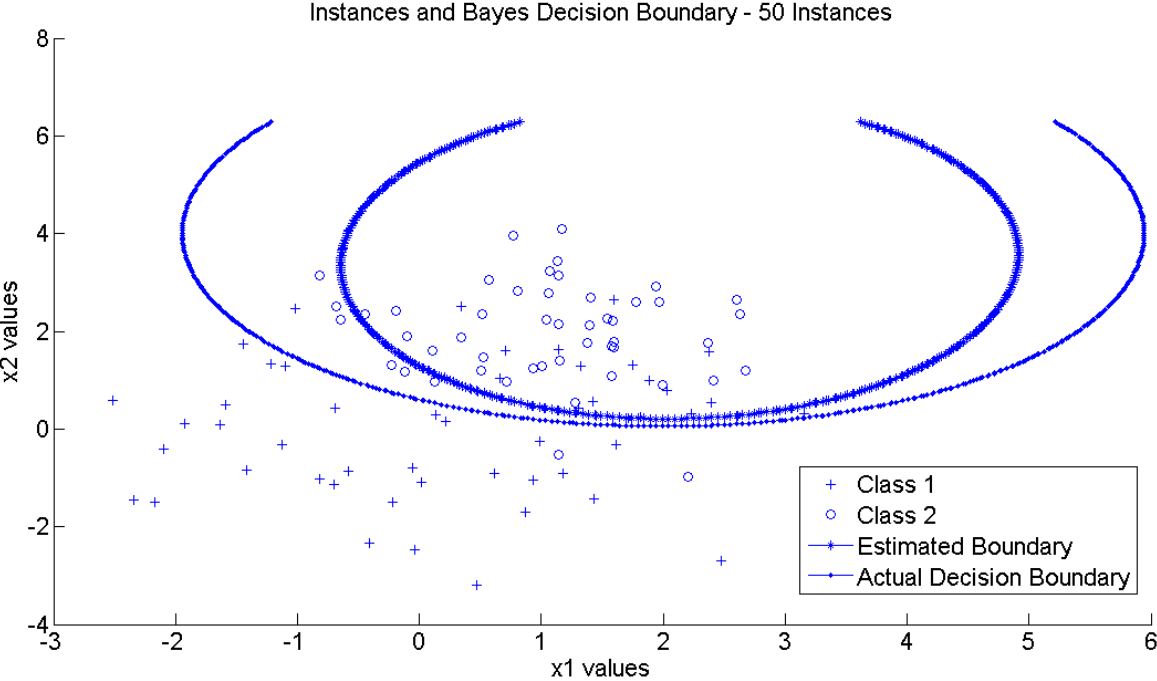4b and 4c) Below is the plot of Bayes decision boundary for 50 instances with estimated and actual values of mean and covariance.


Instances and Bayes Decision Boundary - 50 Instances

4d)

For 1000 instances: Decision boundary coming from actual parameters is shown with a solid line (--) and the estimated one is shown with x's.

Instances and Bayes Decision Boundary - 1000 Instances

4d)

For 1000 instances: Decision boundary coming from actual parameters is shown with a solid line (--) and the estimated one is shown with x's.
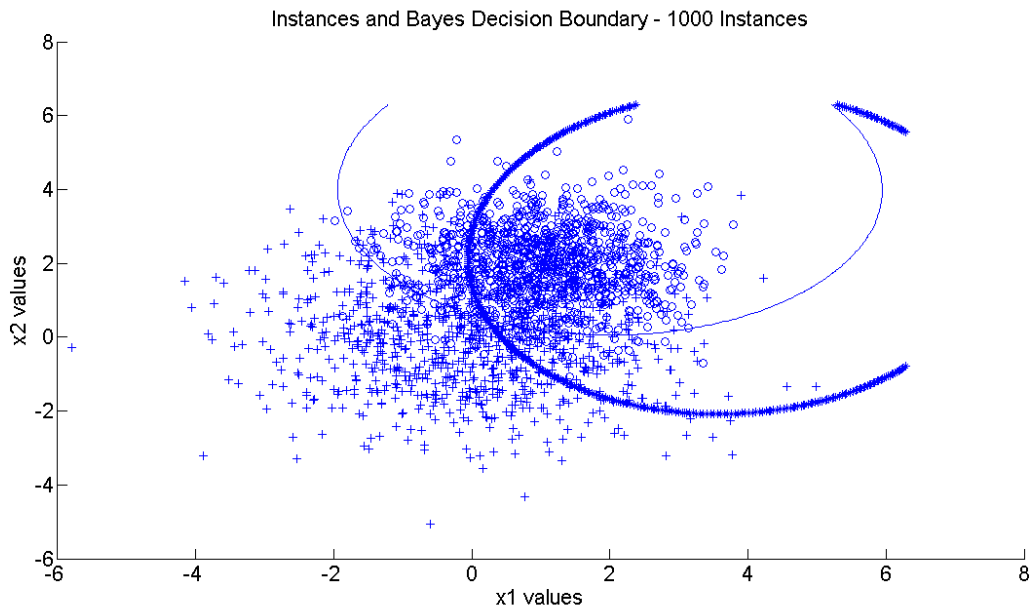
Instances and Bayes Decision Boundary - 10000 Instances
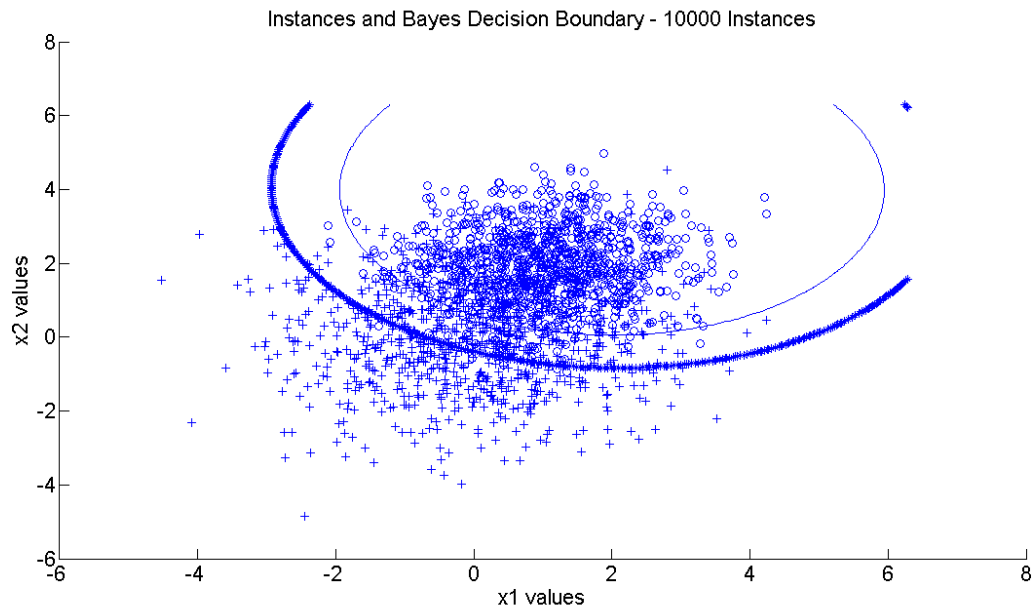
As we can see from the above Figures for 1,000 and 10,000 instances, our decision boundary that is based on samples becomes closer to the actual decision boundary as the number of sample instances increase. Theoretically, we need infinitely many instances to reproduce the exact decision boundary. However, as we can see we have a very similar estimated decision boundary to the actual decision boundary when we use 10,000 instances.