

Assignment 4: Object Detection with SSD

February 10, 2020

Objective

- Continue gaining experience with PyTorch and helper libraries
- Understand the VOC Object Detection Dataset
- Train and evaluate the SSD neural network architecture
- Perform an ablation study testing a different base network and learning rate schedule
- Learn the Non-Maximum Suppression (NMS) algorithm

Resources and Instructions

Environment Setup:

We recommend using Google Colab to complete this assignment.

1. Create a folder called “ece495_assignment4” within your Google Colab “Colab Notebooks” folder.
2. Upload the assignment ipynb, utils.py and json files to the Google Colab “ece495_assignment4” folder
3. Open the assignment
 - Runtime -> change runtime type
 - Set hardware accelerator to GPU
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Assignment:

1. Ablation study on using a different network base
 - Model A: Train and evaluate the SSD network with the default VGG base.
 - Model B: Implement the ResNetBase class. Then train and evaluate this model.
2. Ablation study on updating the learning rate
 - Model C: Train and evaluate the SSD network with the default VGG base but also with a PyTorch learning rate scheduler.
3. Answer 2 questions on the differences from the NMS pseudo code described in the lectures / tutorial and the implemented version in the code.

Deliverable HTML output:

In the Jupyter notebook, go to File > Download as > HTML (.html) Submit a ZIP file containing the HTML output. Please follow the naming convention of your zip file: a4_<user_id>.zip

Due Date

11:59 pm, February 26, 2020

No late submissions will be accepted. There will be no extensions.

Marking Scheme

This assignment is out of 10 marks.

- 2 marks for training and evaluation output for the SSD network with the default VGG base
- 3 marks for implementing the ResNet base and displaying the training and evaluation output
- 3 marks for adding the learning rate scheduler and the training and evaluation output for the SSD network with the default VGG base

- 1 mark for the model with the learning rate scheduler to get at least 50% mAP
- 1 mark for the NMS questions

PoliciesCollaboration

You can discuss the problem with peers, but you must design and implement your own solution independently.

Use of online resources

You may consult online resources for inspiration, but you must develop your own code.