MLProgramming assignment III

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1 Description of the Problem

In the programming assignment, we need to complete two parts. The first part is to modify the previous code so that it can calculate the error in approximating the derivative of the given function. However, since the package originally used is not suitable, in this assignment the program is modified into the form of a neural network.

The second part requires using a neural network to approximate both the Runge function and its derivative, and define a loss function consisting of two components. Unfortunately, the neural network package I used in the first part cannot directly modify the loss function during training. Therefore, for this part, I used GPT to help me modify the program from the first part into one written with TensorFlow, and then proceed with the subsequent requirements of the assignment.

2 Programming process

The basic setup is the same as in the previous assignment. However, for data splitting, the initial points are divided into three parts: training, validation, and testing, to perform training, validation, and testing separately. The decision on whether to retrain is based on the size of the MSE on the validation points. Then, the modifications from the two parts of the assignment are incorporated into it.

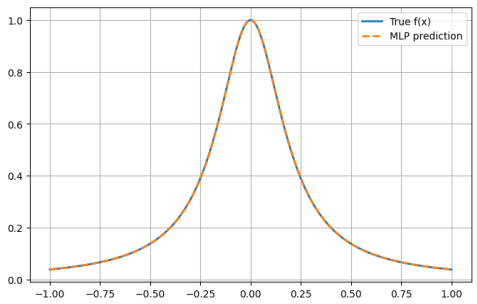

Figure 1: true function and the neural network result

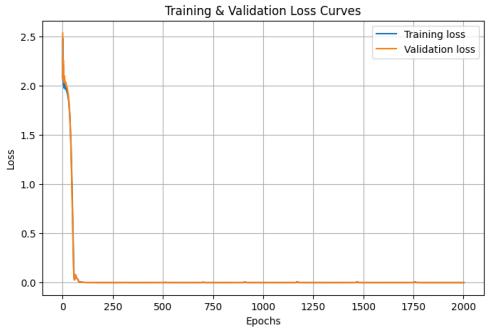

Figure 2: the training/validation loss curves