CENG499 - Introduction to Machine Learning
HW03 Report
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1 Decision Tree

1.1 Information Gain

Accuracy : 0.933

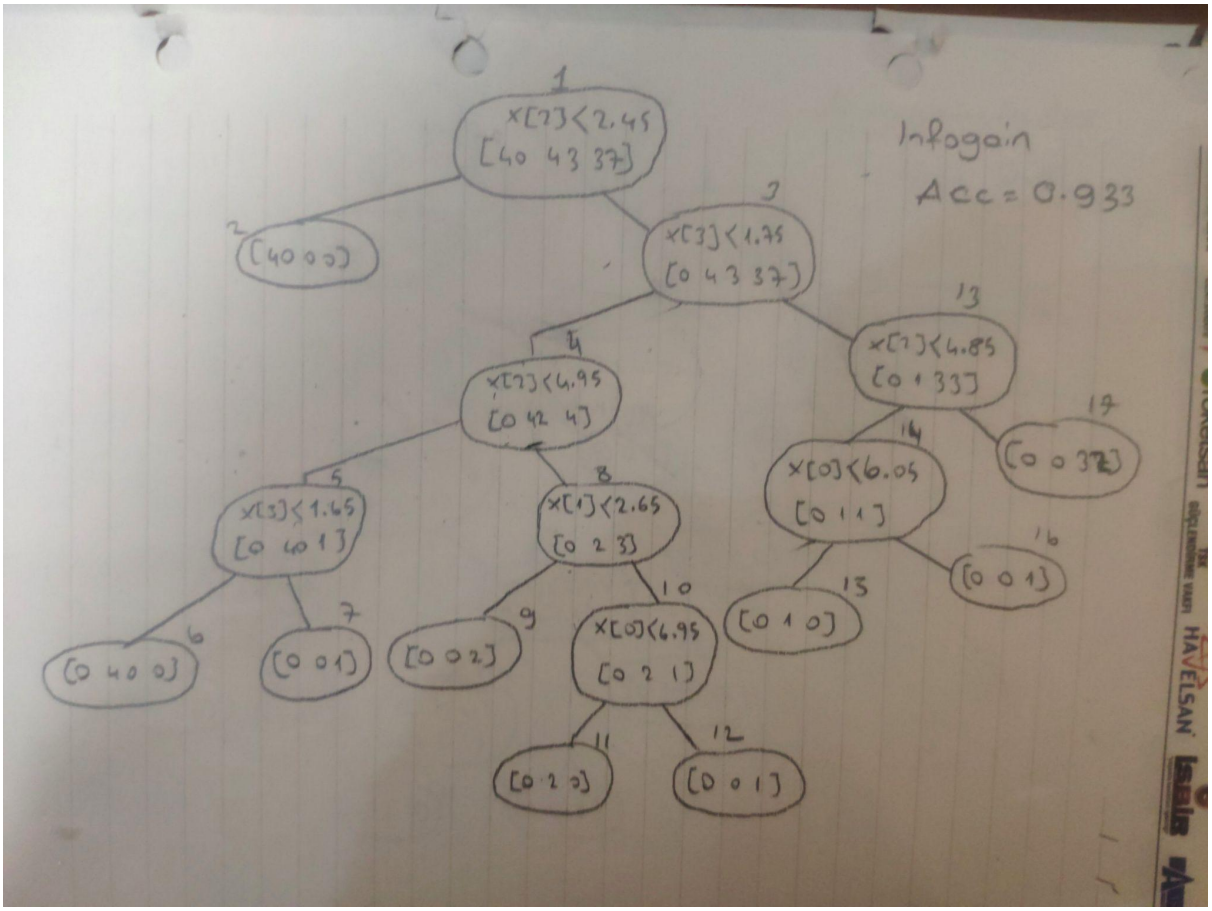

Figure 1: Decision Tree for Information Gain (text version can be found in information_gain.txt)

1.2 Average Gini Index

Accuracy : 0.90

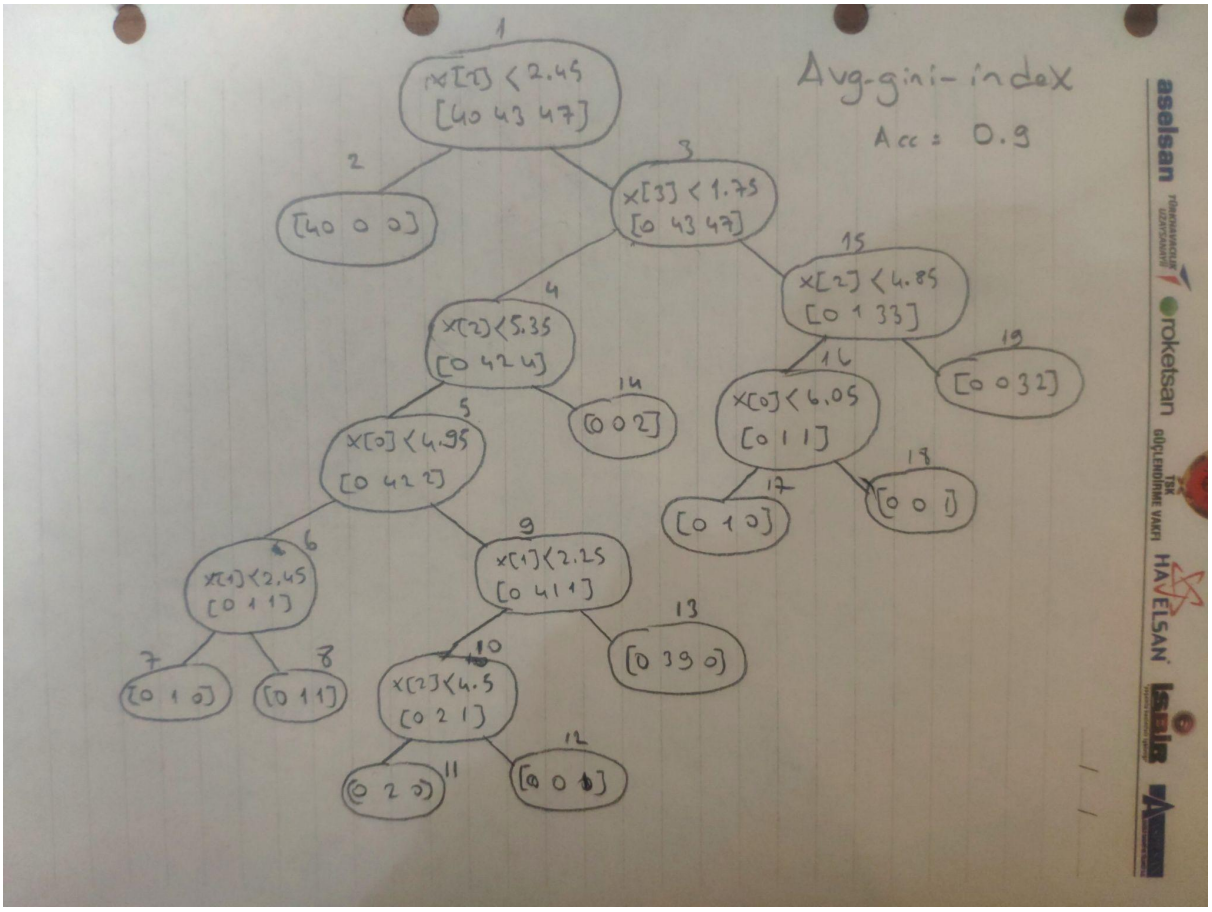

Figure 2 : Average Gini Index Decision Tree (text version can be found in avg_gini.txt)

1.3 Information Gain with Pre Prunning

1.4 Average Gain Index with Pre Prunning

2 SVM

2.1 Task 1

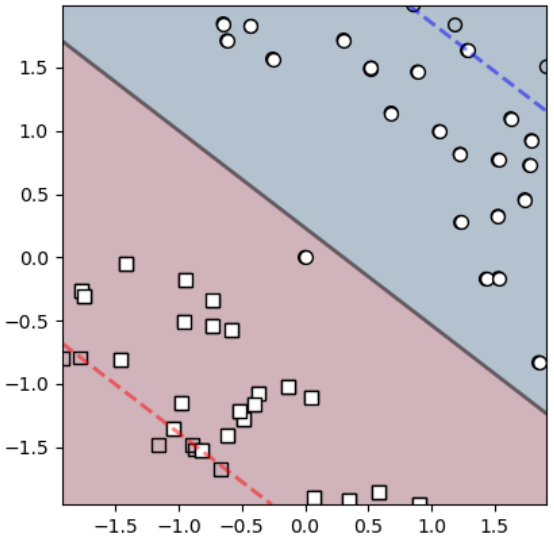

Figure for C=0.01

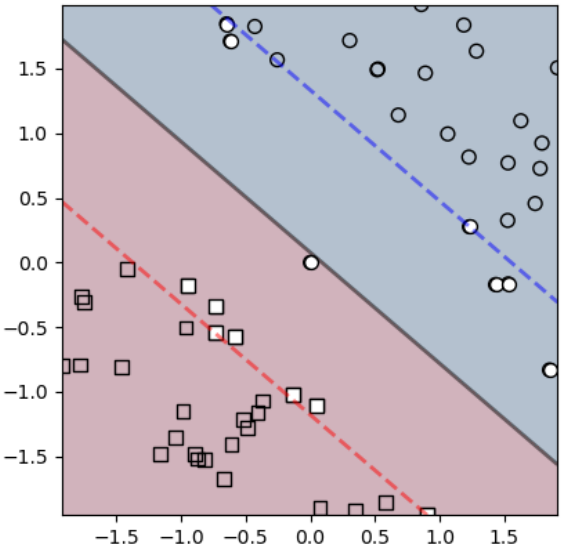

Figure for c=0.1

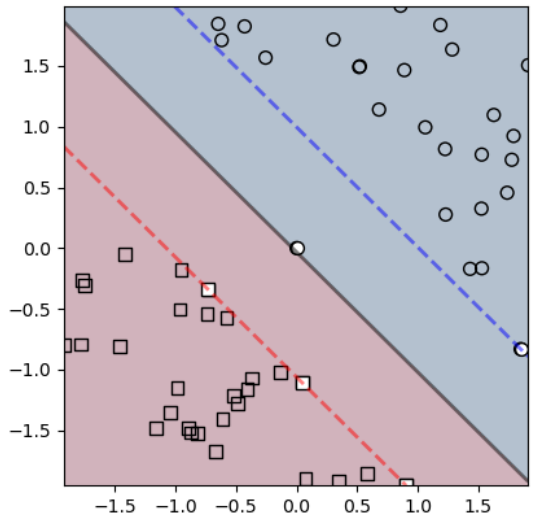

Figure for C=1

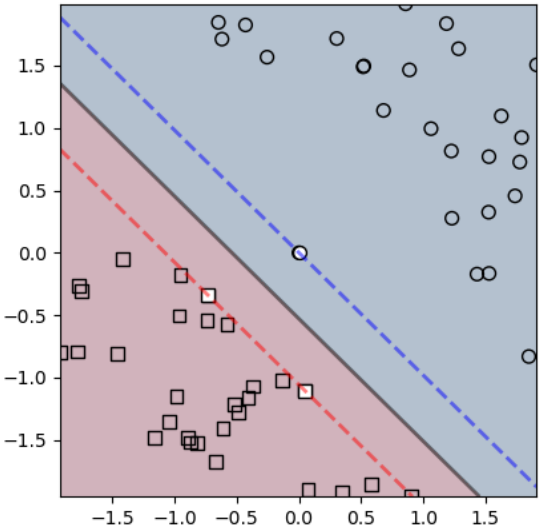

Figure for C=10

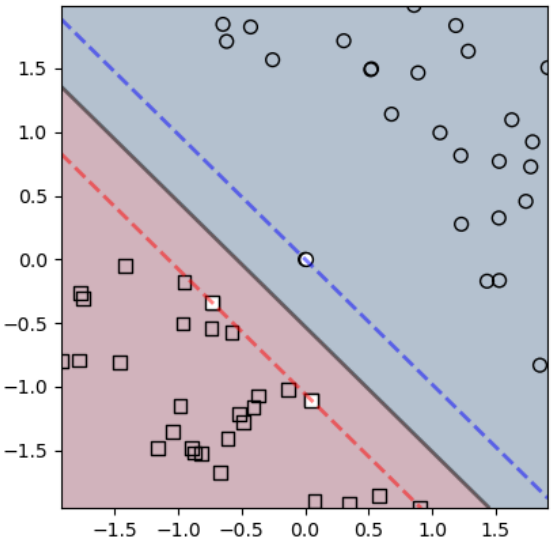

Figure for C=100

Comment

As C values get bigger, the margins get smaller. And with that, as seen in figures hyperplanes are also changing, affecting the classifier as well. Trying with different c values we can find outliers in the data better. To do that, we must iteratively try different c values and detect them from the classified points or graph itself.

2.2 Task 2

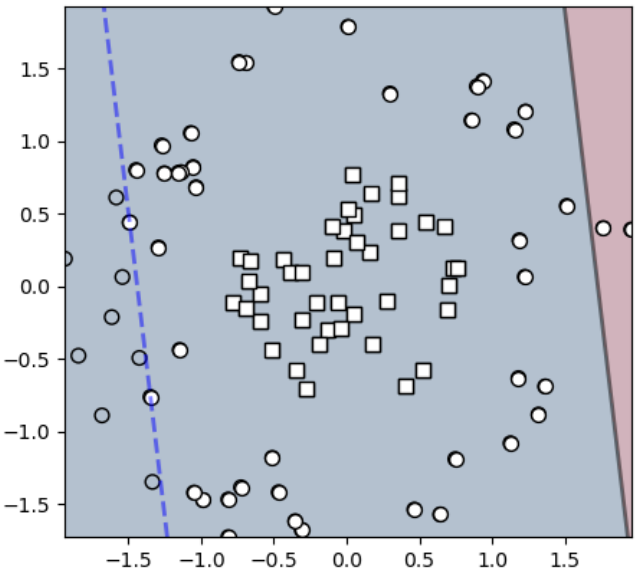

Figure for Linear Kernel

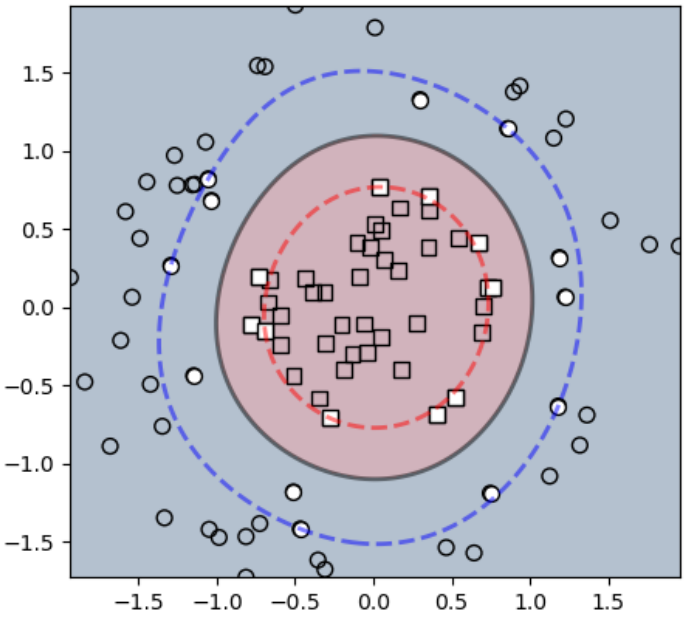

Figure for RBF Kernel

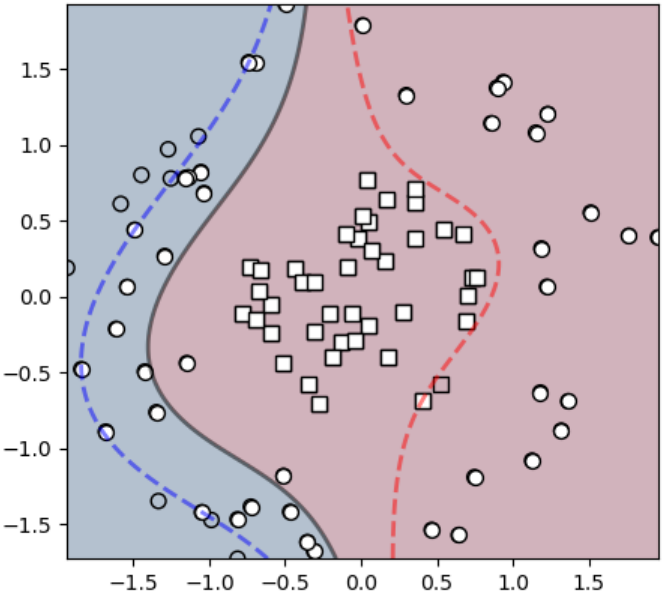

Fİgure for Polynomial Kernel

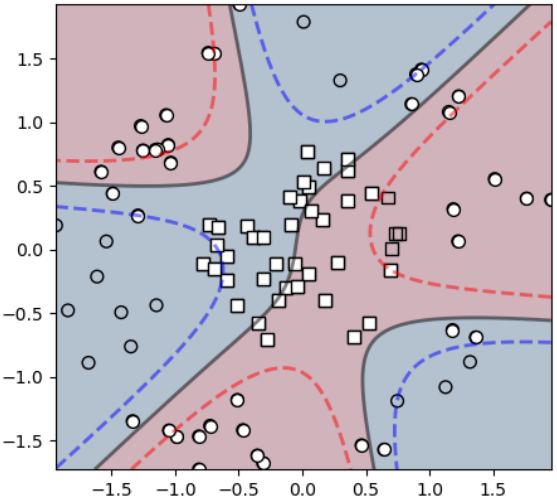

Figure for Sigmoid Kernel

Comments

In order to find the best SVM model for our data, we are using different kernels. Since our data can be projected on the plane by many different groupings, different kernels fit the data better. With different kernels, we can now separate data in non-linear ways also. Since our data can vary in dimensions, linear methods will not be sufficient in those cases. A close example is that as can be seen in the dataset, an RBF or sigmoid kernel really shows a more robust grouping than the others since they yield non-linear groupings, a linear kernel would be underscored.

2.3 Task 3

Sorry, I couldn't extracted in time, but it's working and in the code, you can see them in q3.txt after running it.

2.4 Task 4

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