Deep Learning - Lab 5 Exercise

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Exercise 1.1:A simple CNN baseline

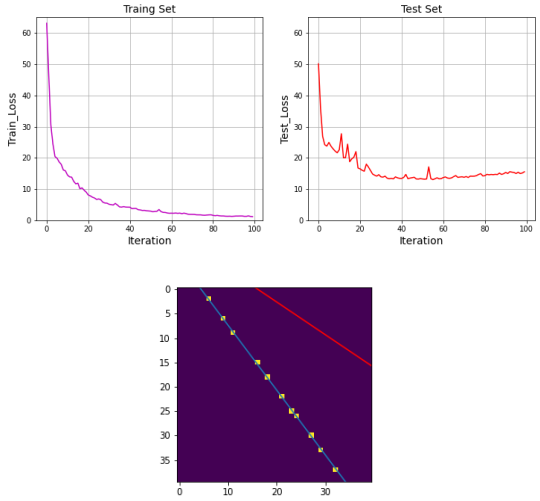

Figure 1: Model performance for initial attempt

In the first attempt, since the task is a regression task, Mean squared error (MSE) is a choice to measure the error. After completing training, the testing error is 16.79, which is shown in Figure 1. The distance between the regression line and the target line can be observed and the majority of reconstructed lines depart somewhat from their targets. The model's overall performance is bad.

Exercise 2.1:A simple CNN with global pooling

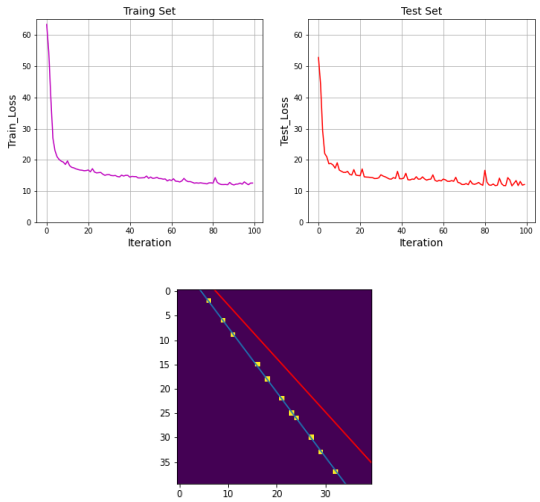

Figure 2: Model performance for second attempt

In the second attempt, a max pooling layer was added to the first attempt model. The testing error is reduced 12.37, which is a sightly improved compared to the first attempt. It can be observed that there is a certain gap between the target line and the predicted line, but it is a little better than the first model. The overall performance of the model is similar to the first model.

Exercise 3.1:Let's regress

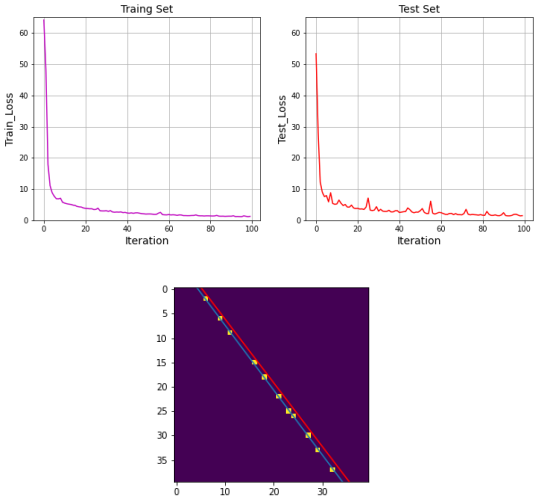

Figure 3: Model performance for third attempt

The performance of the model in the third attempt was significantly improved compared to the previous two. The testing loss is about 1.35. The regression line also almost coincides with the target line, and the difference is very small.

The improved method used here is known as CoordConv.The rationale for this modification is to hardcode the Cartesian coordinate data along with the other channel data so that the convolution kernel knows where it is. It solves the problem of coordinate transformation and have better generalization ability.