# CSL-407
# Machine Learning
# Homework #3

Submitted By:
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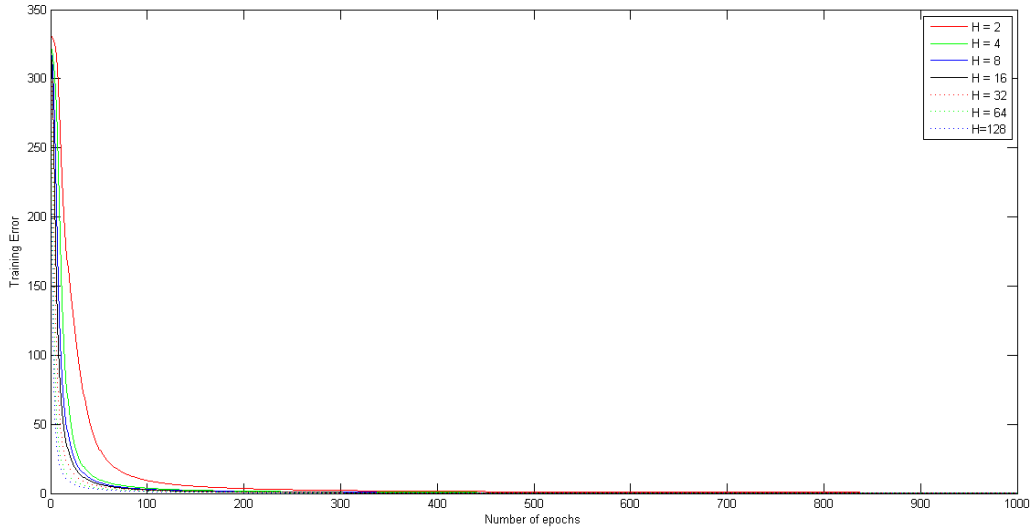
( 2011CS1031 )

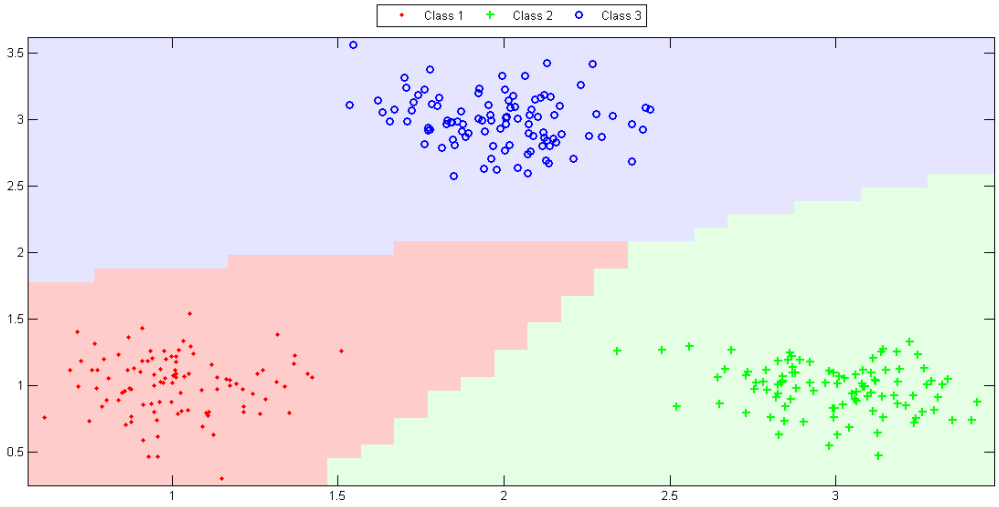
Question - 1

d ) Variation of training error with number of epochs for different choices of hidden layer

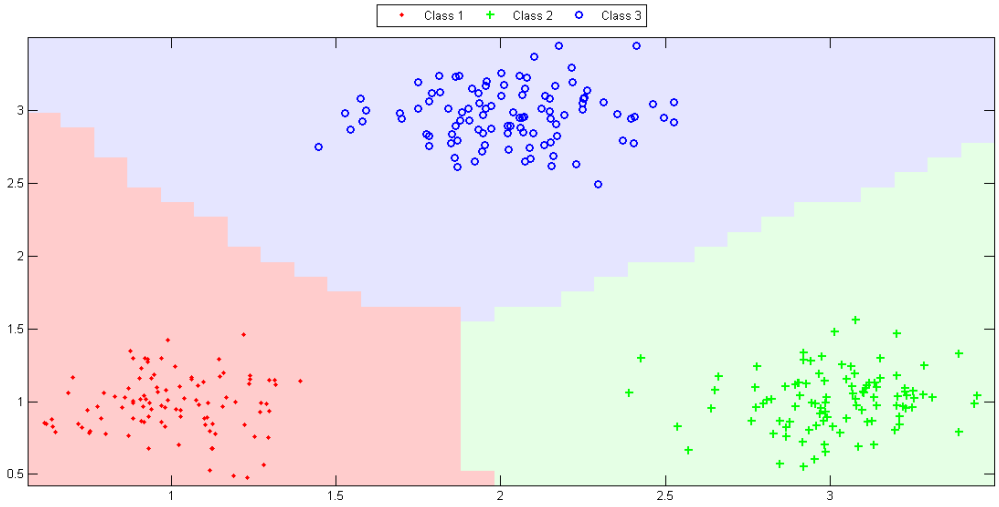



Observation:
Training Error decreases with increase in the number of hidden nodes.

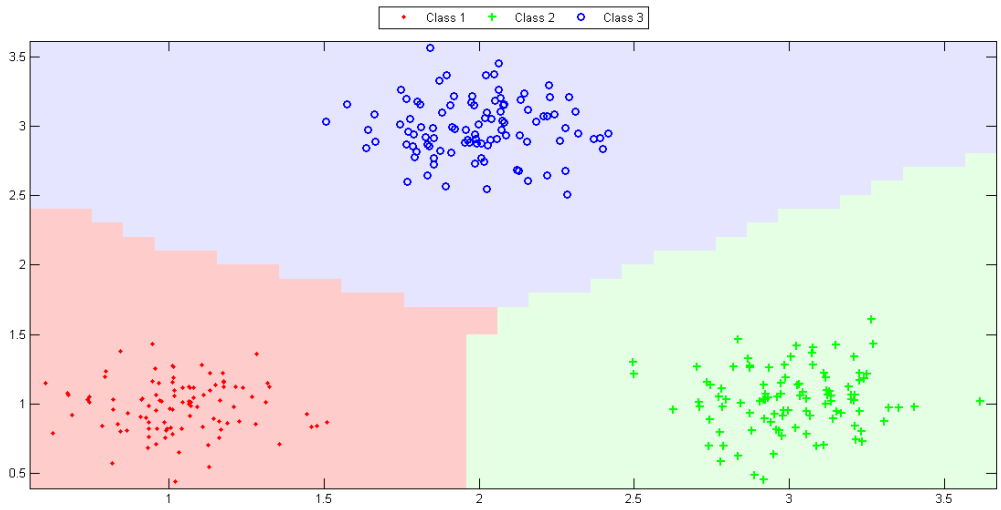
Decision boundary for 2 Hidden layer units:




Decision boundary for 4 Hidden layer units:

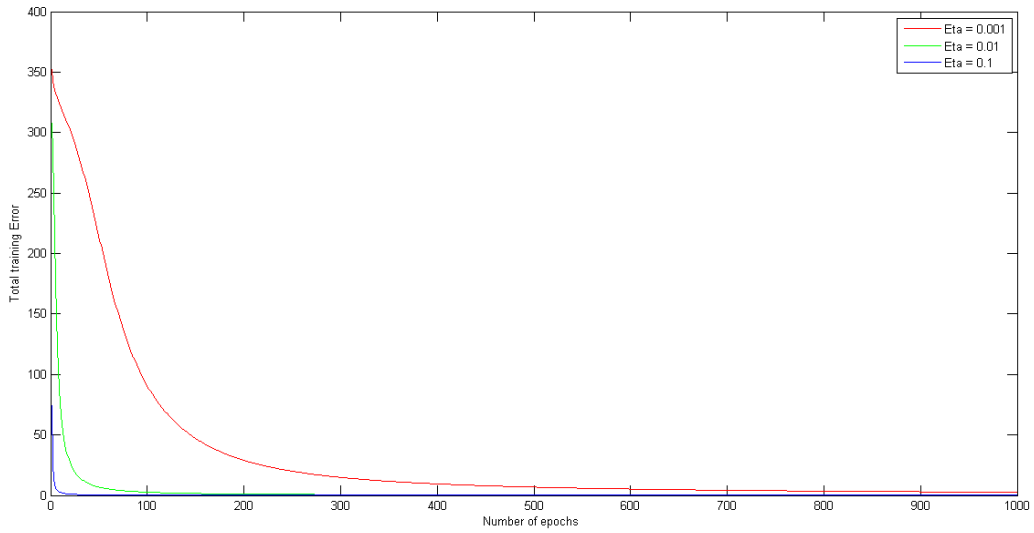


Decision Boundary for 64 hidden layer units




Observation:
Lower number of hidden layer units cause underfitting while higher number of hidden layer units cause overfitting.

Q1 e) Variation of training error with number of epochs for different values of learning rate

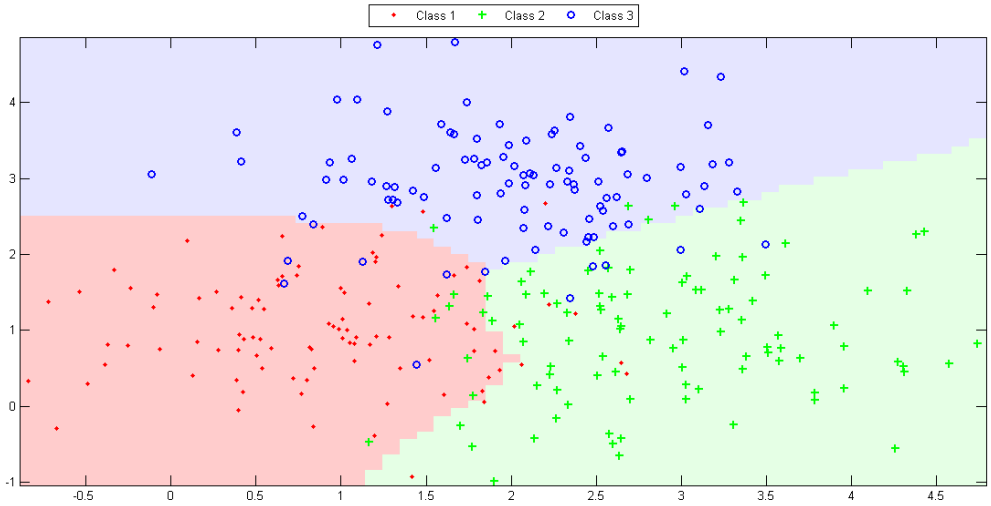



Observation:

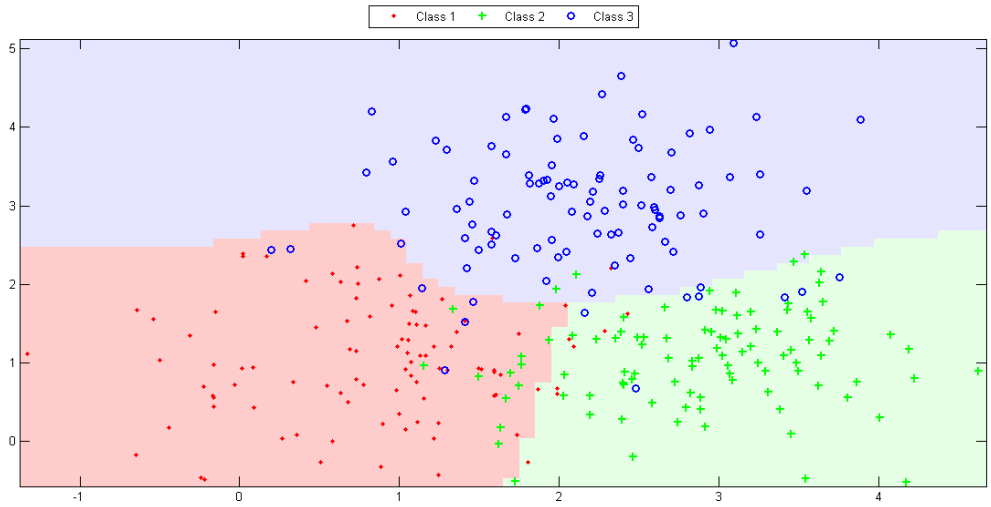
Training Error decreases steeply as the value of learning rate increase, but a high value of learning rate can result in oscillations in training error.

Q1 f)
standard deviation = 0.75
Total Training Error at the end of 1000 epochs = 96.21474
Total Training Error at the end of 5000 epochs = 79.962044
Total Training Error at the end of 10000 epochs = 70.106267

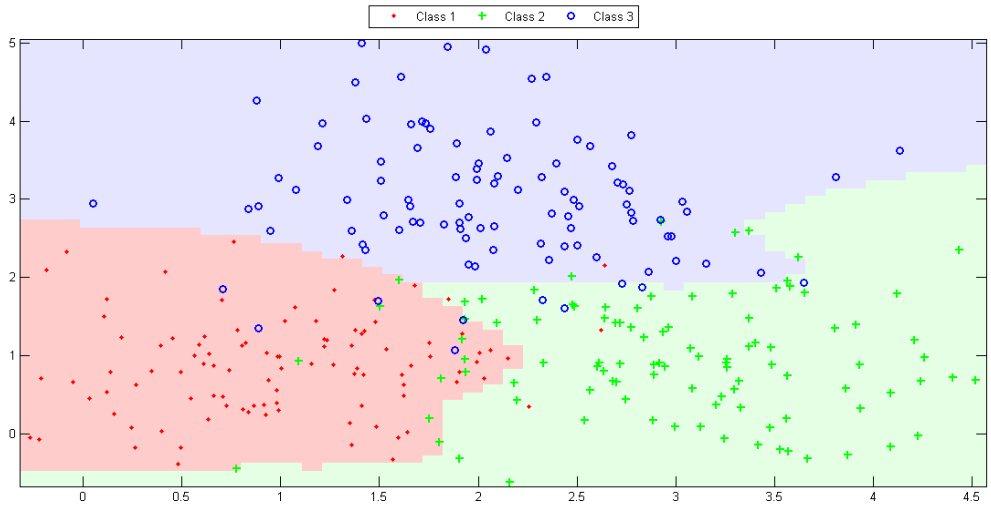
Decision boundary for 1000 epochs:




Decision boundary at the end of 5000 epochs

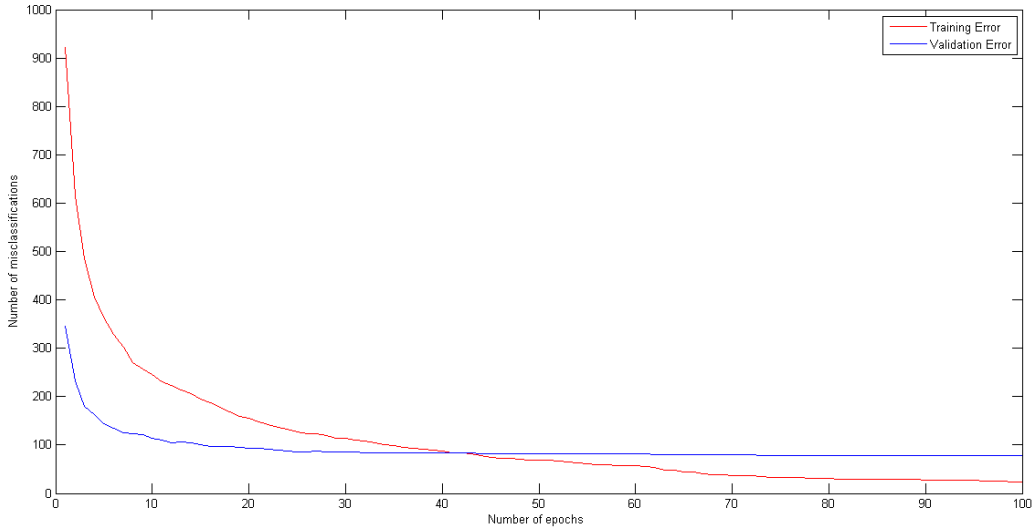


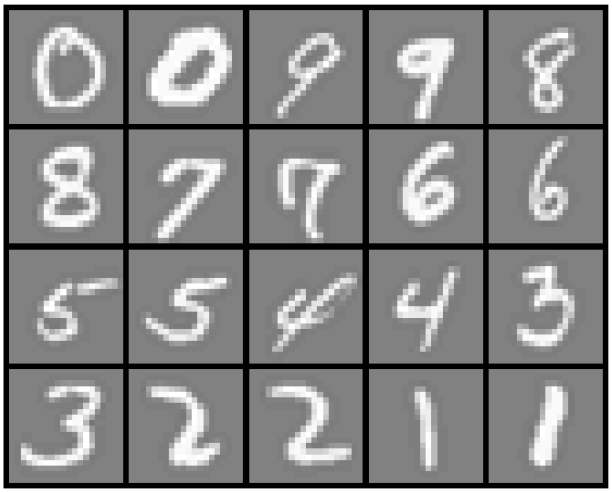
Decision boundary at the end of 10000 epochs:




Question 4

c ) Training and validation error as a function of number of epochs




Some missclassified data points