



Milestone (1):

You will compare between the performance of the following optimization algorithms:

- a) Stochastic Gradient Descent with Warm Restarts
- b) Nesterov Accelerated Gradient (NAG)
- c) RMSProp
- d) Nadam
- e) Learning Rate Schedulers (Exponential Decay, Step Decay)

One way is to use these algorithms in training the well-known CIFAR-10 data set for character recognition. In your comparison, use a shallow neural network. You need to record the training time in each case.



Major Task Project: Optimization & Image Classifiers

Students are encouraged to work in groups. Each group has at most three students.

Due Date: Milestone (1): TBD - Milestone (2): TBD

Milestone (2):

The aim of this project is to create and train an encoder-decoder network for the face recognition problem. You may use the well-known datasets CASIA-WebFace or FRGC.

- 1- You may divide the data sets to be 70% for training, 15% for validation, and 15% for testing.
 - 2- Normalize your data using the techniques explained in the course lectures by subtracting from the mean and dividing by the standard deviation at each dimension. Visualize your data after normalization.
 - 3- Using tensor-flow, design your encoder and decoder as a multilayer neural network and compare between the performance of the following encoder-decoder
 - a. Vanilla Autoencoder
 - b. Variational Autoencoder (VAE)
 - c. Convolutional Autoencoder (CAE)
 - 4- Using cross validation, what will be the best number of hidden layers as well as number of nodes per layer?
 - 5- You need to visualize the training process (loss vs iterations).
 - 6- What will be the best accuracy you get?
 - 7- Use the output code of each image as a feature vector. What will be the recognition accuracy using the minimum Euclidean distance classifier?
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MCT & MCTA Programs
CSE473: Computational Intelligence
Fall 2024

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Important: You need to write a neat report for each milestone with the following contents:

- Problem definition and importance (1 Page).
- Methods and Algorithms (2-3 Pages).
- Experimental Results (samples of your trails) and discussions.
- Appendix with codes.

Warnings: (1) Plagiarism is prohibited. (2) Assignments with no reports and or no presentations will not be graded.
