

# HW3 Report

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## 1 Neural Networks

The implementation of feedforward and backpropagation process is shown in code folder. At the end of training iterations,  $loss = 1.717e - 01$ ,  $accuracy = 0.9400$ , which is not the optimal actually. And for testing,  $loss = 2.522e - 01$ , and  $accuracy = 0.9230$ .

## 2 K-Neareast Neighbor

(a) boundary figures is shown below:

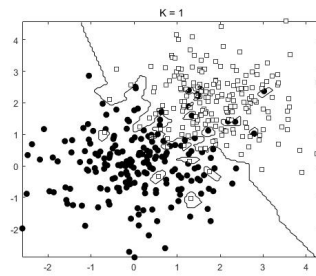


Figure 1: K = 1

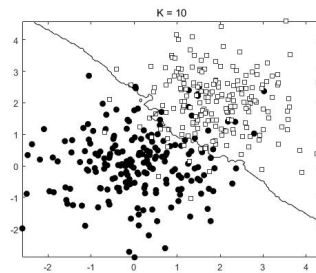


Figure 2: K = 10

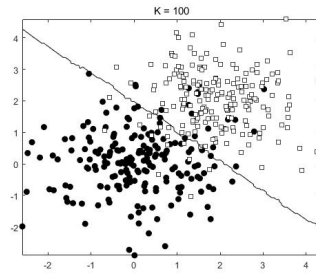


Figure 3:  $K = 100$

(b) One of methods is that choosing a proper  $K$  by Cross-Validation. Compute the validation error on validation set using different values for  $K$ . And pick the optimal  $K$  with the lowest validation error.

(c)

### 3 Decision Tree and ID3

The decision tree and respective information gain is illustrated as the graph below:

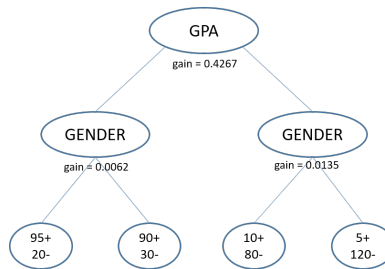


Figure 4: decision tree