Practical Machine Learning Assignment 7

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1. Problem Definition

This assignment involves creating CNN (Convolutional Neural Network) model to classify whether images contain either a dog or a cat and also to suggest what types of images are for training the models.

2. Research Design and methods

There are four types of images of cats and dogs. Grayscale 64x64 pixels , Color(RGB) 64x64 pixels , Grayscale 128x128 pixels, and Color(RGB) 128x128 pixels. Each type has 1000 images of cat and 1000 images of gods.

We will create 4 CNN models, one for each image type and compare their prediction accuracy. Python Tensorflow package will be used to build CNN classification model and to calculate its performance accuracy. CNN architecture will have 2 convolutional layer, 1 max pool layer and 1 fully connected layer and a output layer with 2 outputs.

3. Implementation and Programming:

The first step is to load cats and dogs .npy files into python numpy array objects. Since the images are in 3d array from (height, width , channel (gray or color)), images are flattened to create a 2d array. Featured are rescaled from [0, 255] using MinMax scalar. Images are labeled with 0 and 1, 0 for cats and 1 for dogs. The data is then divided into training set (1600 images) and test set (400 images). Four CNN models are build, one for each image type.

The model contains 4 hidden layers (2 convolutional layer, 1 max pool layer and 1 fully connected layer) and are trained using 20 epochs and batch size of 50. Model accuracy is calculated for each model on training and test image sets.

4. Findings and recommendations

All four models accuracy is in the range of 64% to 68.5% . CNN models requires large dataset for training to get high prediction accuracy. The training set only had 1600 images to train our models which is very less for Deep learning models hence the low accuracy %.

Recommendation : For the given image classification problem, Convolutional Neural Network model should be used to get best prediction accuracy. Also from prediction accuracy results of all four models, it appears low quality (64x64 pixels) color images are the best choice for training models (around 68%) also the website should store new images in color 64x64 pixels format to get the best prediction from the model.