Capstone Proposal

Domain Background: Computer vision is currently the hottest in field of Artificial intelligence because of its applications in wide variety of industries and fields. Computer vision mainly deals with how computers/machines can learn from images or videos. It mainly wants to mimic what we humans do with our eyes. Image classification is the most widely used application of computer vision and its very important that we get good results on these as researchers found it to be useful in many critical areas like cancer detection, detecting diseases in crops.

https://www.ijitee.org/wp-content/uploads/papers/v8i2s/BS2713128218.pdf

Problem Statement: Main goal of the project is to classify different breeds of a dog. Given an image of a dog, my algorithm will identify an estimate of canine's breed. If supplied image of a human, algorithm will identify the resembling dog breed. As mentioned before image classification is widely used and one of most difficult applications of computer vision but we do have number of potential solutions to solve it. One such solution is to use transfer learning of Image net classification.

Datasets and Inputs: I will be using two datasets dog dataset and human dataset for my project. Dog dataset contains 133 folders, each corresponding to different dog breed. So, each folder has one class label. But human's dataset has 5749 folders, each corresponding to images of different humans. Data for the project is downloaded from https://github.com/udacity/deep-learning-v2-pytorch/blob/master/project-dog-classification/README.md. In the project these two datasets will be used mainly for 3 tasks, first to detect humans in a particular image, second to detect dogs in a particular image, third to classify dog breeds.

Solution Statement: Since we are dealing with image data, will be using convolution neural networks with varying depths to classify our data and select the best model. We will also be taking advantage of transfer learning to get better results than the model which we built from scratch.

Benchmark model: I considered VGG-16 as my benchmark model as it proved to give great results on ImageNet data, and it is runner-up at ILSVRC 2014 competition. ImageNet data is very popular dataset used for image classification with around 1000 different categories. VGGNet consists of 16 convolutional layers and is very appealing because of its very uniform architecture. VGG-16 was able to get around 7% error rate in ImageNet data. https://neurohive.io/en/popular-networks/vgg16/

Evaluation Metrics: I will be using accuracy as my evaluation metric to quantify performance of both benchmark model and my model. Since my problem is multiclass classification problem accuracy is one of the appropriate metric.

Project Design: Since my problem deals with image data, I decided that I will be using convolutional neural networks framework to classify different dog breeds. I will be building image classification model from scratch and also will be using transfer learning to take advantage of different architectures which are already built on large number of different images. So my workflow would be using pretrained models to detect both humans and dogs in images, build a CNN from scratch to classify different dog breeds, build a CNN using transfer learning to classify different dog breeds.