CS/ECE 8690 Computer Vision

Homework 3A - Object Detection using Pre-trained Deep Learning Networks [40 pts]

Out: Tuesday Feb 28 **Spring 2023**
Due: Tuesday Mar 7

The goal of this assignment is to get familiarized with

- PyTorch installation
- TorchVision library [1]
- Loading deep learning models and pre-trained weights
- Perform object detection using Faster R-CNN deep learning model

Faster R-CNN [2] is a popular two-stage object detection algorithm. The first module is a deep fully convolutional network that proposes regions. The second module is the Fast R-CNN detector [3] that uses the proposed regions. The entire system is a single, unified network for object detection (Figure 1).

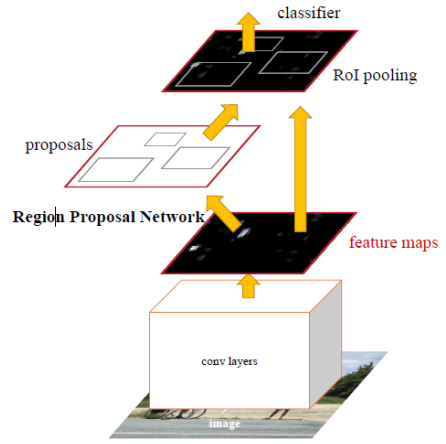

Figure 1. Faster R-CNN is a single, unified network for object detection. The RPN module serves as the 'attention' of this unified network [2].

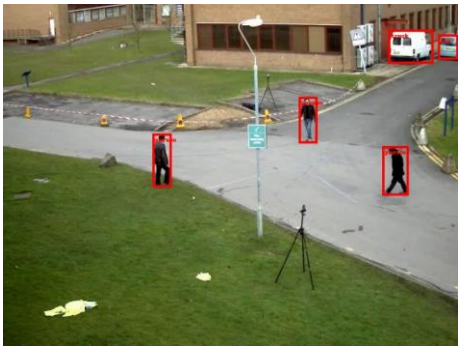

Figure 2. Sample detection results.

Tasks:

1) Install PyTorch
2) Load Fast R-CNN model
3) Detect pedestrians in the given test video
4) Draw detection bounding boxes on test video

Report: Show detection results on frames: 1, 100, 200, and 400 of the given test video.

Test dataset: https://motchallenge.net/vis/PETS09-S2L1

Submission instructions: Your submission should include a report (including output images & your interpretation of the outputs) and associated programs (as separate files).

References:

[1] https://pytorch.org/vision/main/index.html

[2] S. Ren, K. He, R. Girshick, and J. Sun. "Faster r-cnn: Towards real-time object detection with region proposal networks." *Advances in neural information processing systems*, NeurIPS 2015.

[3] Ross Girshick, "Fast r-cnn." In *Proceedings of the IEEE international conference on computer vision*, pp. 1440-1448. 2015.

[4] Slides for Lecture 9 and 10 on Canvas

[5] Canvas\Review-Tutorials\CS-ECE-8690-pytorch-tutorial.pdf