

ECEN 689: Applied Information Sciences

Challenge: 5

Aim:

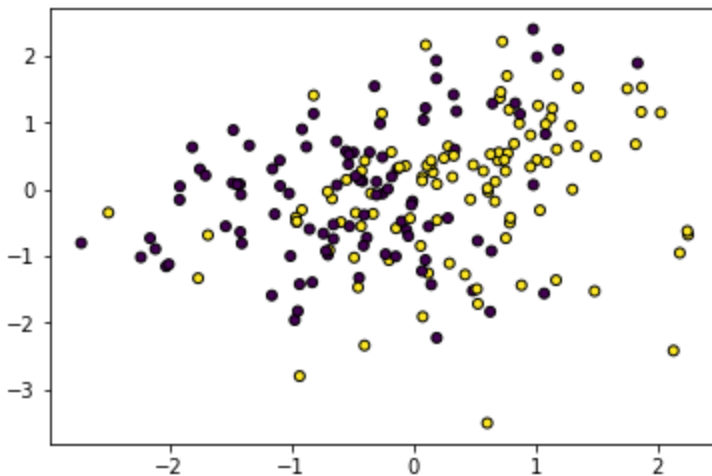
The objective of this challenge is to build a binary classifier based on SVM.

Data:

We are provided with two datasets: Training dataset with specified Classes, and Testing Dataset whose Classes are to be predicted.

For student_identity = 'faziabatool', We get :

	Unnamed: 0	Class	Feature 0	Feature 1
0	0	1	2.251906	-0.680615
1	1	0	1.187075	2.096370
2	2	1	0.612317	-0.033336
3	3	0	-0.445284	-1.326287
4	4	1	0.285041	0.645865



Kernel:

There are a variety of kernels for us to choose from with good categorization accuracy namely, linear, polynomial and radial.

I have implemented Linear SVM in this Challenge.

Linear SVM:

Linear SVM is the newest extremely fast machine learning (data mining) algorithm for solving multiclass classification problems from ultra large data sets that implements an original proprietary version of a cutting plane algorithm for designing a **linear support vector machine**.

Linear SVM is a *linearly scalable routine* meaning that it creates an SVM model in a CPU time which scales *linearly* with the size of the training data set.

Features:

- Efficient in dealing with extra large datasets.
- Works with high dimensional data in both sparse and dense format.
- No requirement of expensive computing resources.
- Ideal for contemporary applications in digital advertisement, e-commerce, web page categorization, text classification, banking services and so forth.

Result:

Score for various Kernels are:

Linear - 0.72

Poly - 0.68

Rbf - 0.975

Conclusion:

The SVM classifier tries to draw a decision boundary to separate different labeled classes - the algorithm being different for linear and non-linear data. For a linear data, the SVM classification can be solved by finding a linear hyperplane that separates both the data. However, for non-linear data, we would need to explore different kernels and fine-tune the parameters influencing the classification.

References:

1. <http://web.mit.edu/6.034/wwwbob/svm-notes-long-08.pdf>
2. <https://www.ics.uci.edu/~welling/teaching/KernelsICS273B/svmintro.pdf>