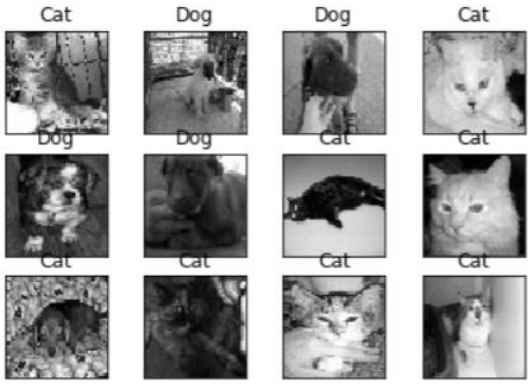
MSDS 422 Assignment 7

In order to determine the efficiency of convolutional neural networks in correctly labeling images, image data of cats and dogs from kaggle.com was used. The training data set included 25,000 images, with half of them being cats and the other half being dogs. Images that featured dogs would be labeled as '1' and cats would be labeled as '0.' The testing data included 12,500 images, and the goal of the convolutional neural network would be to correctly label the test data. The images were processed to all have the same size and the used in the CNN model. Here is an example of the images:



Models with different parameters were employed, in which the amount of layers and filters were adjusted. By having varying filters and layers one can determine which model produces the most accurate predictions and spends the least amount of time. Five models were produced, and the details of the parameters and accuracy results can be seen below.

	Model 1	Model 2	Model 3	Model 4	Model 5
# Layers	6	5	6	3	3
Filter Number Layer Structure	32-32-64-64-128-128	32-64-128-64-32	32-32-64-64-128-128	32-64-128	32-64-64
Filter size	5x5	10x10	10x10	5x5	5x5
Time	2:57.02	10:47.15	17:21.50	2:50.73	2:50.74
Accuracy	0.69075	0.69180	0.69312	0.60528	0.58235

Based on the results of the five models, Model 1 is the most successful. It produced one of the most accurate scores at 69.075% in the least amount of time at about 2 minutes and 50 seconds. It appears that this is due to the fact that it had the most number of layers and featured two levels of 128 filters. Furthermore, the time it took to build the model was effected by the filter size, which can be seen by comparing the results of Model 1 and Model 3. Therefore, in general, more layers and higher number of filters will improve the accuracy of a model, while filter size has a significant impact on duration.

From a managerial perspective, I would recommend the website provider to add more layers and higher levels of filters to their CNN models. This should help produce more accurate results. This may increase processing time, but I believe it will be worth it since this study's best model only scored 69% , which can definitely be improved. The website provider should also consider the quality and consistency of pictures. The dogs and cats were not consistent images. The images themselves were different sizes and had to be rescaled. Furthermore, the dogs and cats were different breeds, different sizes, in different position, etc. This makes it harder for the model to be trained, as opposed to the previous week's study of hand-written numbers, which feature images of the same size that have similar profiles.

Kaggle profile name: James Casey

Kaggle username: jcasey2