Deep Learning
Assignment 3

1. Consider a ConvNet composed of 3 convolutional layers, each with 3X3 Filters. The first layer has 100 Activation Maps, the middle layer has 200 and the last layer has 400 Activation Maps. The input images are RGB images of 200x300 pixels.
   a. What are the total number of parameters in the ConvNet?
   b. Assuming a stride of 1, compute the size of the Layer 1, 2 and 3 Activation Maps.
   c. If the Layer 2 and Layer 3 Activation Maps are constrained to be of the same size as that of Layer 1, what is the zero padding P required (assume stride =1)?

   (10 points)

2. Please refer to Page 7 of Lecture 12:

   a. The figure shows the use of 1x1 filters in order to reduce the number of parameters in the model. Verify that the number of parameters reduces to $3.25C^2$ for this model (you may ignore the bias parameters for this calculation).

   b. Compare the number of computations required in both the figures to check whether smaller filters are also effective in making the models run faster.

   (10 Points)

3. Download the MIT Flowers dataset from: https://goo.gl/EgJVXZ.

    a. Use the procedure describe in Lecture 9 (pages 21-27), to feed this data into a ConvNet that classifies the images into the various flower types. You may start with the Convnet from Section 5.1 of Chollet (that I uploaded into Camino) for this exercise, and modify it as necessary.

    b. Use Transfer Learning with the MobileNet model (available in Keras) to speed up the training process. Use Method 1 (see page 54 of Lecture 12) to do the Transfer Learning. Freeze all the layers in MobileNet, except for the last (logit) layer.

(20 Points)