None, 3)                 33
=================================================================
Total params: 83
Trainable params: 83
Non-trainable params: 0
_________________________________________________________________
```

3. A screen print of the model accuracy and loss plots



4. A 300 word (max) blog critically appraising your choice of model parameters and hyperparameters

Important Note: Submit your work as a zipped folder via the link provided on Moodle (Prediction Challenge 1 Submission). Your zipped folder MUST have two items namely: your code downloaded from Colab as .ipynb and your word or pdf file that contains the above screen prints plus your 300-word (maximum) that critically appraised your model. Also, the zipped folder should be named using the following format **StudetName_studentID.zip**

For example: **AliyudaAli_123456789.zip**