

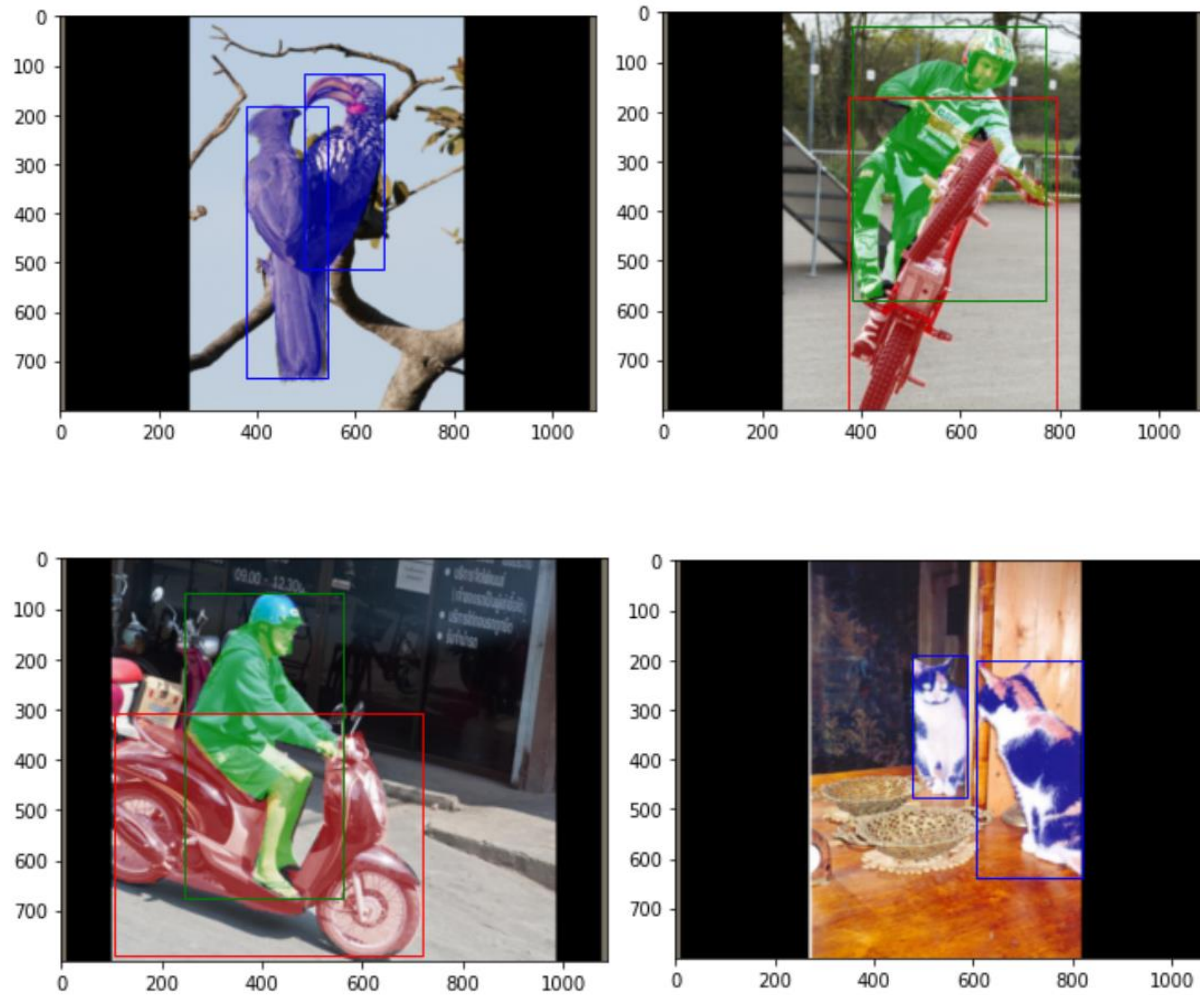
CIS 680 Project 3 – SOLO

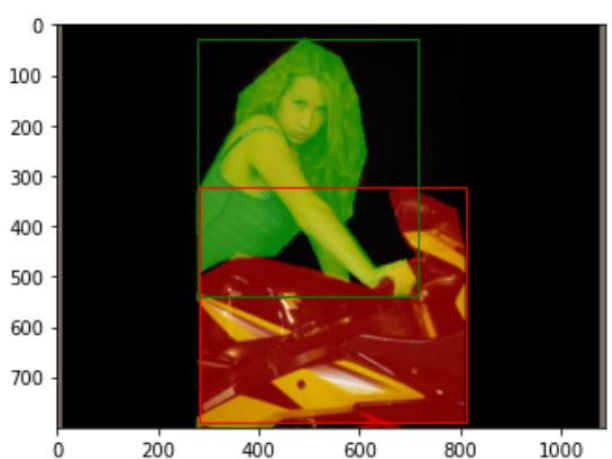
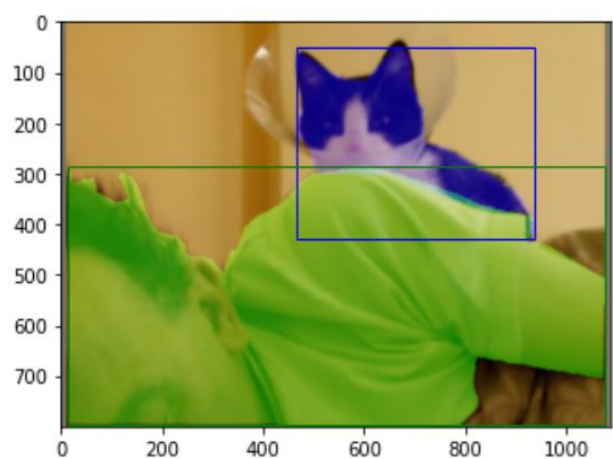
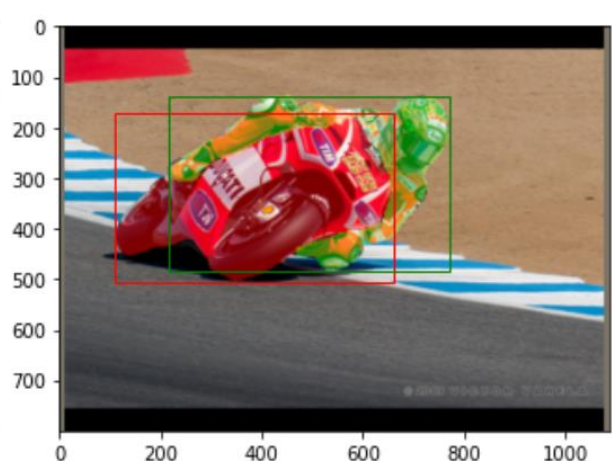
Group members:

William C Francis (willcf)

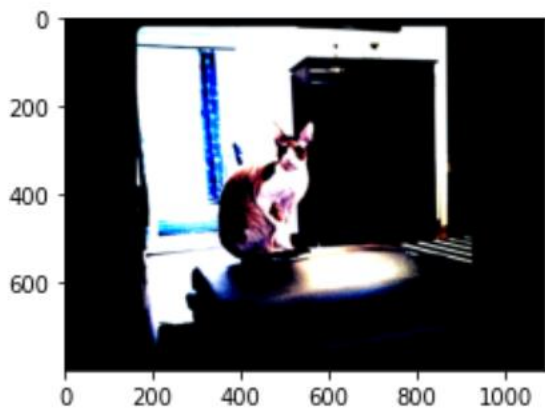
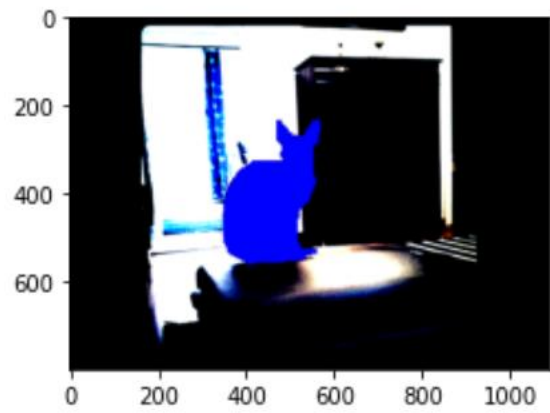
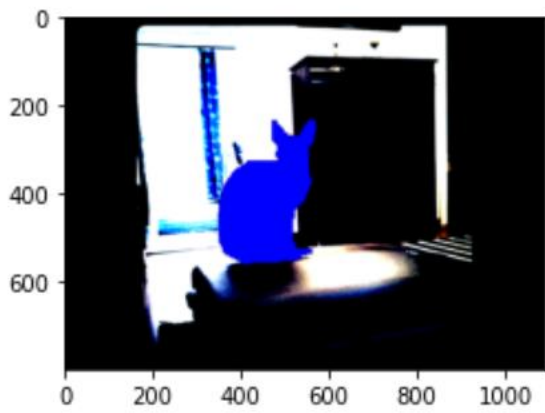
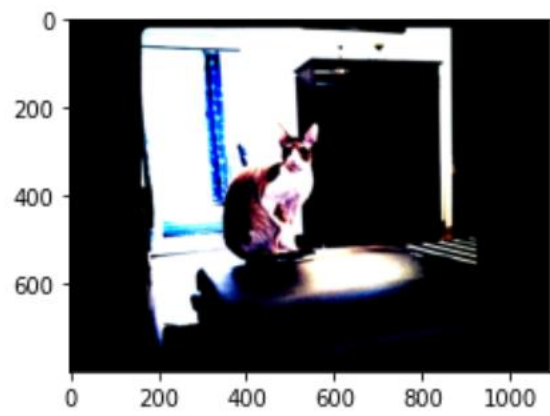
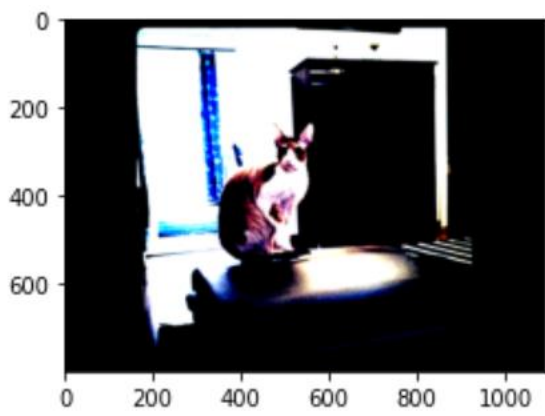
Rashmi Phadnis (rphadnis)

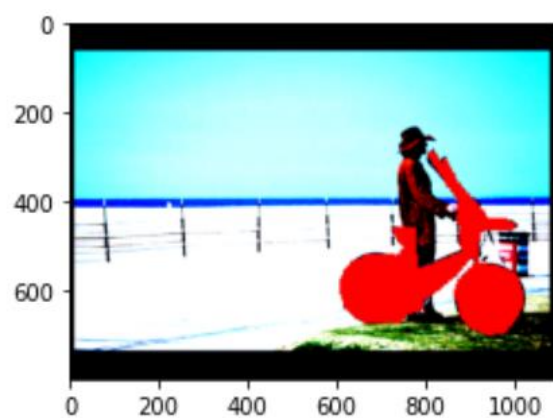
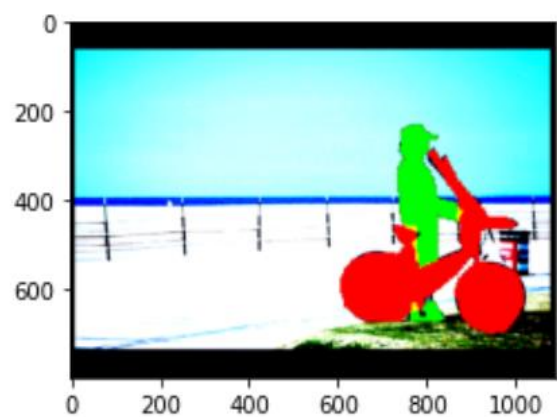
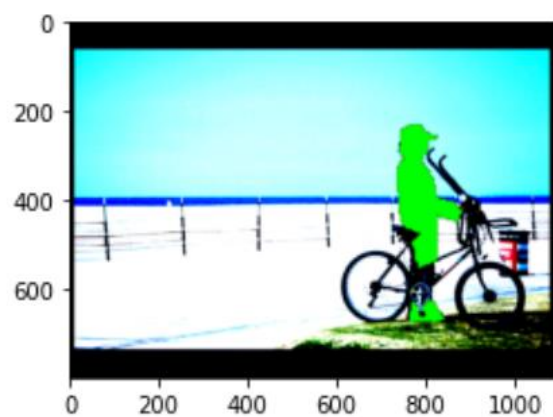
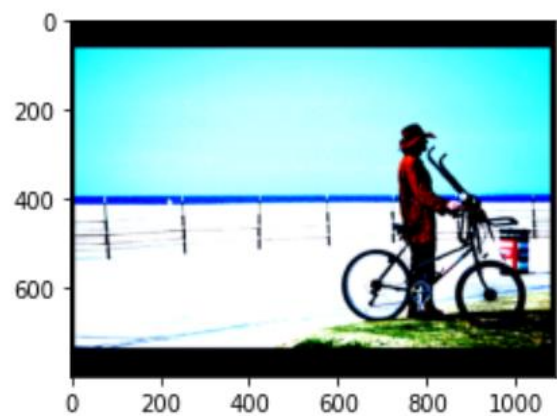
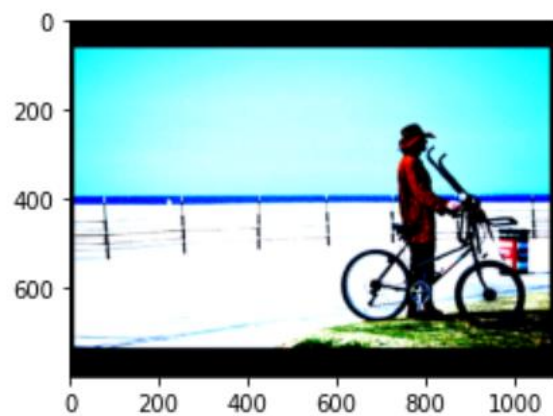
Dataset Visualization Plots

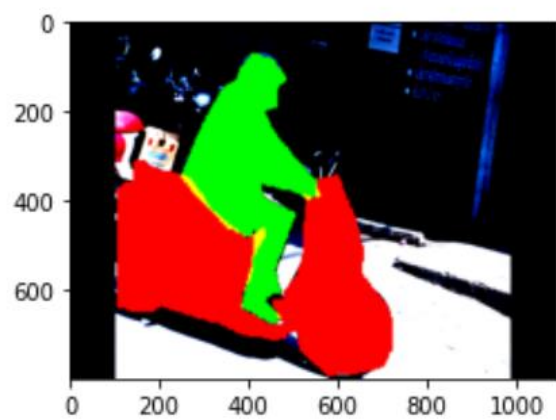
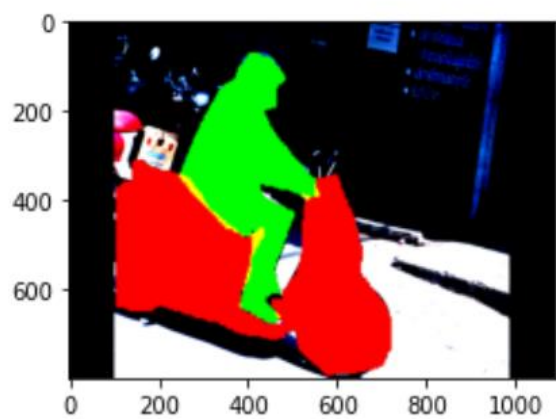
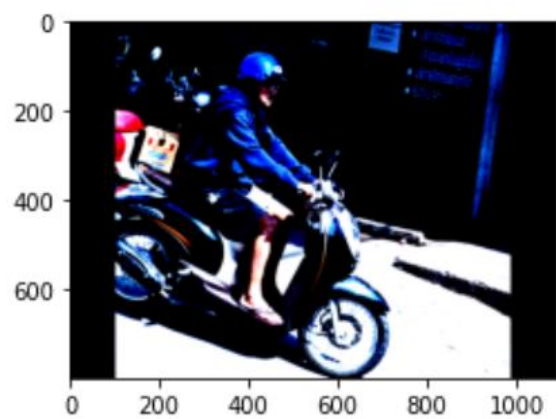
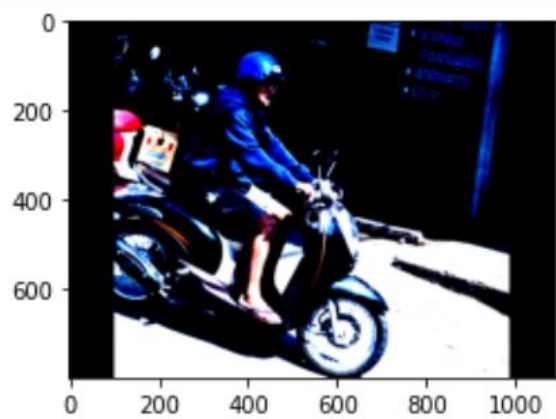
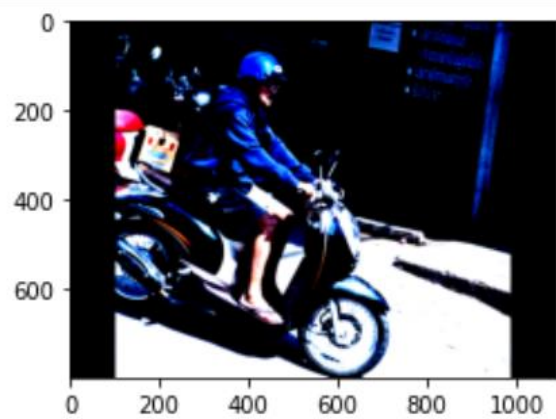


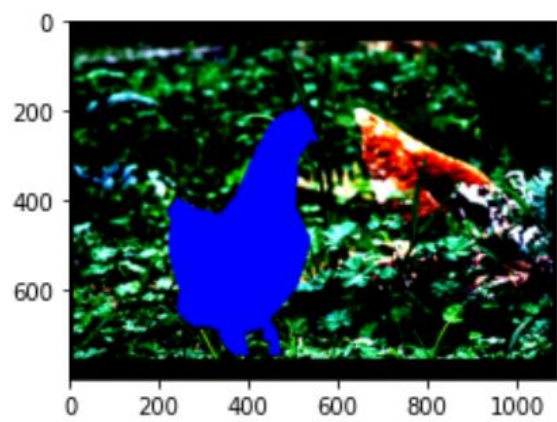
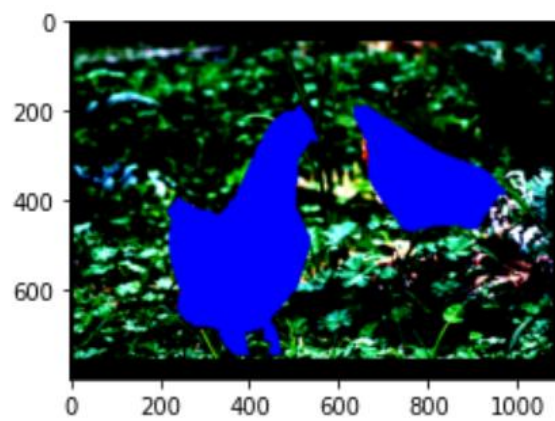
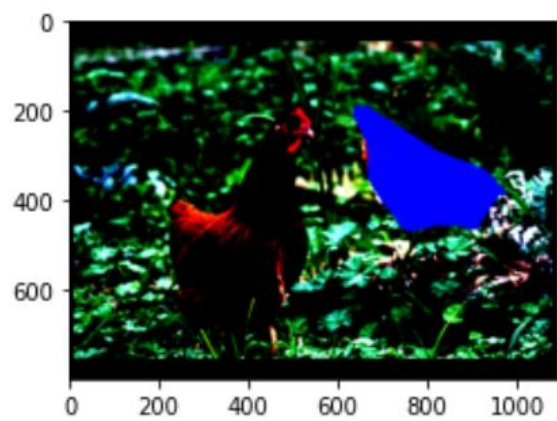
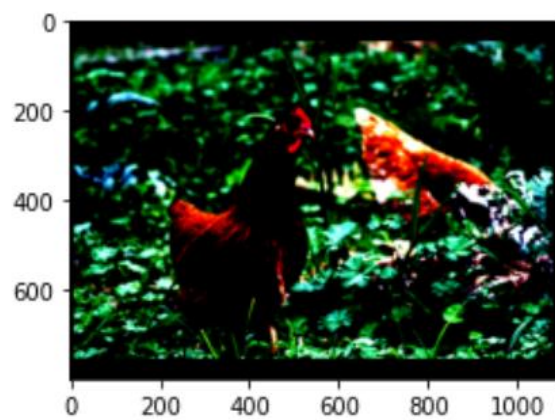


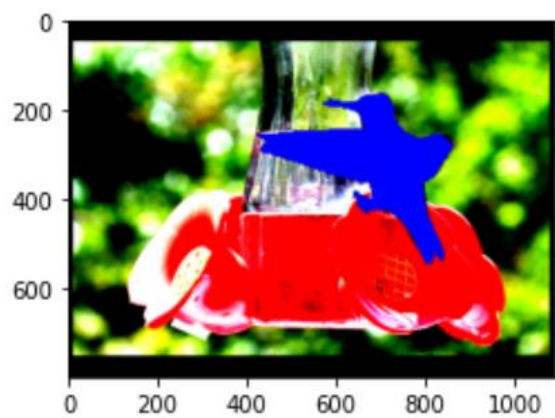
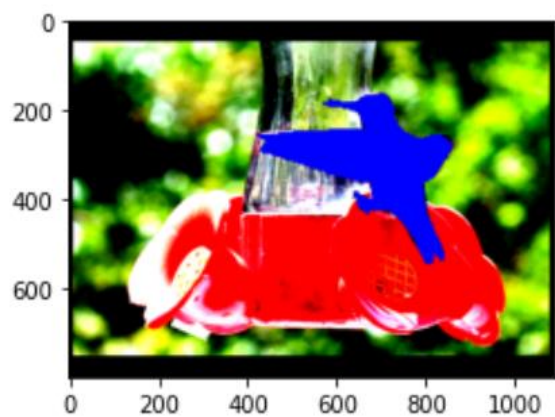
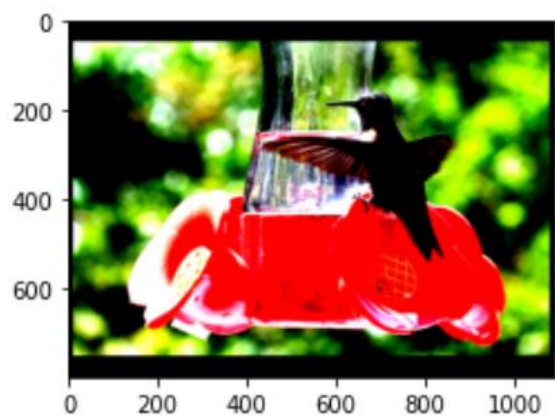
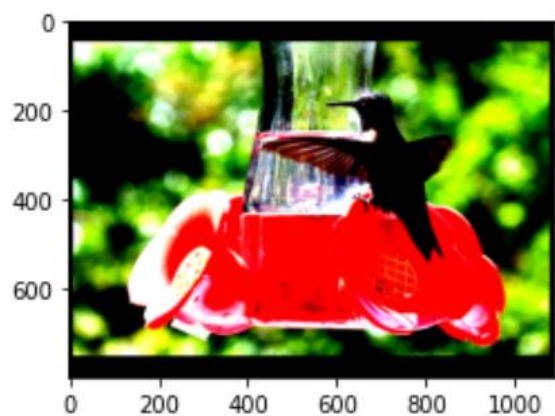
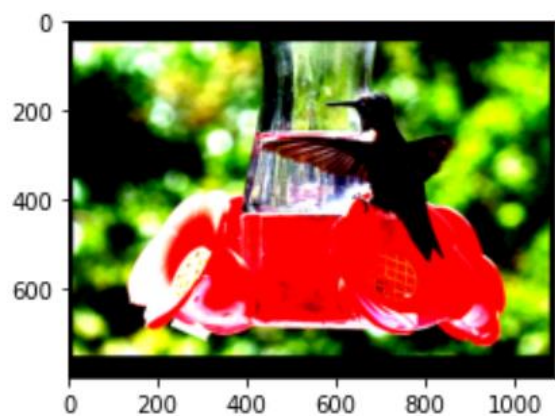
Target Assignment Plots

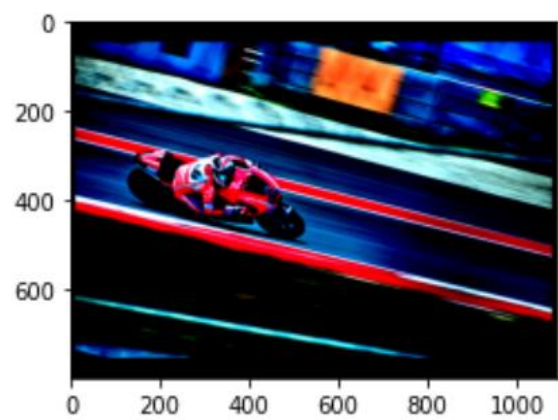
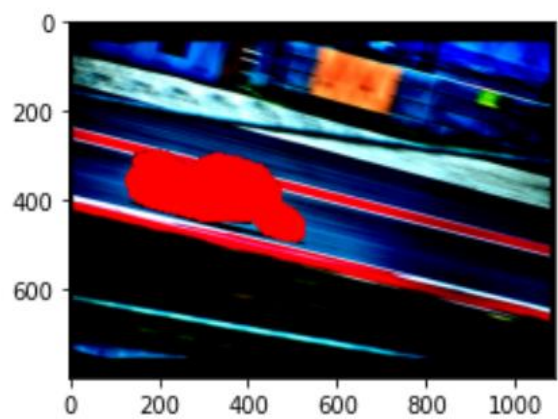
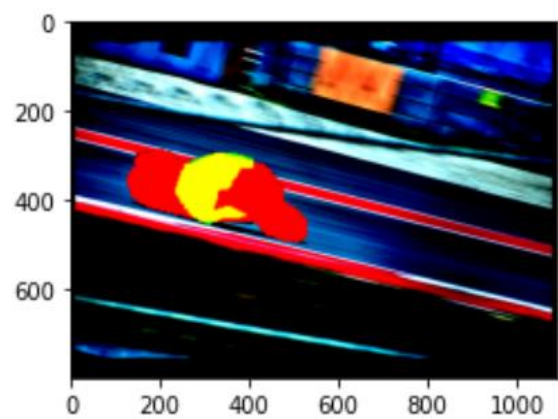
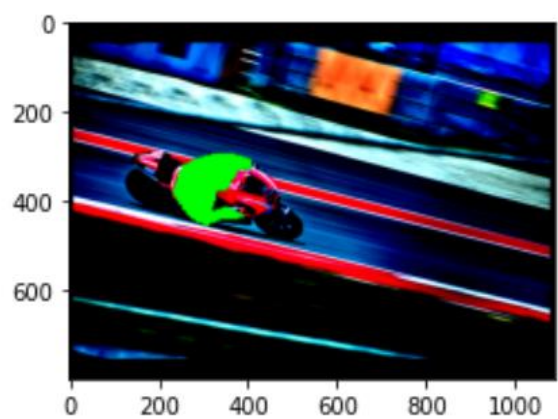
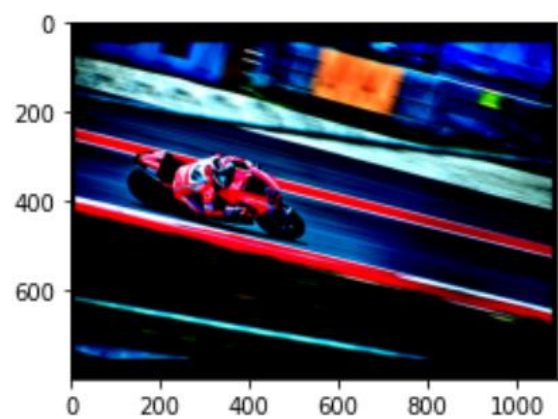


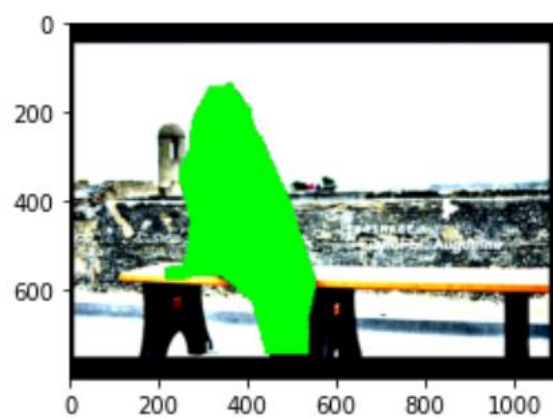
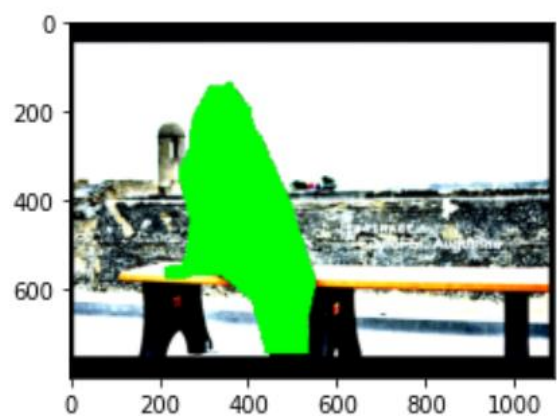
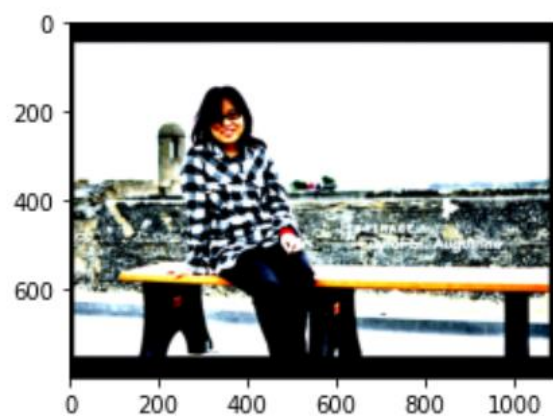
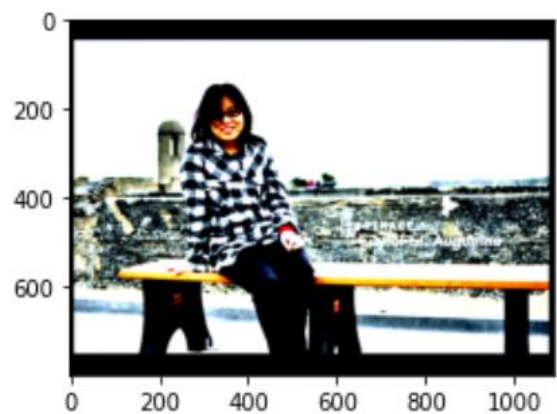
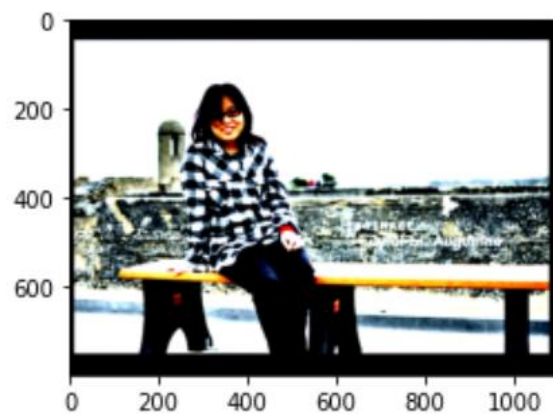


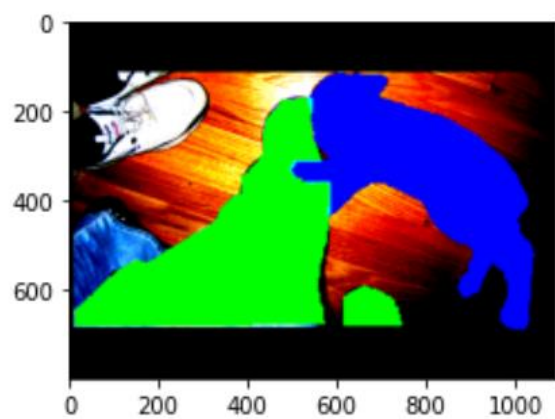
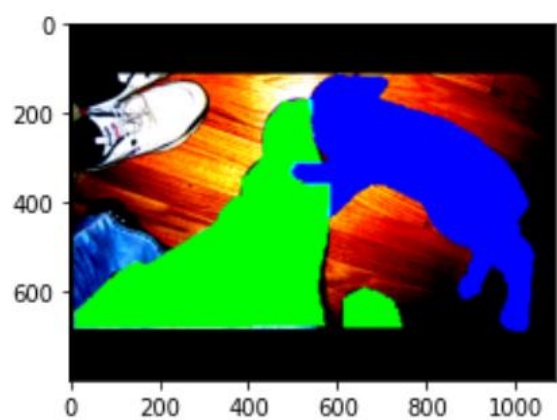
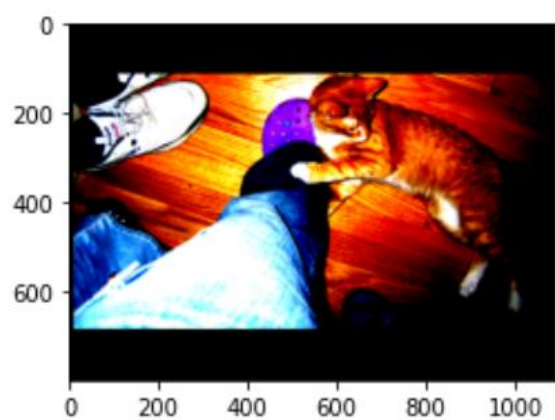
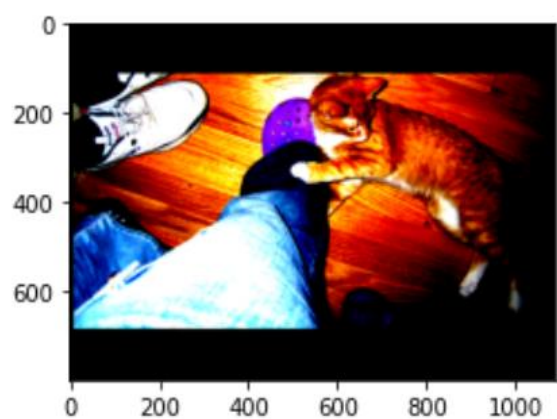
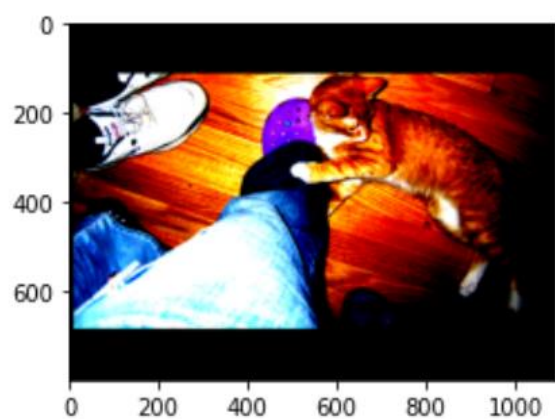




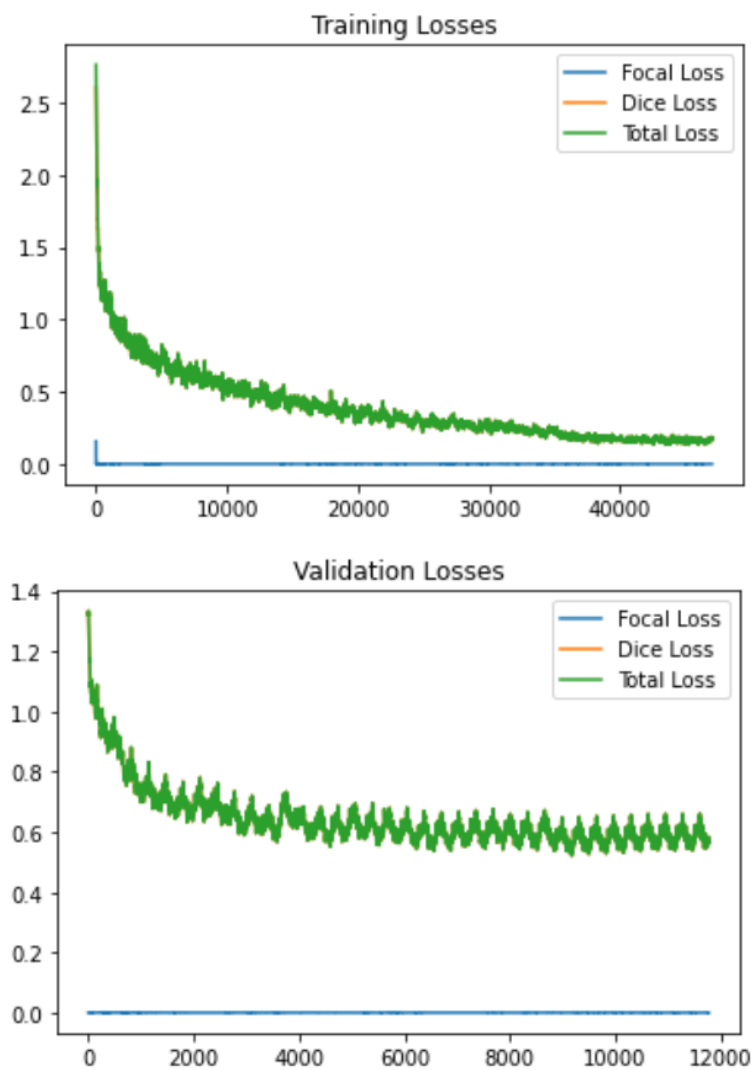




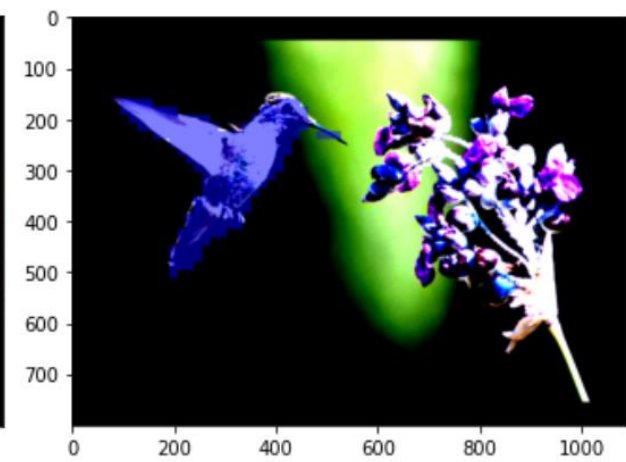
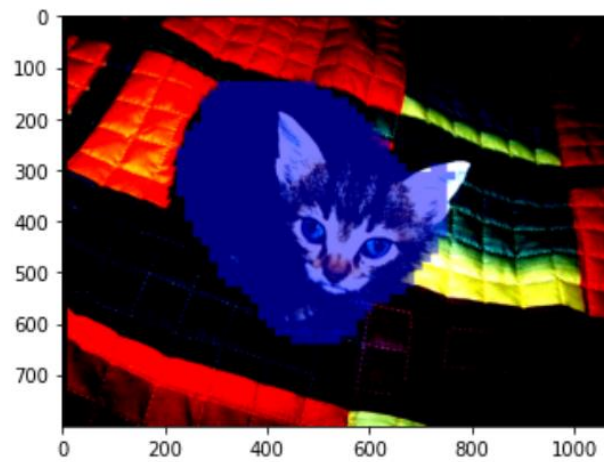
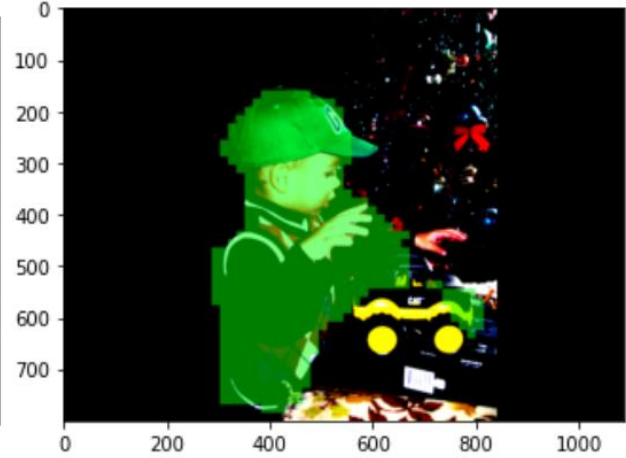
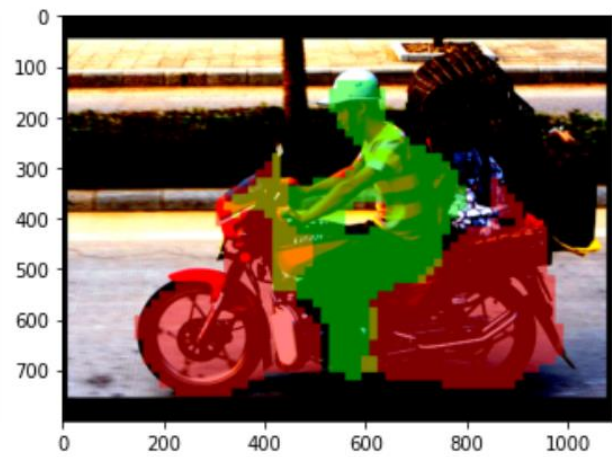
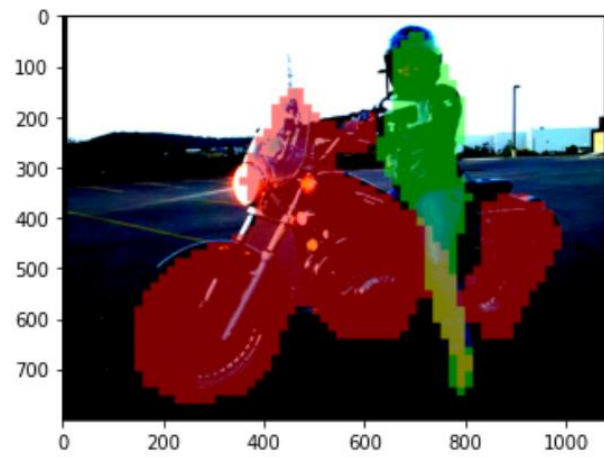


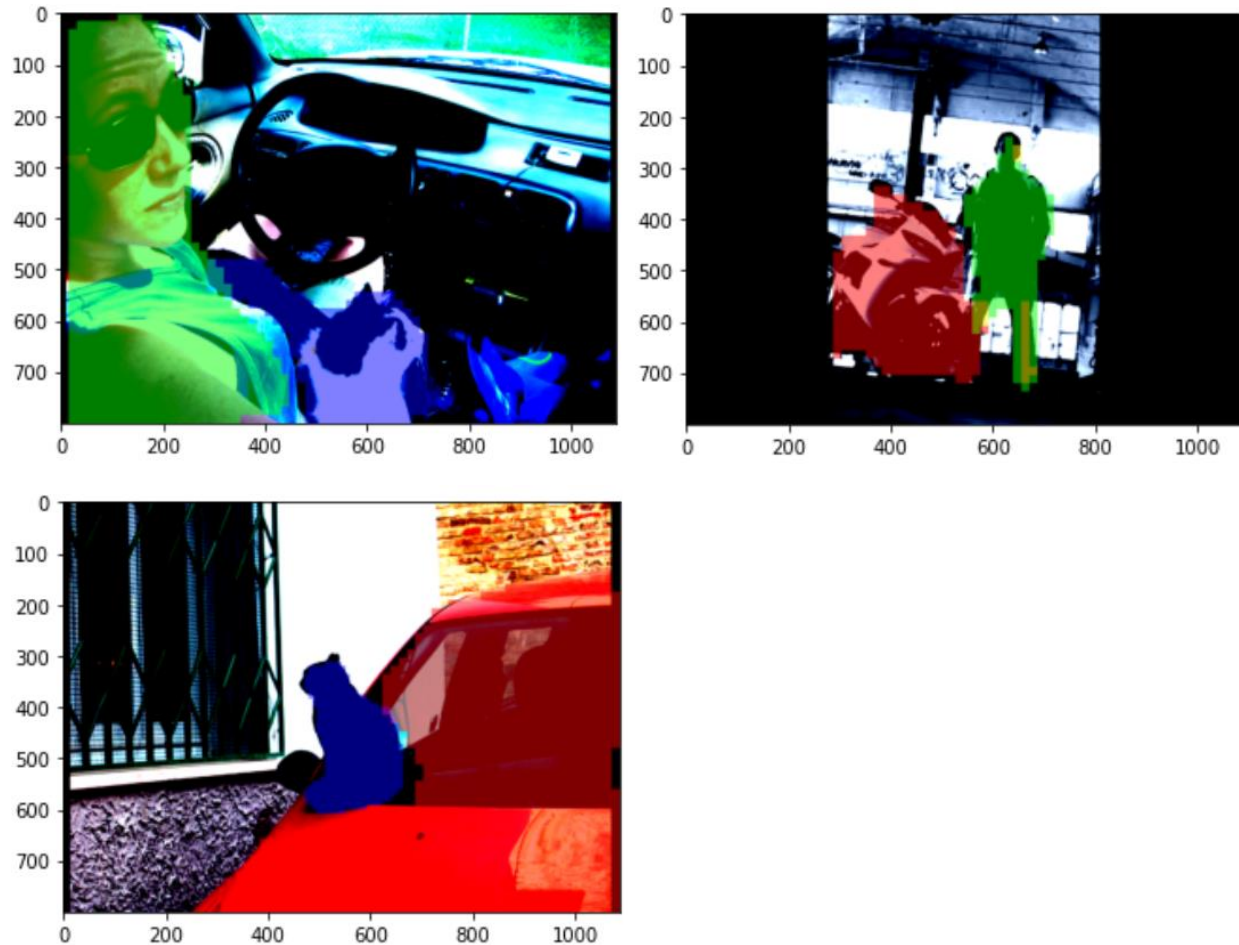


Training and Validation Loss



Final Inference Results





Discussion

While training the model, we faced issues with CUDA memory shortage, due to which we had to reduce the batch size to 2 from the proposed 16. We also had to clear the CUDA cache every iteration to optimize training as well as to avoid the CUDA out of memory error. Another challenging task was to interpolate the strides of the feature pyramid from [4,8,16,32,64] to match the SOLO paper which has the strides [8,8,16,32,32]. One of the changes we made to the suggested architecture is changing the optimizer from SGD to Adam. This was to improve the convergence while training. We considered data augmentation, however, we decided against it because the training was already taking a long time and augmentation would increase the dataset size. An interesting observation is that the Focal Loss is extremely small compared to the Dice Loss. It is in the order of $10e-5$ while the Dice loss is in the order of $10e-2$. This is also why we can only see the Total Loss and Focal Loss in the Loss curve plots. The Dice Loss becomes almost equal to the Total Loss since Focal Loss is very small. A potential improvement would be to include data augmentation as it would make the model robust to noises. Increasing the number of FPN layers might also improve the performance as it helps deal with the object sizes at a higher resolution. But this comes with an increase in computational complexity.