

CS 395

Deep Learning

Assignment 1

This assignment is an introduction to deep learning tools for computer vision. You will design/use and train deep convolutional networks. you can use any opensource deep learning toolkit.

Note: For this assignment, submit your local copy of code and answers. Submit the file to Blackboard under Assignment1 using this format:

Yourfirstname_lastname_Assignment1.zip, inside this zip file, you should have a file name **report.pdf** to report your results.

Deadline: Wednesday, March-15-2021 11:59 PM.

In this assignment, you are asked to work on **human object sketches** dataset. It contains 20,000 unique sketches evenly distributed over 250 object categories. for each category choose the first 60 images for training the other 20 for testing (they are ordered by number).

You can use any convolutional neural network architecture, you can use Alexnet, VGG16, VGG19, resnet, etc ... or you can come up with your own!

Submit your code and results (accuracy or error rates, number of epochs, etc ...) for these scenarios:

1. Train from scratch – Use GPU on deep green or your own GPU! [33 points]

This might take a while to train, so you can train the model for few epochs until you sure it is converging, no need to complete the whole training.

2. ConvNet as a fixed feature extractor[33 points]: We take a ConvNet pretrained on the ImageNet dataset, remove the final fully-connected layer and treat the rest of

the ConvNet as a fixed feature extractor for the new dataset. We can train a linear classifier (linear SVM or SoftMax classifier) on these extracted features (4096-D vectors for every image in case of AlexNet) for the new dataset.

3. **Finetuning the ConvNet**[33 points]: The second strategy is to not only replace and retrain the classifier on top of the ConvNet on the new dataset, but to also fine-tune the weights of the pretrained network by continuing the backpropagation. It is up to you (with justification) to decide on the layers that need to be finetuned.

Competition part:

- This part of the assignment is optional, for extra credit purpose 😊
- Come up with your best architecture and report your results in this document by adding your name and the results that you achieved:
<https://docs.google.com/document/d/1rPpmy5d8l9AwZBb1Z8A72-k0yJ7Zn4JXk8e7ZTIKVvE/edit?usp=sharing>
- Winners 1st : 3 extra credits.
- Winners 2nd : 2 extra credit.
- Winners 3rd : 1 extra credit.
- Three winners in total.