

Assignment #3: Neural Network Classifier

Due: Friday, April 2nd, 2021 at 11:59 PM (EST)

Description

In this homework you will practice how to write Neural Network classifier in Python with NumPy package. You need to understand how Neural Network classifier work, including back propagation and gradient decent in order to implement this homework successfully. The goals of this homework are:

- To implement and understand Neural Network classifiers.

Instructions

*** Important *** In order to complete this lab, you will need to install additional packages. The packages are: NumPy, Matplotlib, Tensorflow, and Keras. This can be done using the package manager built into PyCharm (tested with Windows and Linux). As some of the packages in this list depend on other packages in this list, it is recommended that you install them in the given order.

In this homework, you need to fill the block of code in 2 python files, `runTwoLayersNN.py` and `twoLayersNN.py`.

- `runTwoLayersNN.py`: This is the main file that you will execute. It reads and processes the CIFAR10 dataset, initializes the classifiers, trains them, and also tunes the hyper parameters.
- `twoLayersNN.py`: Two-layer Neural Network class that contains 5 functions: initialize, train, predict, calculate loss, and calculate accuracy.

Notes:

- Each file has comments that will walk you through the implementation. Furthermore, they have explanations in each block of code that you have to fill in.
- The number of points available for each block of code is in the comment with the instructions.
- Comment your code.
- Do not call the print function in your final submission.
- *** Do NOT edit any of the code outside of the TODO blocks. ***

Submission

Your submission ZIP archive will contain 2 python files named: `'runTwoLayersNN.py'`, and `'twoLayersNN.py'`. (Do not change the names of the python files!)

- Zip file named via the following convention:
 - `<SU-EMAIL>_<FIRST-Name>_AS3.zip`
 - Ex. `dprider_Daniel_AS3.zip`
- In the report, paste a copy of the output from `runSvmSoftmax.py` as well as your answer from the gradient calculations.
- Upload the zip file to blackboard before 11:59PM (EST Time) 04/02/2021