CMP_SC 8690: Computer Vision
Homework 4A: Semantic Segmentation Using Pre-Trained Deep Learning Networks
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Due: 4/2/2024

Abstract:

    The goal of this assignment was to strengthen using pre trained deep networks for computer vision tasks. We were tasked with exploring the ResNet50 to segment images utilizing the COCO_WITH_VOC_LABELS_V1 weights. It is also to explore possible reasons for pitfalls of the segmenting algorithm.

Experiments and Results:

Conclusion:

      After loading in the given images into CV2 and utilizing the ResNet50 with the pretrained weights we were able to obtain segmentation masks for the images. The segmentation masks that were produced were not perfect. I think the biggest pitfall for the segmentation of these images were the fact that the model was trained on a general dataset and was not necessarily trained for the data that was given to it. The first image was able to do a decent job and segmenting the background, and for the motorcyclist it is able to tell two different classes between the rider and the motorcycle itself. This was surprising to see that it was able to pick that up because the motorcyclist looks very similar to the motorcycle itself. It struggled to segment the car however and thought it was two different classes. I think the decals and the coloring of the car possibly confused the ResNet model on what was there. It also was one of the images that needed to be resized so there was some data loss that could've contributed to some of the failures. The second image was of a highway with cars and busses on it. The model was able to tell that the busses and cars were different classes. However, for the cars that were further away in the image the model was not able to catch those. That was most likely because it appears those are part of the background, if you look at the bridge that looks closer than the cars below it and the bridge is part of the background. The last image was some foggy traffic. It was able to segment some of the cars, but many of the cars in the image are gray which looks very similar to the background, which is probably why it wasn't able to catch those images.

References:
- Libraries and tools: PyCharm, OpenCV, Matplotlib, PyTorch, TorchVision, Preview.
- https://pytorch.org/vision/stable/models/generated/torchvision.models.segmentation.deeplabv3_resnet50.html#torchvision.models.segmentation.DeepLabV3_ResNet50_Weights