Home Assignment 2 (10 points)

Due on: 5pm March 3th, 2020

Late policy: No late submission policy

# Regulation.

1. Implement our algorithms in GPU-based Keras, Tensorflow, or Matlab environments. If codes are implemented in another environment, no points will be given.
2. If students do not follow the requirements to select the datasets and neural network models, no points will be given.
3. The codes may upload to Moss(https://theory.stanford.edu/~aiken/moss/) to check the similarity. If similarity rate is above 60 percent, instructor will report it to Departmental Chair for a further penalty.

# Description

The course projects focus on the following two aspects.

1. Implement the basic deep convolutional neural networks to an advanced GPU-based environment (Keras, Tensorflow, and Matlab).
2. Compare the performance differences between transfer learning and learning from scratch.
3. How to use ImageNet pretrained deep features with a simple classifier (we will test it in a random quiz).

# Section I: Used datasets

Use one of the following datasets according to your student last digit of your student ID.

* (the last digit of ID belongs to 1-2): Scene-15 dataset and Caltech101
* (the last digit of ID belongs to 3-4): Scene-15 dataset and Caltech256
* (the last digit of ID belongs to 5-7): CIFAR10
* (the last digit of ID belongs to 8-9, 0): CIFAR100

# How to construct the training and testing dataset

1. For mnist, CIFAR10/100, the training set, and testing set were organized.
2. For Caltech101/256, the method to generate the training and testing dataset could be found in http://places2.csail.mit.edu/PAMI\_places.pdf.

# Section II: Select one of the following deep convolutional neural networks (DCNN)

Use one of the following datasets according to your student the second last digit of your student ID.

1. Resnet (the second last digit of student ID belongs to 1-2)
2. VGG16 (the second last digit of student ID belongs to 3-4)
3. DenseNet (the second last digit of student ID belongs to 5-8)
4. AlexNet (the second last digit of student ID belongs to 9 and 0)

# Project requirements

Training the given datasets (shown in Section I) with the selected Deep Convolutional Neural Networks (shown in Section II). Students need to complete the following tasks. Students should provide codes and the related experimental results such as experimental settings, figures, log files, etc. to validate the results they obtained

* (4 points) run the pretrained DCNN from Section 2 with the data from Section 1, take the average accuracy from 3 runs (test and training)
* (4 points) run the DCNN from Section 2 with the data from Section 1 from scratch, take the average accuracy from 1 runs (test and training)
* (2 points) compare the performance gab and training time between the above two conditions. Explain why you obtained such results, and give a brief discussion about it.