PyBark

A neural network model for classifying dog breed images

CWRU Bootcamp Final Project

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The Dataset

9,600 dog images

120 dog breed categories

https://www.kaggle.com/datasets/miljan/stanford-dogs-dataset-traintest

Data Pre-processing

- Renamed dog image folders to remove hyphens
- Created a database for the dog breed images

Database

- SQLite database
- Flexible
- Simple
- Breed (*text)*, dog picture (*blob*)

Model Training

- Models were trained on a sample size of 9,600 images
- 2 different models trained
- First Model (Pre-trained) - 86% accuracy

```
: Found 12000 images belonging to 120 classes.
Found 8580 images belonging to 120 classes.
Downloading data from https://storage.googleapis.com/tensorflow/keras-applications/vgg16/vgg16_weights_tf_dim_ordering_tf_kernels_notop.h5
58889256/58889256 [==============================] - 1s 0us/step
Epoch 1/5
375/375 [==============================] - 1923s 5s/step - loss: 1.742 - accuracy: 0.8272 - val_loss: 0.6712 - val_accuracy: 0.7459
Epoch 2/5
375/375 [==============================] - 1896s 5s/step - loss: 1.7896 - accuracy: 0.8452 - val_loss: 0.7078 - val_accuracy: 0.7442
Epoch 3/5
375/375 [==============================] - 4621s 12s/step - loss: 1.7608 - accuracy: 0.8483 - val_loss: 0.6957 - val_accuracy: 0.8439
Epoch 4/5
375/375 [==============================] - 3630s 10s/step - loss: 1.822 - accuracy: 0.8806 - val_loss: 0.6671 - val_accuracy: 0.7360
Epoch 5/5
375/375 [==============================] - 16573s 44s/step - loss: 1.632 - accuracy: 0.9434 - val_loss: 0.6868 - val_accuracy: 0.7268
269/269 [==============================] - 822s 3s/step - loss: 4.6868 - accuracy: 0.8568
[4.686814308166504, 0.026806525886058807]
```

Model Deployment & Testing

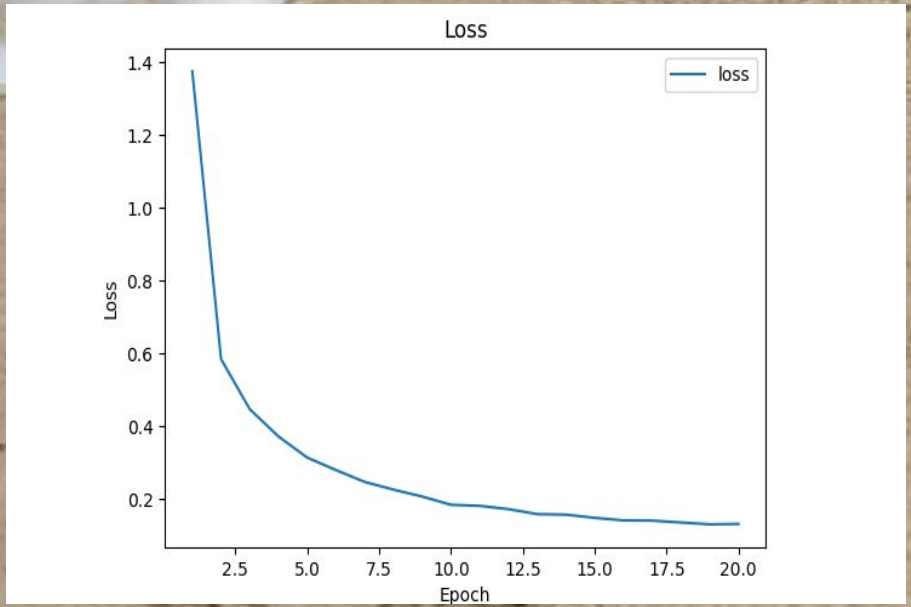
- 96.2 % accuracy model
- 1.35% loss

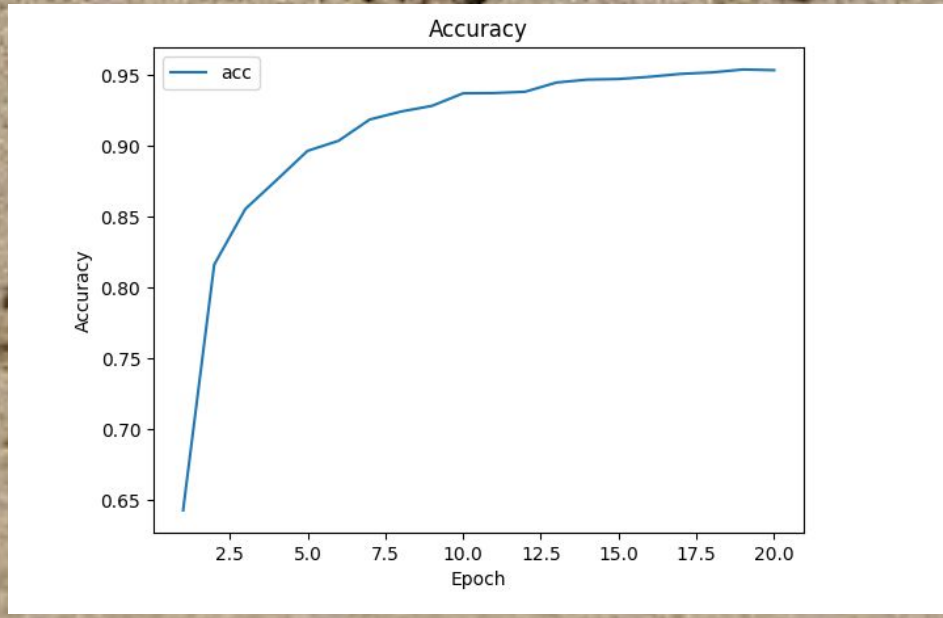
```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 keras_layer (KerasLayer)    (None, 1280)              2257984

 dropout (Dropout)           (None, 1280)              0

 dense (Dense)               (None, 120)               153720

=================================================================
Total params: 2411704 (9.20 MB)
Trainable params: 153720 (600.47 KB)
Non-trainable params: 2257984 (8.61 MB)
_________________________________________________________________
```

```
Epoch 1/10
300/300 [==============================] - 470s 2s/step - loss: 1.6255 - acc: 0.6020 - val_loss: 0.6830 - val_acc: 0.8079
Epoch 2/10
300/300 [==============================] - 466s 2s/step - loss: 0.5804 - acc: 0.8283 - val_loss: 0.6000 - val_acc: 0.8146
Epoch 3/10
300/300 [==============================] - 466s 2s/step - loss: 0.4369 - acc: 0.8658 - val_loss: 0.5614 - val_acc: 0.8154
Epoch 4/10
300/300 [==============================] - 514s 2s/step - loss: 0.3437 - acc: 0.8938 - val_loss: 0.5503 - val_acc: 0.8229
Epoch 5/10
300/300 [==============================] - 504s 2s/step - loss: 0.2794 - acc: 0.9146 - val_loss: 0.5515 - val_acc: 0.8246
Epoch 6/10
300/300 [==============================] - 511s 2s/step - loss: 0.2334 - acc: 0.9317 - val_loss: 0.5502 - val_acc: 0.8279
Epoch 7/10
300/300 [==============================] - 523s 2s/step - loss: 0.2021 - acc: 0.9389 - val_loss: 0.5638 - val_acc: 0.8267
Epoch 8/10
300/300 [==============================] - 523s 2s/step - loss: 0.1809 - acc: 0.9467 - val_loss: 0.5620 - val_acc: 0.8333
Epoch 9/10
300/300 [==============================] - 472s 2s/step - loss: 0.1541 - acc: 0.9551 - val_loss: 0.5686 - val_acc: 0.8258
Epoch 10/10
300/300 [==============================] - 514s 2s/step - loss: 0.1358 - acc: 0.9623 - val_loss: 0.5641 - val_acc: 0.8296
```

Data Model Optimization

- Re-ran original model at 20 epochs instead of 10
- Model trained at 100% accuracy leading us to conclude that the model was over-trained
- Loss: 1.8%
- Accuracy: 100





Model predictions (green: correct, red: incorrect)

Conclusion and Final Thoughts


THE END