

MIT CSAIL
6.869 Advances in Computer Vision
Fall 2019

Miniplaces Challenge: Part 2

Posted: Thursday, Nov 7, 2019

Due: Friday, Nov 15, 2019

Note: 6.869 and 6.819 students are expected to finish all problems unless there is an additional instruction.

We provide a python notebook with the code to be completed. You can run it locally or in Colab (upload it to Google Drive and select 'open in colab') to avoid setting up your own environment. Once you finish, run the cells and download the notebook to be submitted.

Submission Instructions: You should submit a zip file with a PDF report and your code on stellar whose filename is prefixed by your kerberos ex: `yourkerberos.zip`. We only care that your kerberos is clearly visible - if it helps you organize, you may add more to the filename, separated by underscore (`yourkerberos_miniplaces2.zip`). Make sure to submit the correct zip file!

Late Submission Policy: If your pset is submitted within 7 days (rounding up) of the original deadline, you will receive partial credit. Such submissions will be penalized by a multiplicative coefficient that linearly decreases from 1 to 0.5.

In this assignment, you will be experimenting with neural networks using PyTorch. In order to run the experiments fast, you will need access to a GPU. If you don't have a GPU, you can use Amazon Web Services (AWS) to rent a GPU, using our educational credits (see notebook).

You can also use Google Colab: Runtime - Change Runtime type - Hardware accelerator - Gpu.

Problem 1 *Improving NN Performance* (5 pts)

This challenge is all about improving the performance of a classification neural network. We have provided skeleton code to train and evaluate a network.

Implement or experiment with at least 2 of the following techniques:

- Add / Remove Dropout Layers
- Change the NN Initialization Technique
- Try at least 2 different network architectures
- Add Skip connections
- Change Optimizers, or Add a scheduler

For each technique you choose, plot the top-5 error of your modified network against the top-5 error of the original network for both the training and validation sets. Try with a few different hyperparameter values! For example, if you choose to modify the learning rate, show what happens when you increase the learning rate, and when you decrease the learning rate.

In your write up, explain each technique you tried, and describe your results.

Problem 2 *The Mini Places Challenge* (5 pts)

Using a combination of different techniques, improve the NN performance on our test set as best you can. See the notebook for more information. To get credit for this problem, your final neural net must achieve an accuracy of at least 70%. The top 20 teams in the class will receive 10% extra credit on this homework, and the top 5 teams will receive 20% extra credit.

In your report, describe the architecture of your NN, your hyperparameters, and any details about how you trained the network. Also talk about things you tried, and decisions you may have made. Use diagrams as needed. This explanation can be brief - try to keep it shorter than a few paragraphs.