

CSCI 631 Project 1 Object Detection

Due date: March 23 2021, 11:59PM

Object detection is one of the fundamental problems in computer vision. In this project, we will write a code for single object detection. You may need to use PyTorch, NumPy, and Pandas to finish this project. Please make sure you understand the lecture material (CNN on MNIST) before you start this project.

Question 1 Write a data loader.

In training_dataset.py file, there is a class named training_dataset.

- (1) In the __init__ function, you need to use Pandas.read_csv() to read the training data and the ground truth of training data (dataset directory) .
- (2) Save the data and the ground truth in self.featurestrain and self.groundtruthtrain (tensor format).
- (3) Save the length of data in self.len.

Question 2 Implement an overlap score function.

In function.py file, there is an overlapscore function.

- (1) Find out left, right, top, bottom.
- (2) Briefly describe how you implemented the overlap score function in your pdf report.

Question 3 CNN model

- (1) In cnn_model.py file, complete the **forward** function according to the instructions. The CNN model contains three convolutional layers, one fully connected layer and one output layer with 4 nodes. A kernel of size 5 with stride 1 is applied in each convolution layer. The first two convolutional layers are followed by a max-pooling layer with kernel size 2 and stride 2. We need to set up a dropout rate (0.5) on the fully connected layer. All inner layers are activated by ReLU function.
- (2) Briefly describe how you implement CNN model in your pdf report

Question 4 Train your model.

In train_cnn.py, follow the instructions and complete the training code.

- (1) Set up hyperparameters.
- (2) Load dataset
- (3) Complete the train_model function according to instructions in train_cnn.py.
- (4) Briefly describe how you implement the train_model function in your pdf report

Question 5 Test your model.

Complete the testing in test_model.py

(1) Load testing data in Dataset/testData.csv and Dataset/ground-truth-test.csv.

(2) Load your model and test your model. (Print the Intersection over Union score and provide one picture with the bounding box in your pdf report)

Note: Please submit your code and the pdf report summarizing your results in one zip file **FirstnameLastname.zip**. You do not need to submit your model.pth file.