

Qn. 4a) Linear Kernel with entire training data

Accuracy: 0.9787735849056604

No. of support vectors: 28

Qn. 4b) Linear Kernel with first {50,100,200,800} training data

(i) First 50 samples:

Accuracy: 0.9764150943396226

No. of support vectors: 2

(i) First 100 samples:

Accuracy: 0.9787735849056604

No. of support vectors: 4

(i) First 200 samples:

Accuracy: 0.9740566037735849

No. of support vectors: 6

(i) First 800 samples:

Accuracy: 0.9787735849056604

No. of support vectors: 16

Qn. 4c) Polynomial kernel with degree 2 and degree 5. State whether TRUE or FALSE

(i) When $C = 0.0001$, training error is higher at $Q = 5$.

Training error for $Q=2$ when $C=0.0001$: 0.008968609865470878

Training error for $Q=5$ when $C=0.0001$: 0.004484304932735439

Hence training error is lesser when $Q=5$. Therefore, the statement that training error is higher when $Q=5$ is **FALSE**

(ii) When $C = 0.001$, the number of support vectors is lower at $Q = 5$.

Support vectors when $Q=2$: 76

Support vectors when $Q=5$: 25

Hence, we have less number of support vectors when $Q=5$. Therefore, question statement is **TRUE**

(iii) When $C = 0.01$, training error is higher at $Q = 5$.

Training error for $Q=2$ when $C=0.01$: 0.004484304932735439

Training error for $Q=5$ when $C=0.01$: 0.0038436899423446302

Hence training error is lesser when $Q=5$. Therefore, the statement that training error is higher when $Q=5$ is **FALSE**

(iv) When $C = 1$, test error is lower at $Q = 5$.

Test error for $Q=2$ when $C=1$: 0.018867924528301883

Test error for $Q=5$ when $C=1$: 0.021226415094339646

Here test error is lower at $Q=2$. Hence, the question statement is **FALSE**

Qn. 4d) RBF kernel with C belongs to 0.01,1,100,10e4,10e6

Value of C	Training errors	Testing errors
0.01	0.0038436899423446302	0.02358490566037741
1	0.004484304932735439	0.021226415094339646
100	0.0032030749519538215	0.018867924528301883
10e4	0.002562459961563124	0.02358490566037741
10e6	0.0006406149903908087	0.02358490566037741

Lowest value of training error is 0.0006406149903908087 which is when $C=10^6$

Lowest value of test error is 0.018867924528301883 which is when $C=100$