2. Wine Classification (kNN)

1. Distinguish between the three classes. Discuss the performance of your classication.

The classifier has an error of 0.0333 and 0.1 with 2 different sets.

2. Which combination of the 13 features leads to the b est results in the questions ab ove? Explain your ndings

We tried finding out a good subset of features by individually measuring the performance of the features but in the end all 13 together performed better (0.9667 vs 0.9333 success rate).

have to use test and training set in this exercise to evaluate your algorithms. Please rep ort on how did you create these datasets. Provide classication errors for k = 1(Nearest Neighb our classier) as well as
for at least two other (b est) values of k

k = 1
0.9 success rate

k = 5
0.9667 success rate

k = 10
0.9333 success rate

Do es the classication error dep end on the choice of the training and test data set? Show the p erformance of the classier by using (at least) two dierent test and training sets. Is you classier go o d enough to b e used in real life?

When using the first 10 samples of each class as the test set, the success rate with k=5 was 0.9667, with the last 10 it was 0.9. It's not perfect but probably usable in real life.

3. Mahalanobis Distance

Test your classier in the data set described in the Exercise 2. Compare the error results with k-NN.

Our Mahalanobis algorithm leads to comparable results to the kNN classifier, however it executes significantly faster.
A learning set of about half of each class leads to an error of 0.0333 with 3 out of 90 wrongly

classified samples. A smaller learning set consisting of the first 10 elements of each class leads to an error of 0.081 with 12 out of 148 wrongly classified samples, that's slightly worse than our results for the kNN algorithm.

4. Discriminant Functions for the Normal Density

Add the mean values of the two classes and their connection line and discuss the result.
Compare the MATLAB result with your findings per hand.
Compare the results when using the identity matrix and the general case when using individual covariance matrices.