Domain Background

Botany, also called plant science(s), plant biology or phytology, is the science of plant life and a branch of biology. A **botanist**, plant scientist or phytologist is a scientist who specializes in this field.

Relevant Publications

Nilsback, M-E. and Zisserman, A.
A Visual Vocabulary for Flower Classification
Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (2006)

Nilsback, M-E. and Zisserman, A.
Delving into the whorl of flower segmentation
Proceedings of the British Machine Vision Conference (2007)

Nilsback, M-E. and Zisserman, A.
Automated flower classification over a large number of classes
Proceedings of the Indian Conference on Computer Vision, Graphics and Image Processing (2008)

Problem Statement

Accurate classification of plant species with a small number of images. This model can be used by botanist to classify flowers.

Dataset

The data that I am using is flower 17 data set.

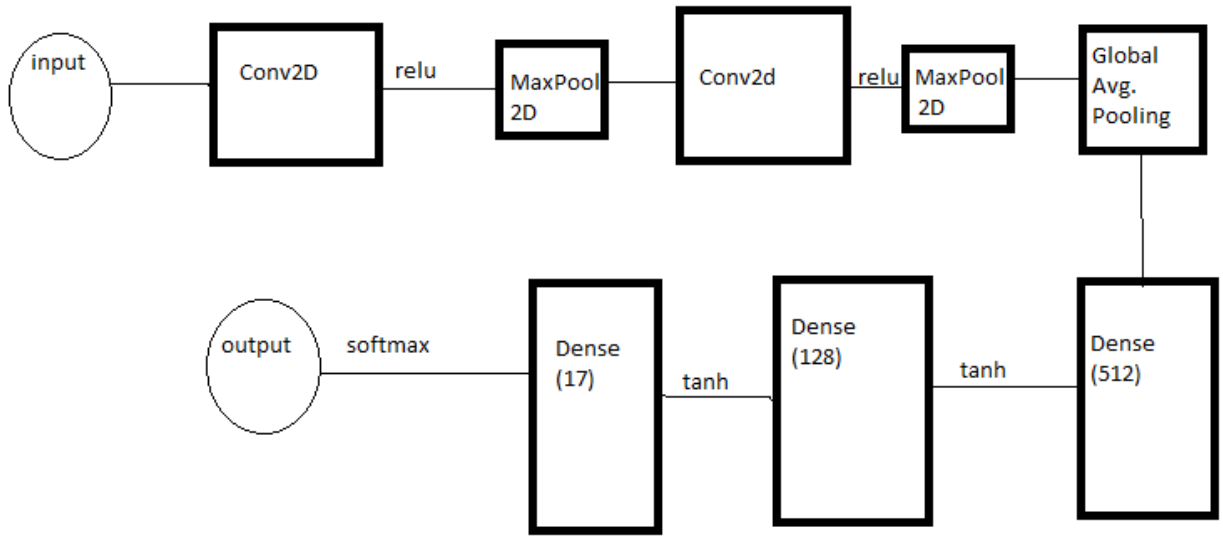
Download link: wget http://www.robots.ox.ac.uk/~vgg/data/flowers/17/17flowers.tgz

Description

- The dataset consists of 17 category of flower with 80 images for each class.
- The flowers chosen are some common flowers in the UK.
- The images have large scale, pose and light variations and there are also classes with large variations of images within the class and close similarity to other classes.

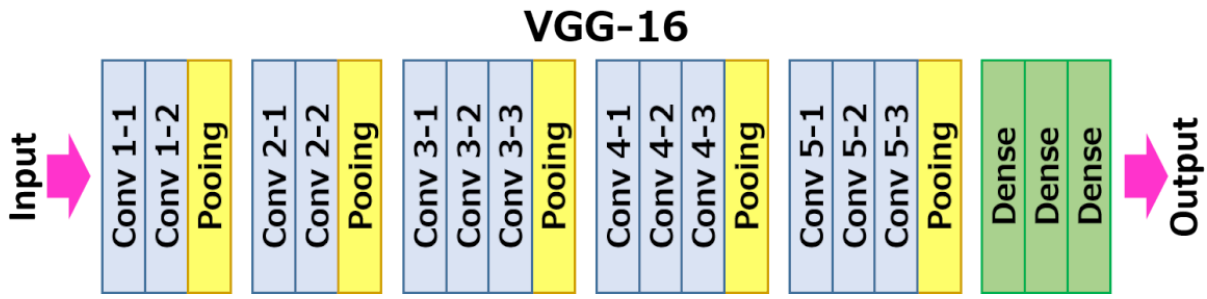
Solution Statement

I am planning to use a CNN network for this task. The network architecture is as follows:



Benchmark Model

I'll be using VGG16 keras implementation as my benchmark model. (Training only the prediction head)



Evaluation Metrics:

Accuracy is one metric for evaluating classification models.

$$\text{Accuracy} = \frac{\text{Number of correct predictions}}{\text{Total number of predictions}}$$

Also,

$$\text{Accuracy} = \frac{TP + TN}{TP + TN + FP + FN}$$

Where *TP* = True Positives, *TN* = True Negatives, *FP* = False Positives, and *FN* = False Negatives.

Project Design

Generally ,CNN architecture for image classification consists of two main parts, “feature extractor” that based on conv-layers, and “classifier” which usually based on fully connected layers. A CNN works by extracting features from images. This eliminates the need for manual feature extraction. The features are not trained! They’re learned while the network trains on a set of images. This makes deep learning models extremely accurate for computer vision tasks. CNNs learn feature detection through tens or hundreds of hidden layers. Each layer increases the complexity of the learned features.

Resources

- http://www.robots.ox.ac.uk/~vgg/data/flowers/17/
- https://blog.keras.io/building-powerful-image-classification-models-using-very-little-data.html