Report for Machine Learning Homework 3

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Part 1

The results shown in figure 1 are the result of using MLP with 1 hidden layer. The dimension of the hidden layer I used is 1200, serve with an SGD optimizer and momentum is 0.9. I also show the decision region of trainset and testset in figure 2 and 3.

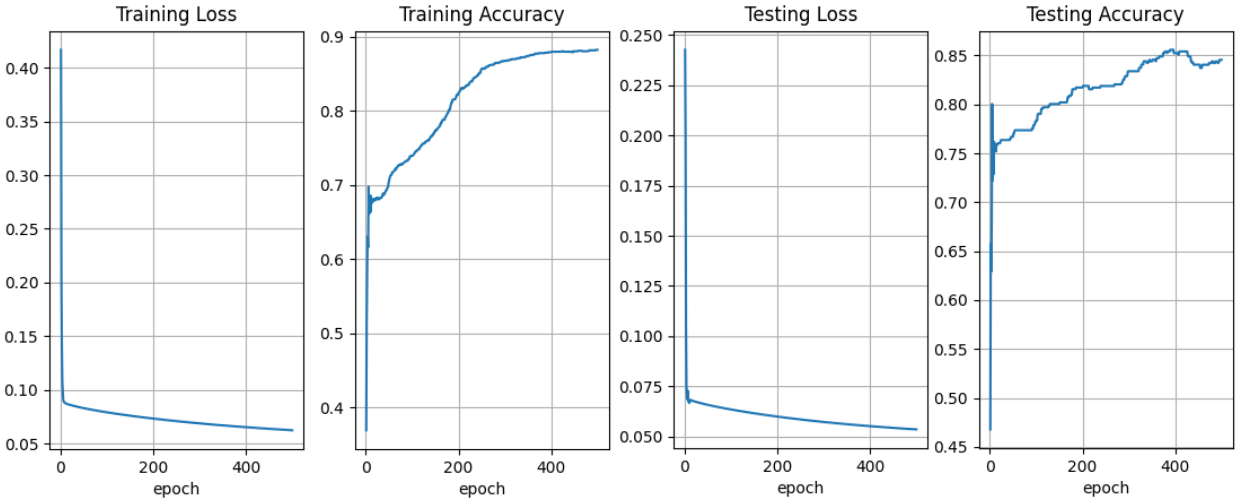

Fig 1. Results of neural network using 1 hidden layer

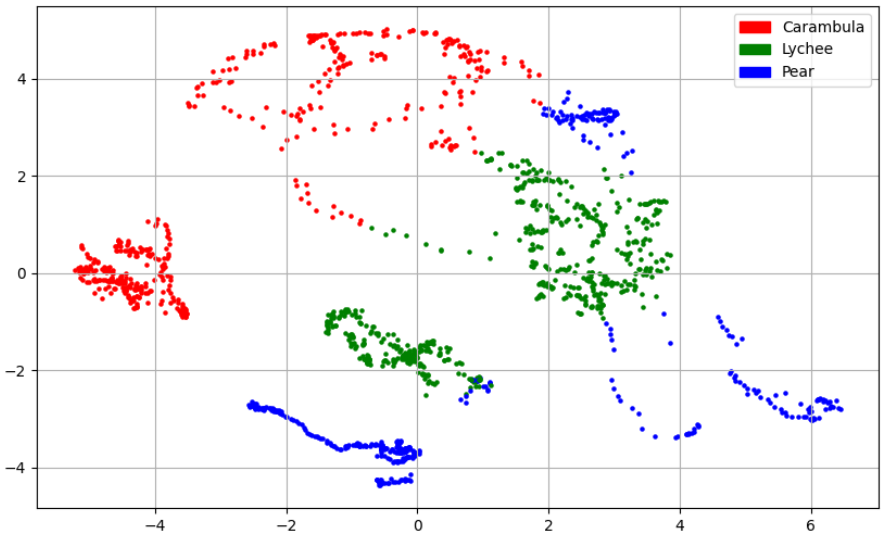

Fig 2. Decision region of the model using one hidden layer perform on trainset

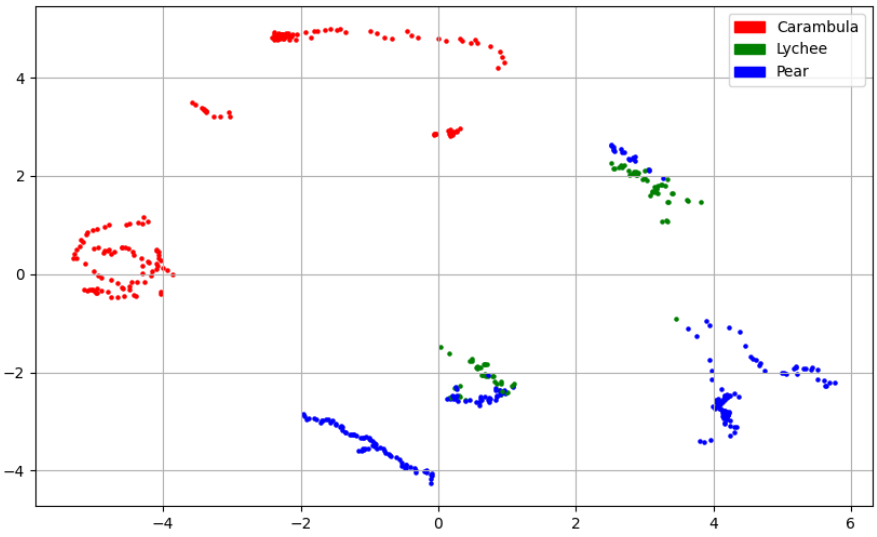

Fig 3. Decision region of the model using one hidden layer perform on testset

Part 2

The results shown in figure 4 is the result of using MLP with 2 hidden layer. Following the setting of part 1, I used 200 and 150 as the dimension of the hidden layers respectively. I also show the decision region of trainset and testset in figure 5 and 6.

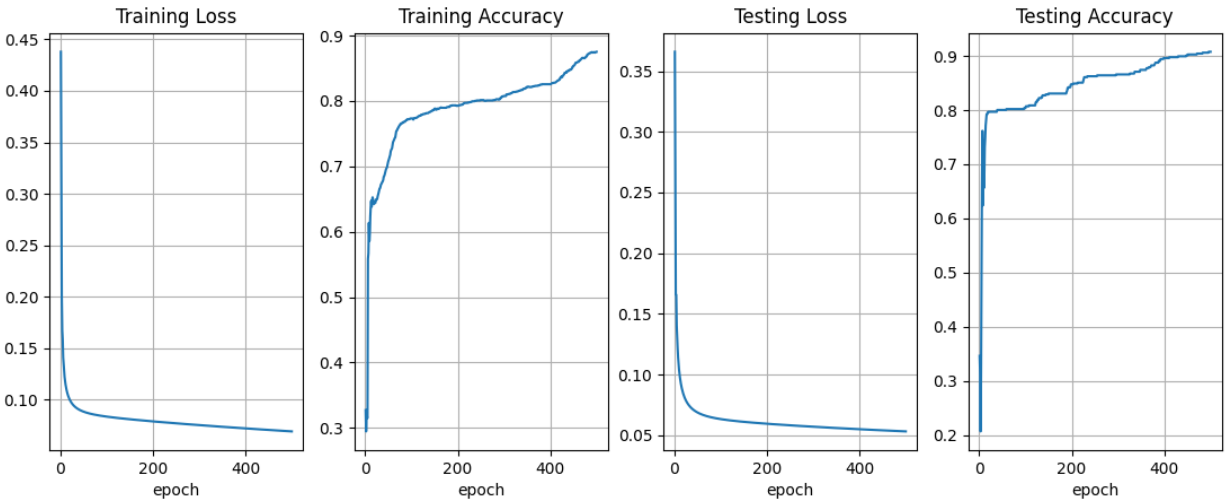

Fig 4. Result of neural network using 2 hidden layer

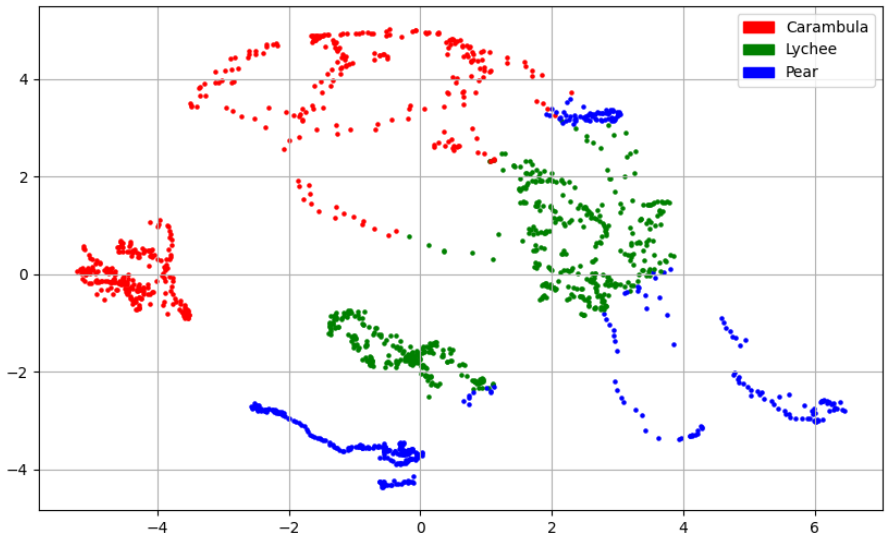

Fig 5. Decision region of the model using two hidden layer perform on trainset

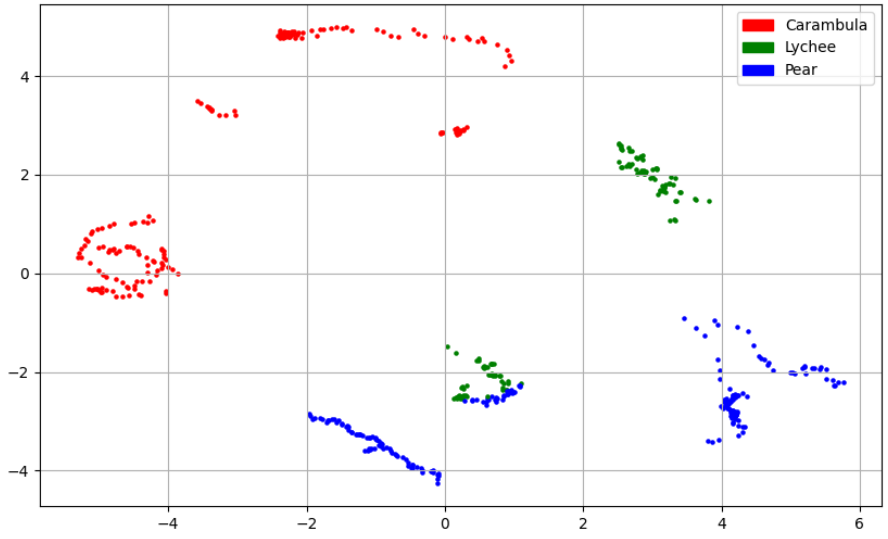

Fig 6. Decision region of the model using two hidden layer perform on testset

Discussion

By adding one layer, the performance of the classifier has been improved, and the decision boundary has slightly moved to a better position. During tuning the dimension of the two hidden layers, I found that the dimension of the first hidden layer has to be larger than the second one. If switch the dimension of two hidden layers, will lead to a performance drop.