

# LEARNING FROM DATA

(TASK 3)

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# REPORT

## DEFINING HARD & SOFT MARGINS

### 1. Hard Margin:

- An SVM with a hard margin is stiff in its classification and seeks to do very well on the training set, which leads to overfitting.
- It is the first and most basic SVM formulation. It proposes that the dataset may be linearly divided into classes.

### 2. Soft Margin

- Soft Margin SVM relaxes the strict limitations of Support Vector Machine, where some misclassification is permitted.
- The Regularization parameter aids in the implementation of Soft Margin SVM. The regularization parameter specifies how much misclassification we wish to prevent.

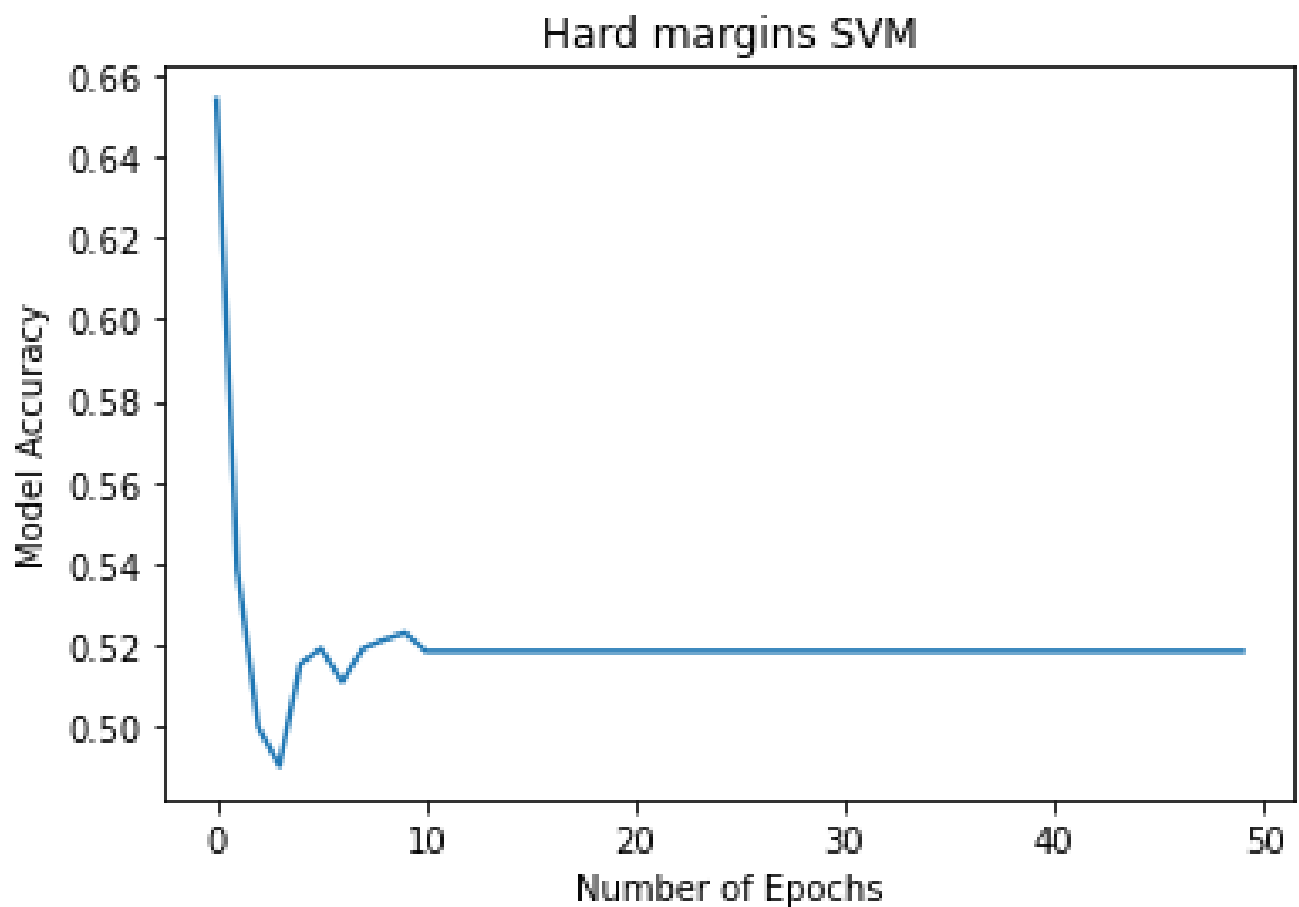
We will use both methods and determine the best fit to this case according to the resulting graphs and indications.

# IMPLEMENTING TO “BANKNOTE AUTHENTICATION” DATASET

## 1. Implementing Hard Margin SVM

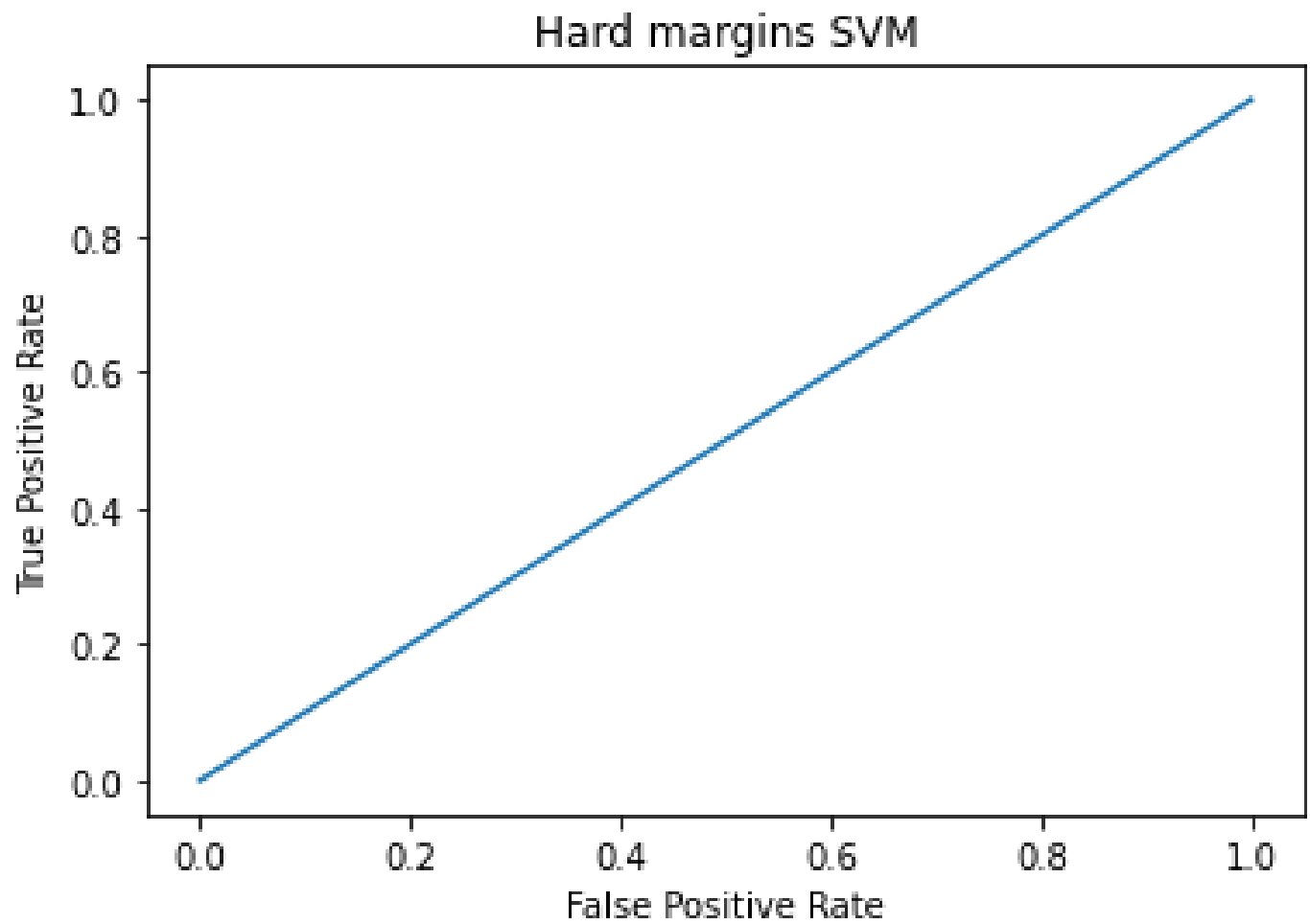
Accuracy results

- The accuracy results of the predictions after each Epoch were as follows:



## Roc Curve

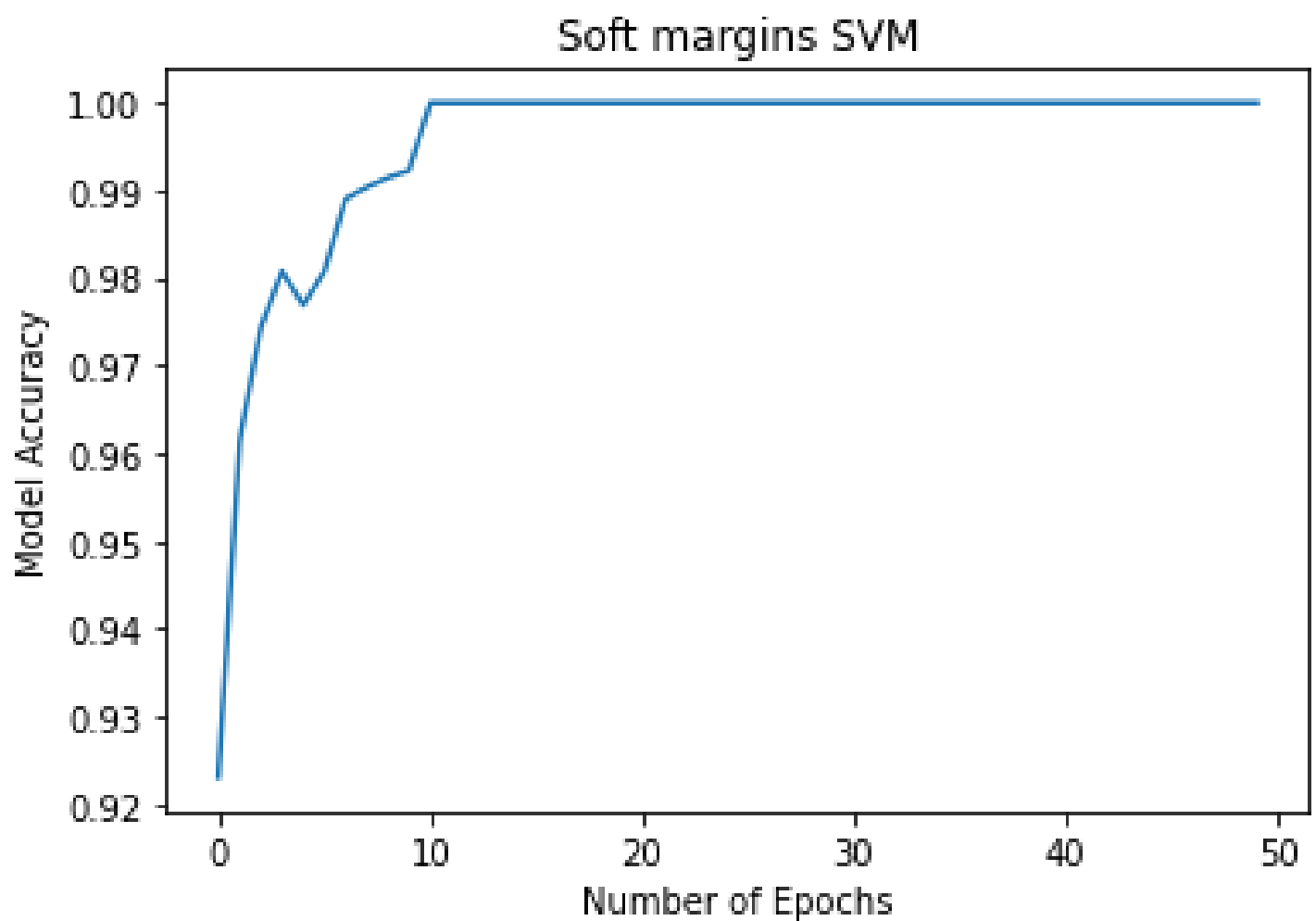
- Here is the ROC Curve result of using the hard margins method:



## 2. Implementing Soft Margin SVM

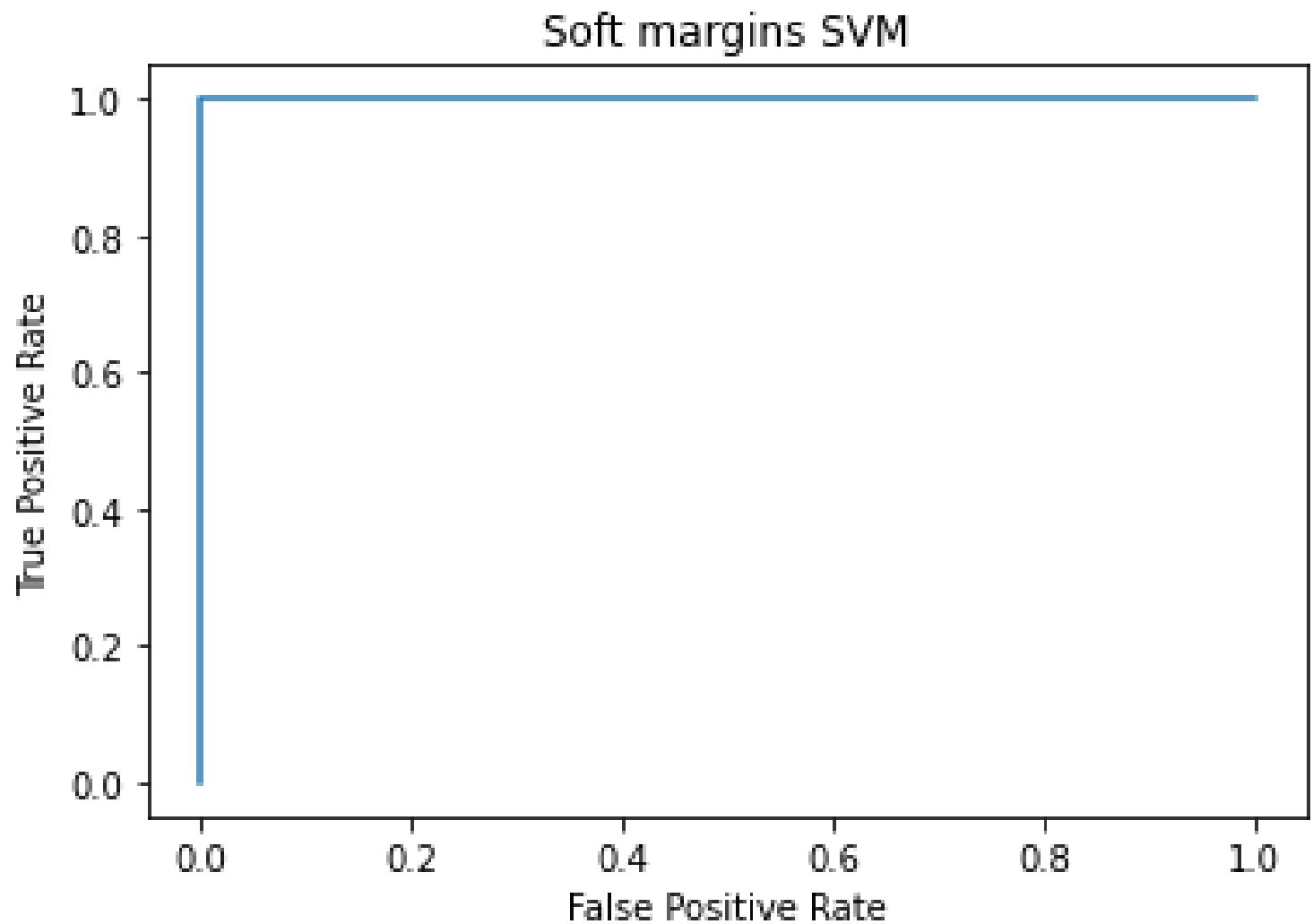
Accuracy results

- The accuracy results of the predictions after each Epoch were as follows:



## Roc Curve

- Here is the ROC Curve result of using the soft margins method:



# CONCLUSION

## 1. Choosing the best fit

- According to the graphs displayed previously, it's obvious that the most fitting SVM to use in this case is the "Soft Margins".

## 2. Justification

- We chose the "Soft Margins" because the accuracy of the predictions was increasing after each Epoch.

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Thank you,  
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