Capstone Proposal

Domain Background: Creating an image classifier which can distinguish between dogs and cats at a really high accuracy. The main work is that I am using CNN model and via Transfer Learning increasing the overall accuracy of the data.

I am using Transfer Learning which I found here-

https://machinelearningmastery.com/transfer-learning-for-deep-learning/

The main idea of this project is to create a powerful image classifier using very little data. The idea I have read can be found here-

https://blog.keras.io/building-powerful-image-classification-models-using-very-little-data.html

Problem Statement: The problem we are talking is getting good accuracy and building classification models with less data.

In order to make the most of our few training examples, we will "augment" them via a number of random transformations, so that our model would never see twice the exact same picture. This helps prevent overfitting and helps the model generalize better.

In Keras this can be done via the keras.preprocessing.image.ImageDataGenerator class. This class allows you to:

- configure random transformations and normalization operations to be done on your image data during training
- instantiate generators of augmented image batches (and their labels) via .flow(data, labels) or .flow_from_directory(directory). These generators can then be used with the Keras model methods that accept data generators as inputs, fit_generator, evaluate_generator and predict_generator.

The documentation can be obtained from the following link-

https://keras.io/preprocessing/image/

Datasets and inputs: As proposed above the dataset is derived from following link-

https://my.pcloud.com/publink/show?code=VZvzMlZyPYO1hSn92LXdzmGNr9y1j7qKDzX

I can also use the pre trained model which is provided and also train myself to create multiple models.

Dataset is divided into training set, validation set and testing set. Most of the data is used in training set which is upto 1000 images of cats and same for dogs. For validation dataset I have used nearly about 300-400 images of both cats and dogs.

Solution Statement: With the help of Transfer Learning I can increase the validation accuracy of the image classification by a higher rate and can work on multiple classes. Currently only 2 classes are taken but it can also be derived for multiple classes problems.

Benchmark Model: Benchmark model is created with the same dataset by using on three convolutional layer not the imagenet cnn network. We calculate the accuracy obtained by it and then we compare that data with our original data which we obtained from the project.

We use 3 convolution layers with a ReLU activation followed by max pooling layers in our benchmark model.

Evaluation Metric: Using the test case to evaluate the accuracy when the model is trained and created.

The target for this project is > 60% on test cases.

Above mentioned benchmark model also created similar type of cases with validation set and testing set.

Project Design:

According to the dataset we are taking image width and height in our case it is 299 x 299

Batch size taken is 32

Learning rate is 1e-4

Transformation ratio is set to 0.05

Momentum is set to 0.9

No. of epochs is set to 50

Data augmentation is done as mentioned above in the problem statement.

Creating a CNN network to train the small dataset of cats vs dogs.

Then we classify new samples for either training model.

Using bottleneck features of a pre trained network.

Then we fine tune the data of a pre-trained network.

Then we predict using the trained model and get the result.

We will use the VGG16 architecture, pre-trained on the ImageNet dataset