CS5691: PRML - Assignment 04

Group 20

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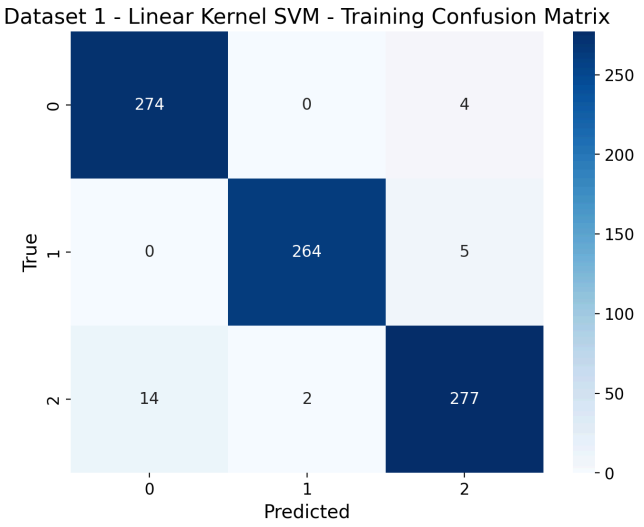
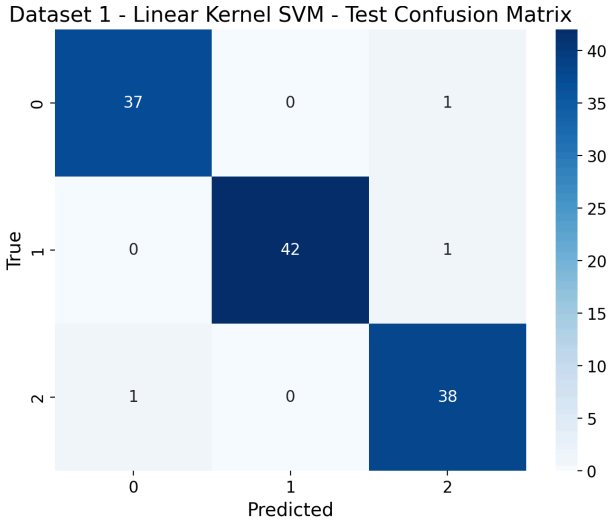
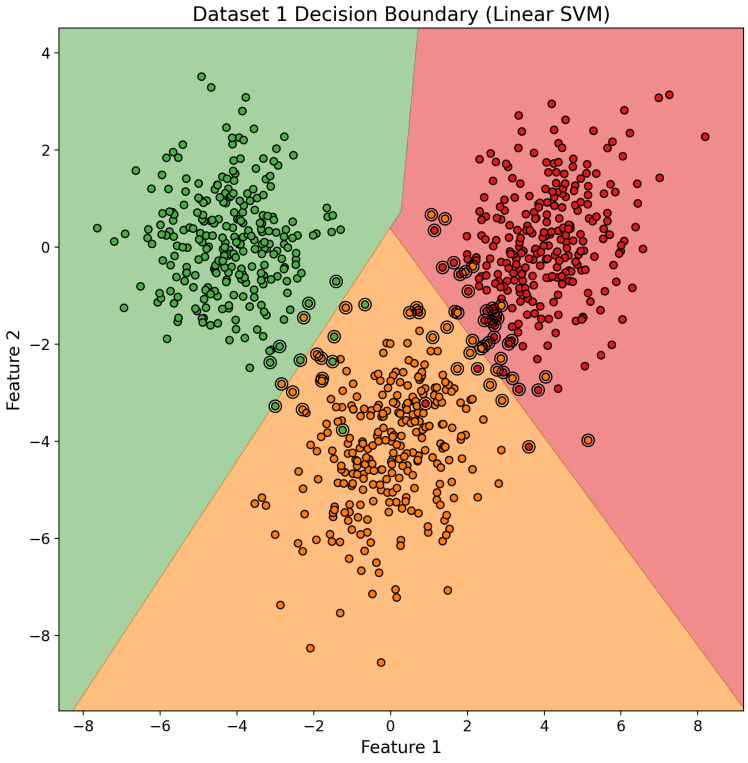
Dataset 1

Dataset 1 - Linear Kernel SVM Accuracy

	Accuracy
Train	0.9702380952380952
Validation	0.9625
Test	0.975



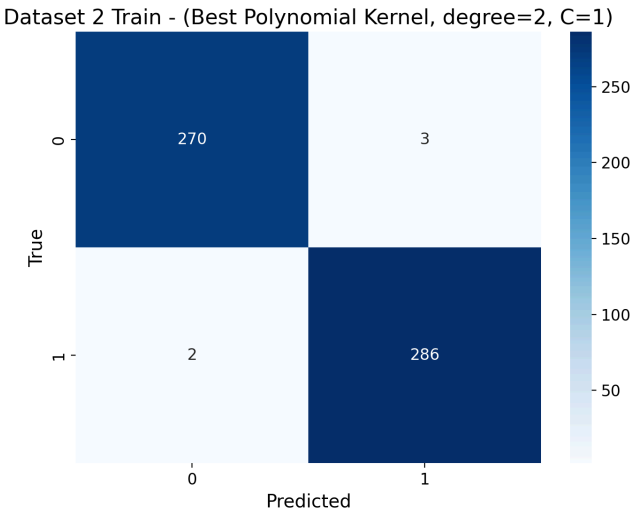


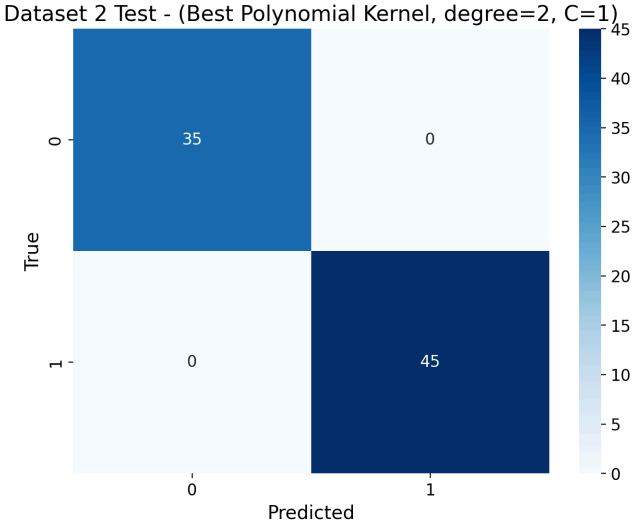


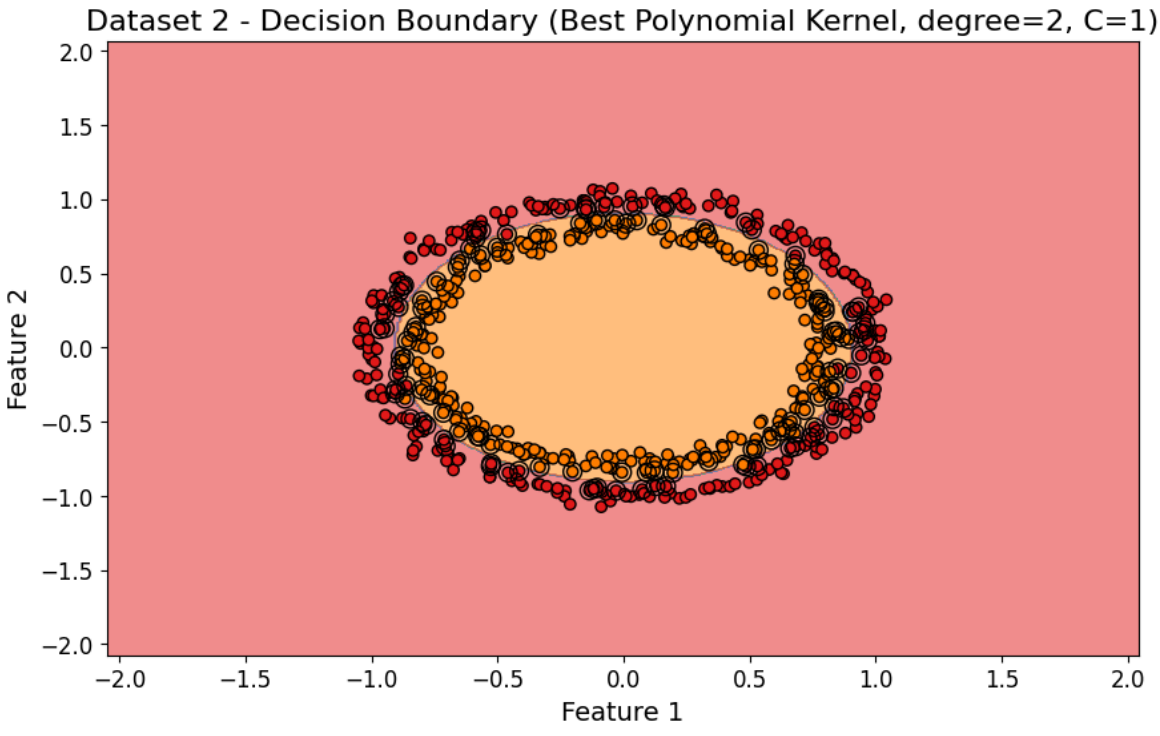
Dataset 2

Dataset 2 - Best Polynomial Kernel SVM Accuracy

	Accuracy
Train	0.9910873440285205
Validation	1.0
Test	1.0

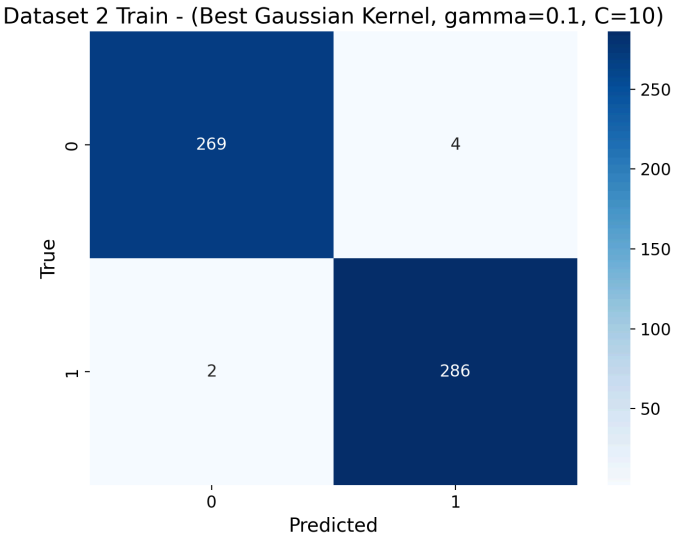


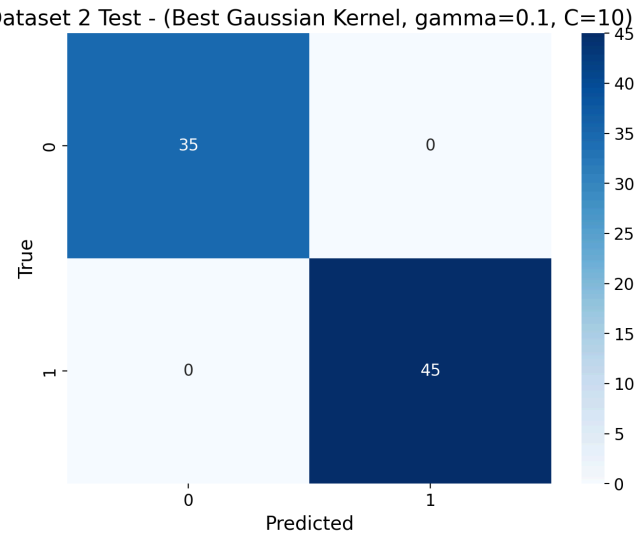


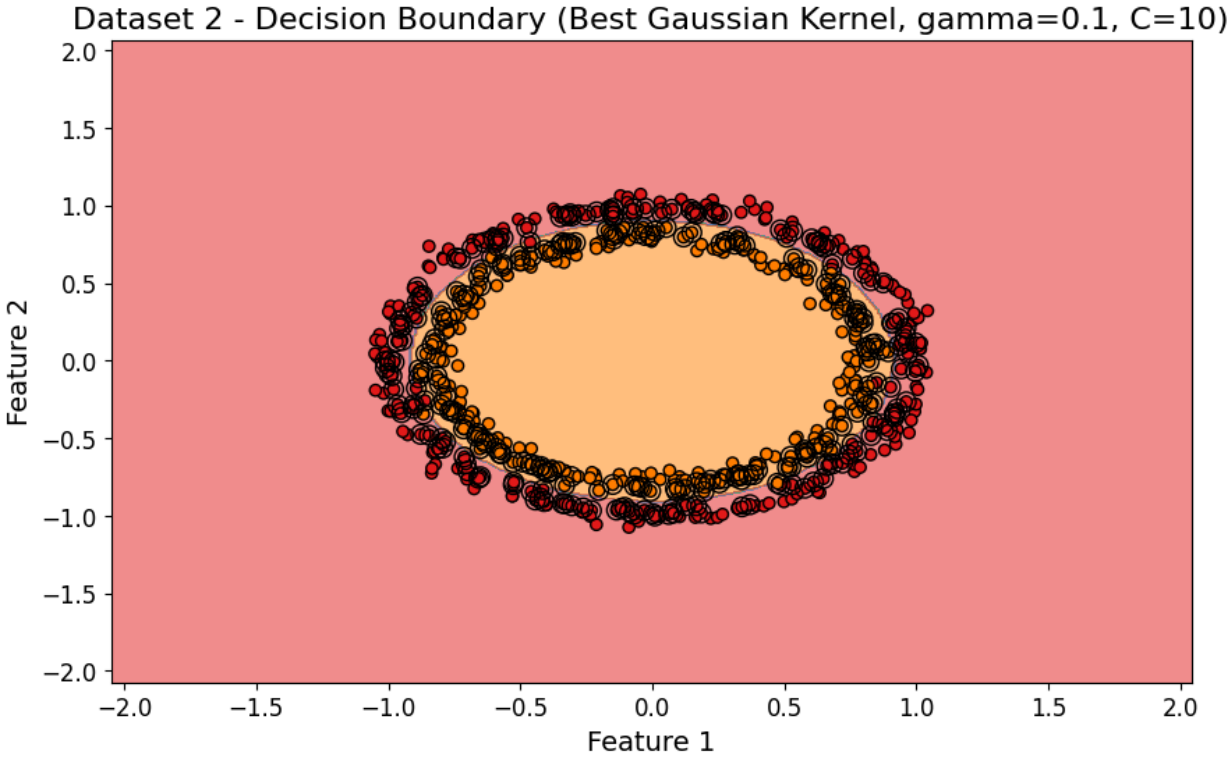


Dataset 2 - Best Gaussian Kernel SVM Accuracy

	Accuracy
Train	0.9893048128342246
Validation	1.0
Test	1.0







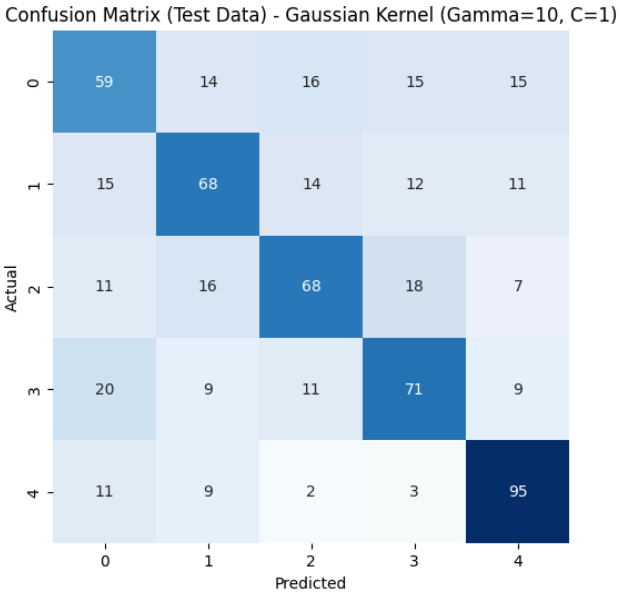
Dataset 3

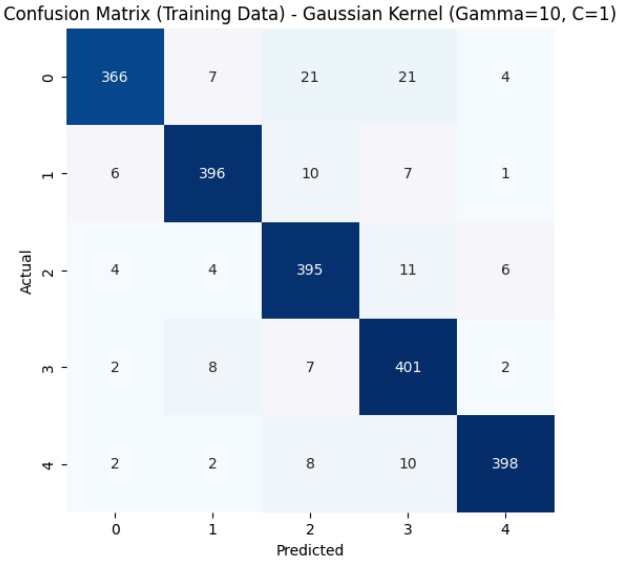
Accuracy for SVM with different Kernels

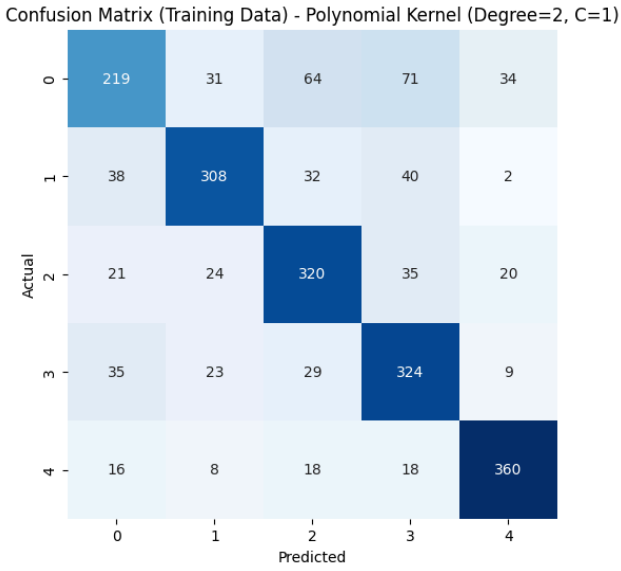
Kernel	Training	Test	Validation	
Poly (Degree=2	C=1)	72.93%	55.59%	58.86%
Poly (Degree=2	C=10)	91.04%	51.58%	58.86%
Poly (Degree=2	C=100)	99.90%	48.74%	52.17%
Poly (Degree=3	C=1)	94.85%	52.09%	57.86%
Poly (Degree=3	C=10)	100.00%	49.25%	53.85%
Poly (Degree=3	C=100)	100.00%	49.25%	53.85%
Poly (Degree=4	C=1)	100.00%	50.58%	53.18%
Poly (Degree=4	C=10)	100.00%	50.58%	53.18%
Poly (Degree=4	C=100)	100.00%	50.58%	53.18%
Poly (Degree=5	C=1)	100.00%	50.92%	54.52%
Poly (Degree=5	C=10)	100.00%	50.92%	54.52%
Gaussian (Gamma=0.1	C=1)	54.17%	50.92%	55.18%
Gaussian (Gamma=0.1	C=10)	58.50%	55.26%	57.86%
Gaussian (Gamma=0.1	C=100)	62.12%	55.43%	56.86%
Gaussian (Gamma=1	C=1)	61.27%	56.09%	58.86%
Gaussian (Gamma=1	C=10)	73.89%	56.93%	59.20%
Gaussian (Gamma=1	C=100)	96.05%	52.09%	56.86%
Gaussian (Gamma=10	C=1)	93.19%	60.27%	61.54%

Gaussian (Gamma=10	C=10)	100.00%	59.43%	57.86%
Gaussian (Gamma=10	C=100)	100.00%	59.43%	57.86%
Gaussian (Gamma=100	C=1)	100.00%	24.87%	25.08%
Gaussian (Gamma=100	C=10)	100.00%	26.54%	25.42%
Gaussian (Gamma=100	C=100)	100.00%	26.54%	25.42%

Confusion Matrix for best performing SVM of each Kernel







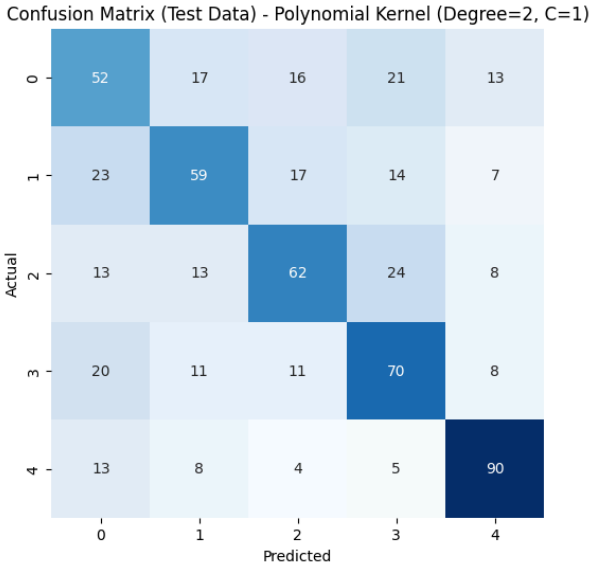
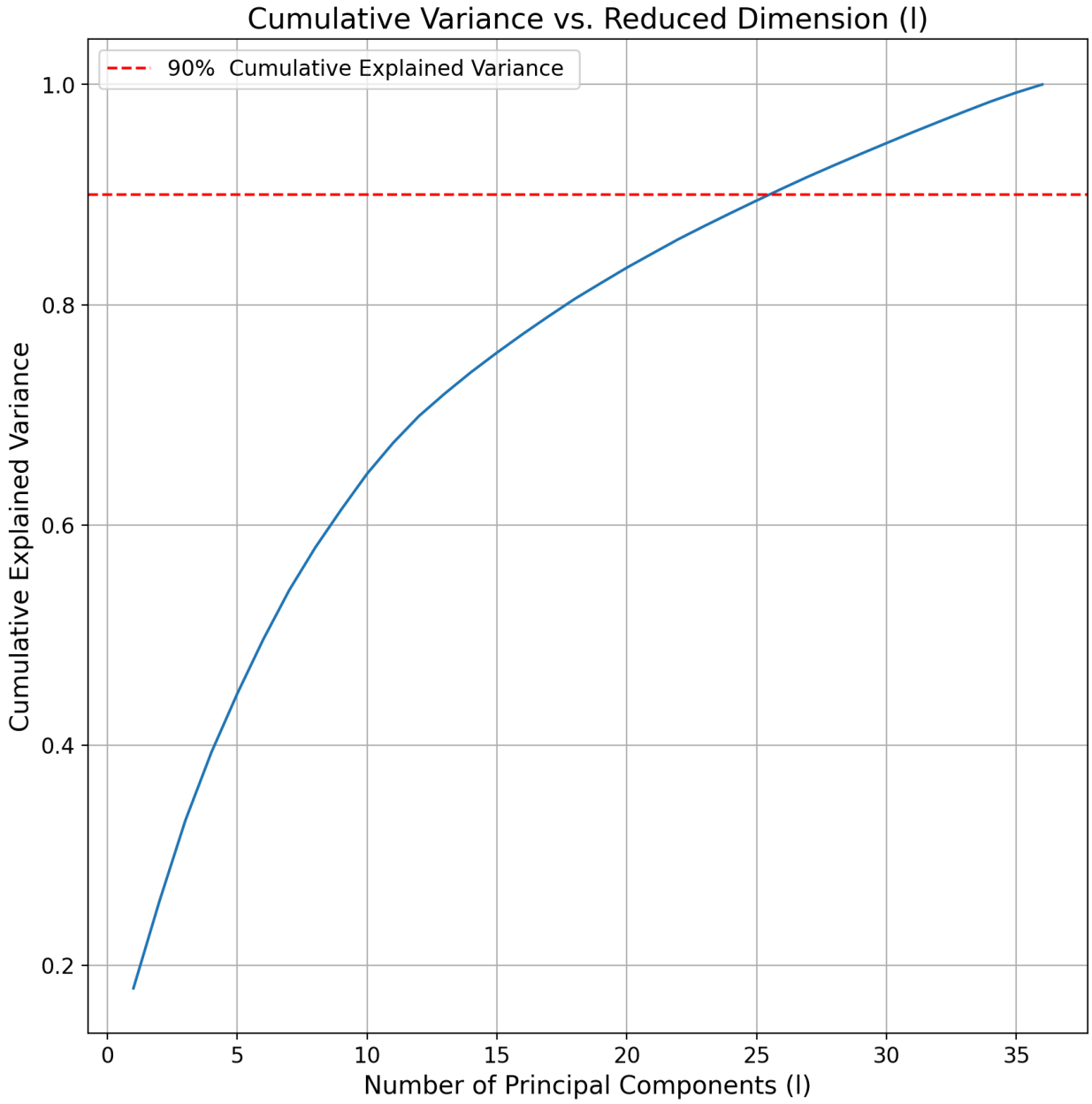


Table of percentage of bounded and unbounded support vector

	Kernel	Bounded Support Vectors (%)	Unbounded Support Vectors (%)
0	Polynomial (Degree=2, C=1)	35.636017	41.400667
1	Gaussian (Gamma=10, C=1)	60.314435	34.444974

(After) PCA Reduced Feature Set

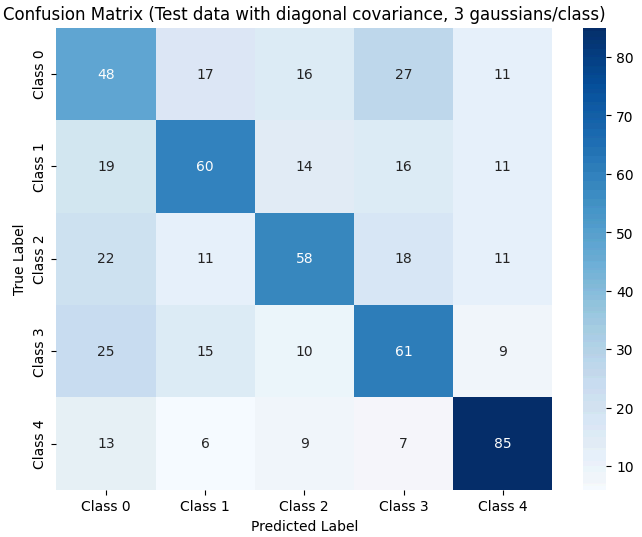
We reduce the original feature set to 26 features (90% variance).

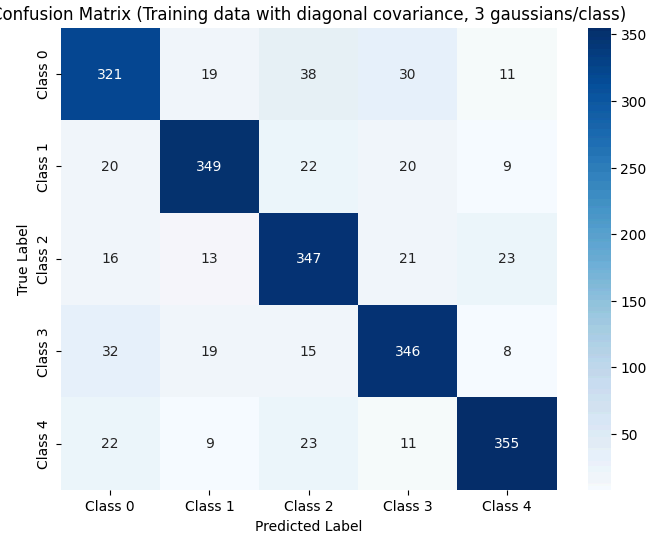


GMM

GMM with 3 gaussians per class and diagonal covariance

	Accuracy
Train	81.85%
Test	52.09%
Validation	51.51%

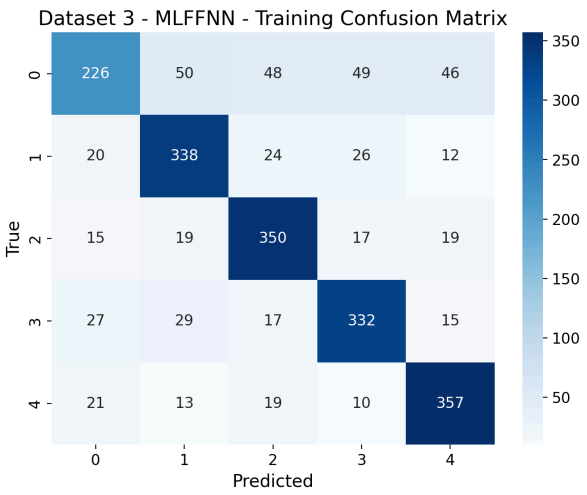


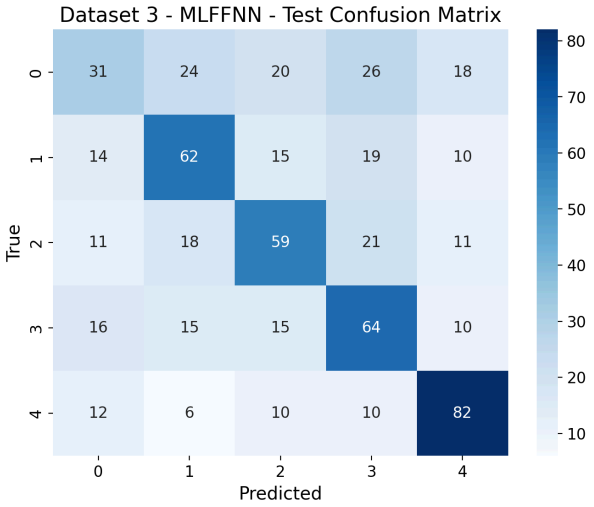


MLFFNN

Dataset 3 - MLFFNN Accuracy

	Accuracy
Train	0.763696998570748
Validation	0.5150501672240803
Test	0.4974958263772955

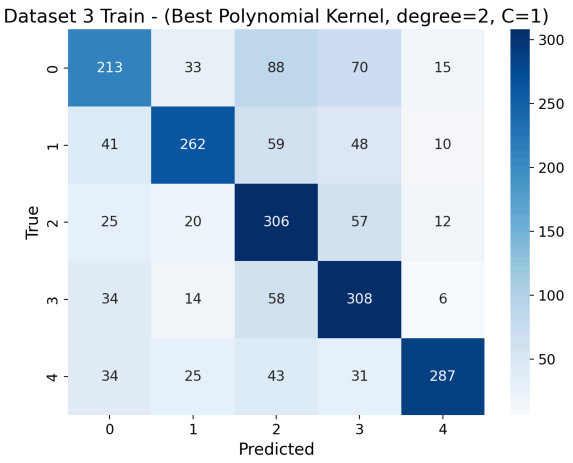


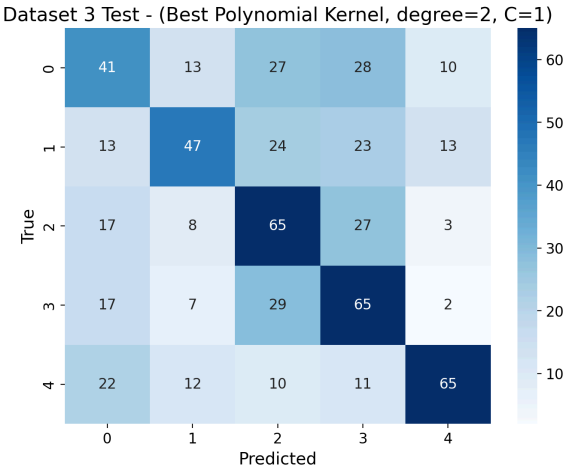


Polynomial Kernel SVM

Dataset 3 - Best Polynomial SVM Accuracy

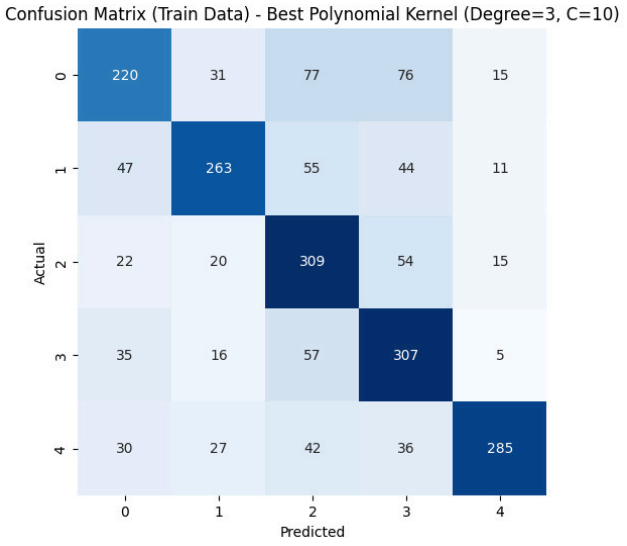
	Accuracy
Train	0.6555502620295379
Validation	0.5284280936454849
Test	0.4724540901502504





Gaussian Kernel SVM

	Accuracy
Train	87.99%
Test	60.10%



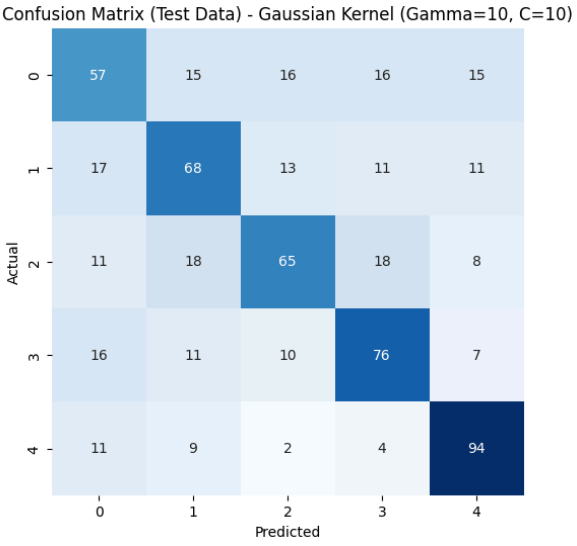


Table of percentage of bounded and unbounded support vector

	Kernel	Bounded Support Vectors (%)	Unbounded Support Vectors (%)
0	Polynomial	27.822773	59.933302
1	Gaussian	54.883278	37.636970