QUESTION 5.a. Train Error, Test Error, No. of Support Vectors-

WITHOUT SCALING –

the number of support vectors : [542 542]

train accuracy: 1.0; train error without scaling : 0.0

test accuracy: 0.976; test error without scaling : 0.024

WITH MIN MAX SCALING –

the number of support vectors : [542 542]

train accuracy: 1.0; train error with min max scaling : 0.0

test accuracy: 0.976; test error with min max scaling : 0.024

WITH STANDARD SCALING –

the number of support vectors : [628 608]

linear kernel train accuracy : 1.0; train error with std scaling : 0.0

linear kernel test accuracy : 0.981; test error with std scaling : 0.019000000000000017

Question 5.b. : train error, test error, and number of support vectors for RBF & Polynomial :

WITHOUT SCALING :

the number of support vectors for RBF kernel : [3000 3000]

RBF train error without scaling : 0.0

RBF test error without scaling : 0.5///

the number of support vectors for polynomial kernel : [641 691]

the number of support vectors for polynomial kernel **with gamma =1** is : [817 938]

poly train error without scaling : 0.0005; with gamma =1 Train error =0

poly test error without scaling : 0.020000000000000018

poly test error without scaling , with gamma =1: 0.02100000000000002//

Out of RBF & Polynomial – We see **that RBF Kernel gives us lower TRAINING ERROR (for No Scaling)**

However if we set gamma =1 for Poly, we get train error =0 = train error of RBF

For Min Max Scaling – Poly gives lower, for Standard – both error 0)

For the comparative results with different scaling- check the screenshot below -

Kernel	Results	Without Scaling	Min Max Scaling	Standard Scaling
Polynomial	Train Error	0.0005	0.0005	0
Polynomial	Train Error with gamma =1	0.0000	0	0
RBF	Train Error	0.0000	0.010166667	0
Polynomial	Test Error	0.0200	0.02	0.021
Polynomial	Test Error with gamma =1	0.0210	0.02	0.02
RBF	Test Error	0.5000	0.035	0.146
Polynomial	No of Support Vectors	[641 691]= 1332 total	[641 691]	[779 783]
Polynomial	No of Support Vectors with gamma = 1	[817 938]	[2287 2372]	[814 938]
RBF	No of Support Vectors	[3000 3000] =6000	[809 832]	[2999 3000] = 5299 total