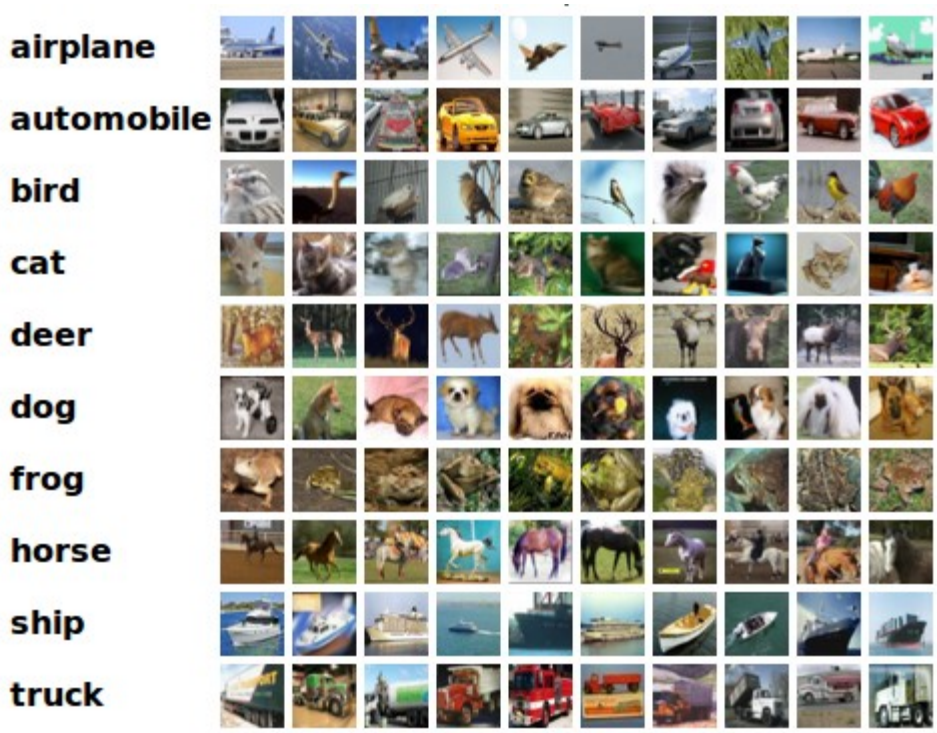
The American University in Cairo

Department of Computer Science and Engineering

CSCE 4930 – Practical Machine Deep Learning

Dr. Mohamed Moustafa	Assignment 2 [10%]	Spring 2017

Implement a multi-layer fully connected Neural Network (NN) classifier that ***best*** recognizes the 10 different classes in the CIFAR-10 dataset.



Details:

a) Download the dataset from http://www.cs.toronto.edu/~kriz/cifar.html The CIFAR-10 dataset consists of 60000 32x32 colour images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images.

b) Implement YOUR OWN NN such that you can dynamically change the architecture, e.g., number of hidden layers, number of neurons per layer, activation functions, etc...

c) Implement YOUR OWN gradient descent learning algorithm (preferably using the computation graph method)

d) Use a validation set (or n-crossfold) to fine tune your hyper-parameters.

e) Use the 10000 testing set to report the accuracy of your classifier .

You are expected to deliver: (one file: first.lastname.assignment2.zip)

1. source code of your implementation. **[3%]**
2. short report containing:
   a) Explanation of any data-preprocessing you have used.
   b) Explanation of how did you choose your network architecture and how did you fine tune your hyper-parameters, e.g., learning rate, regularization, etc...(explanation associated with some numerical evidence is preferred) **[1%]**
   c) a plot of your best training and validation losses (Y axis) versus number of epochs (X axis) showing when did you stop training. **[2%]**
   d) Correct Classification Rate of each of the 10 classes separately. CCRn is the ratio of the number of correctly classified images in class n divided by the total number of test images in class n (which is 1000). Report CCRn for NN versus LLS classifier (from assignment 1). **[1%]**
   e) Average Correct Classification Rate (ACCR) using the 10000 testing set. ACCR is the number of correctly classified images divided by the total number of testing images (which is 10000). **[max(0,30(ACCR-0.5))%]**

- Human ACCR for this dataset is known to be ~ 0.94[1]
- if you beat the 0.9653 record[2] you get an A in the course :)

1 http://karpathy.github.io/2011/04/27/manually-classifying-cifar10/

2 http://rodrigob.github.io/are_we_there_yet/build/classification_datasets_results.html#43494641522d3130