Assignment 2 (Q1)

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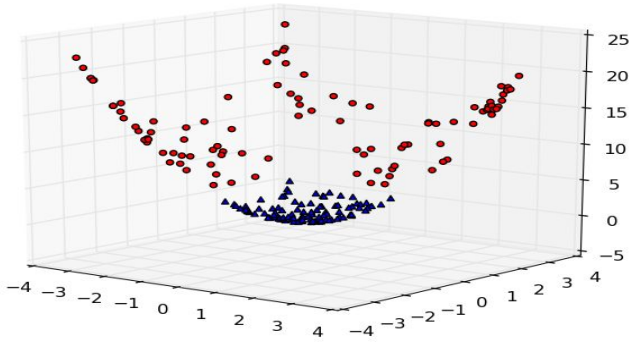
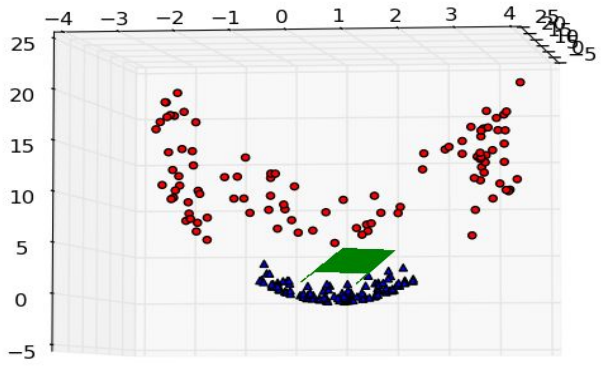
Kernel trick

Kernel { [X1,X2] - > [X1,X2,X1**2+X2**2] } (where X1 and X2 were the points given)

Point plot After Kernelization



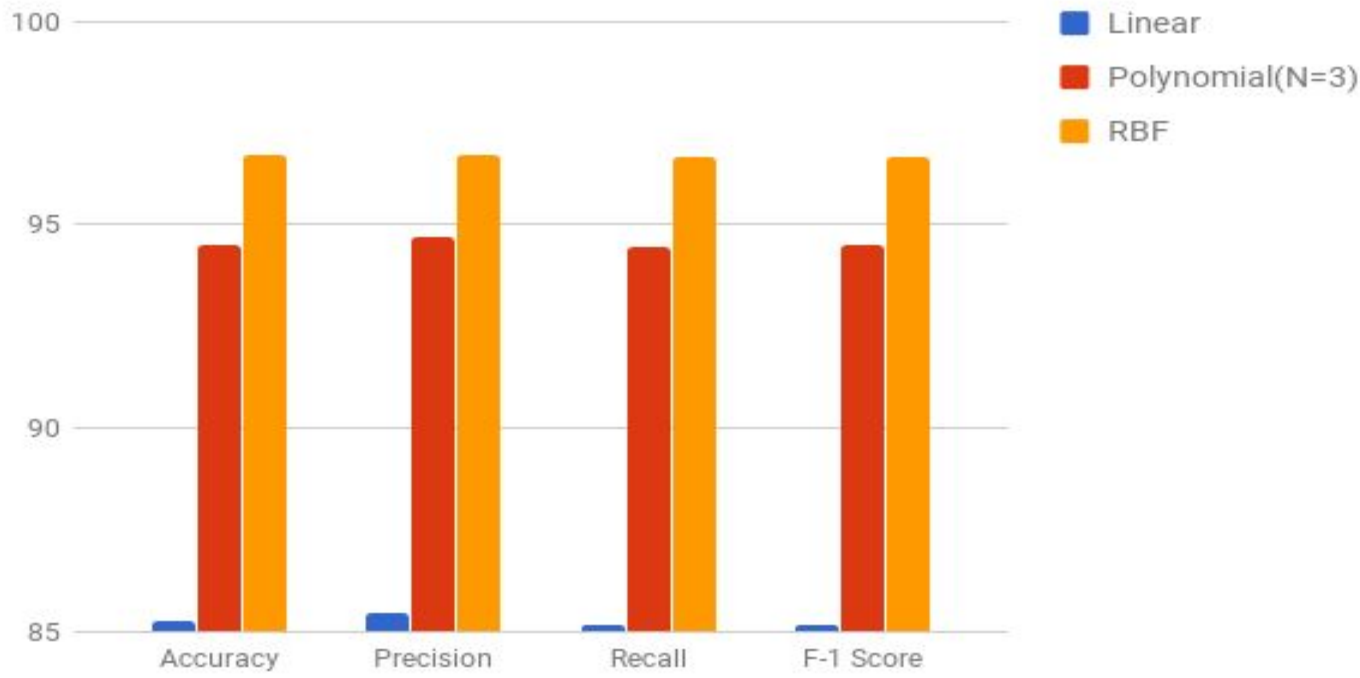
3D Surface Separating (In green) the two class



Letter classification

Best Hyperparameter Setting:

C(Penalty parameter) =10
Kernel =’rbf’
Degree(for polynomial kernel) =3
Kernel coefficient =1/n_features
Tolerance for stopping criterion =0.001



Plot shows the Average (Accuracy, Precision, Recall, F1) Score averaged over five sets of value.

Observation

- As shown in the above plot the rbf kernel performed best among all the kernels tried although other kernels like - Sigmoid were tried but the accuracy obtained was around 10%.
- From the plot we can infer that there was non linearity component in the dataset due to which the performance of the linear kernel did not cross 90%.
- Whereas nonlinear kernels like - Polynomial of degree 3 performed way better than linear kernel.
- RBF kernel performed best which shows they exhibit good generalization and universal approximation.
- The 7th and 8th feature seems to be most discriminating mean x of on pixels in box(7th),mean y of on pixels in box(8th).