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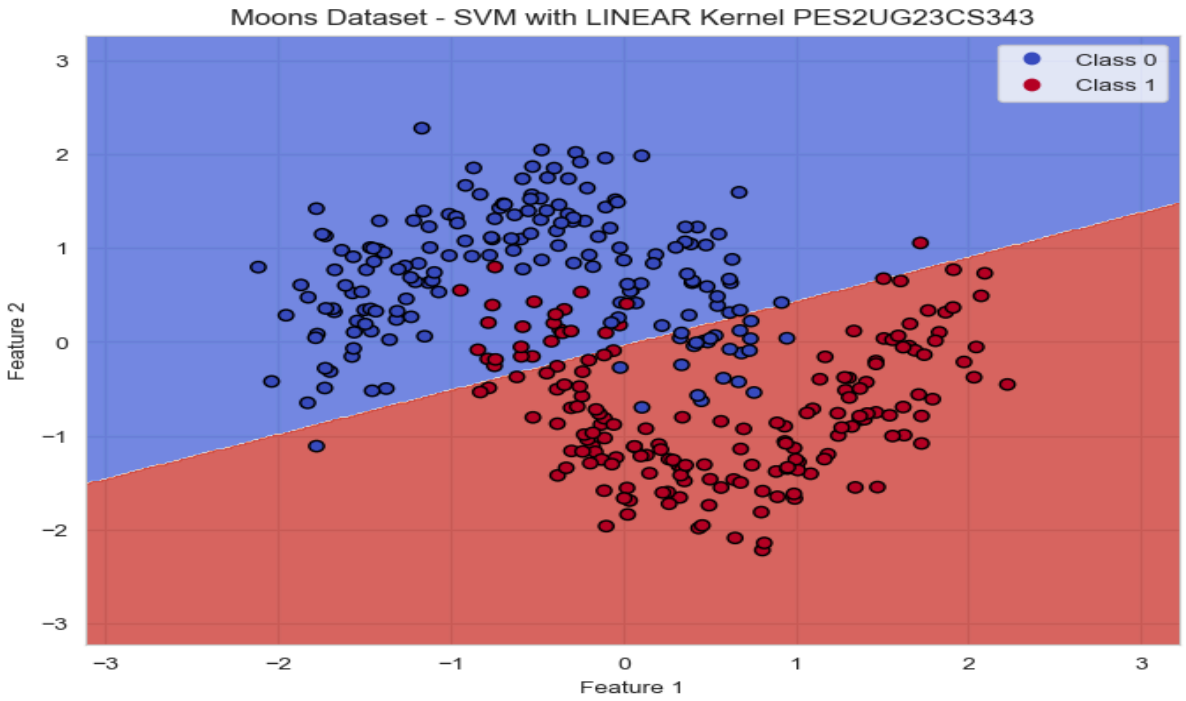
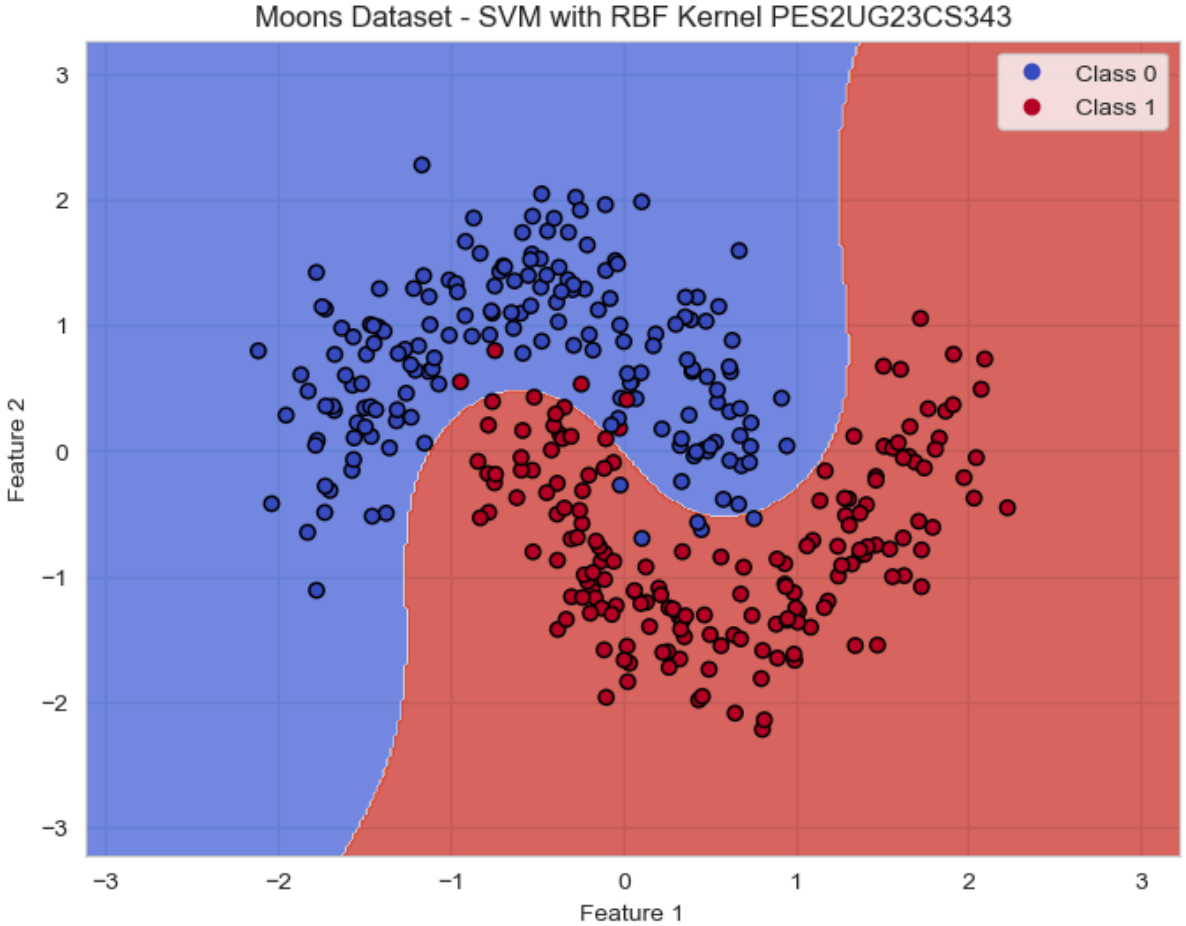
SRN: ***PES2UG23CS343***
Section: ***F***

Moons Dataset:

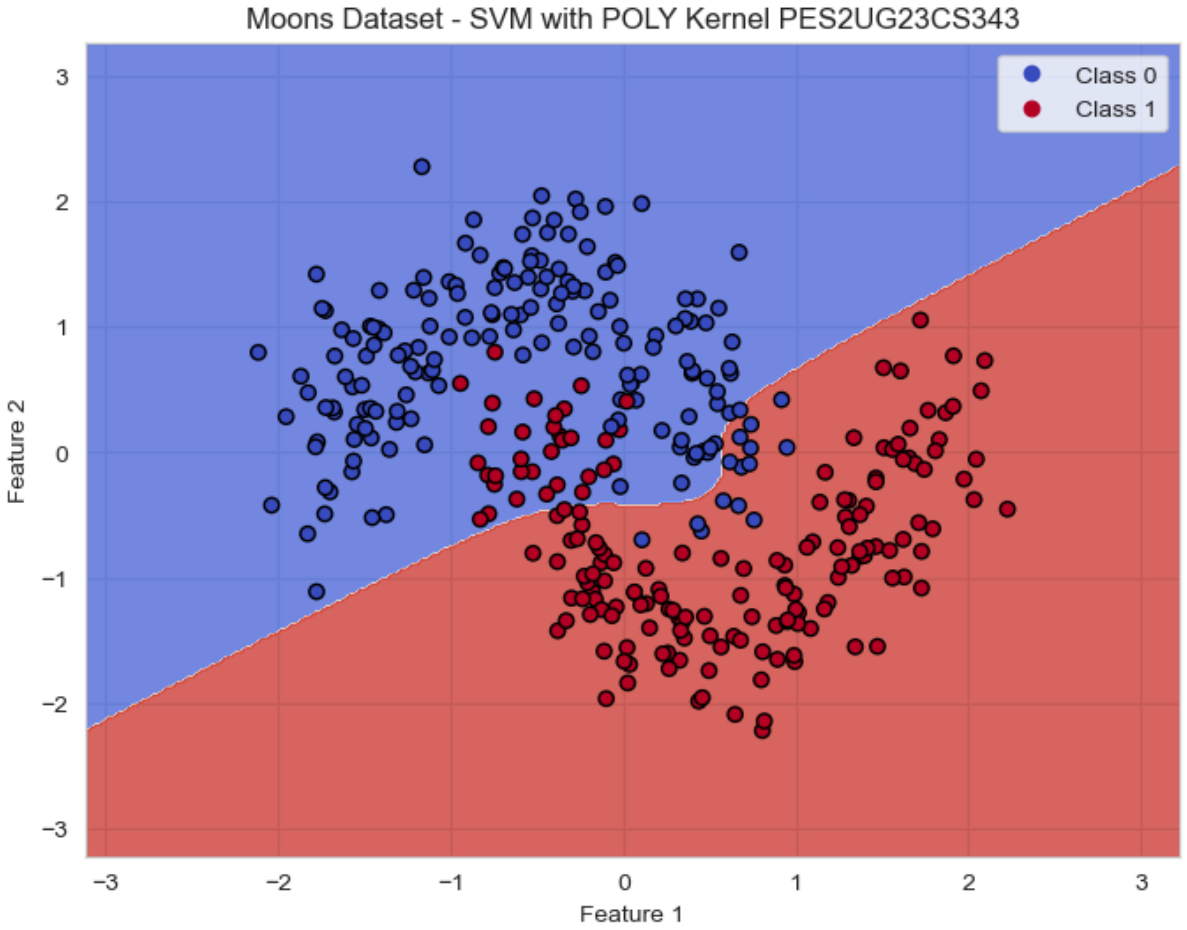
1. Classification Report for SVM with LINEAR Kernel:



2. Classification Report for SVM with RBF Kernel



3. Classification Report for SVM with POLY Kernel



Classification Report for Moons Dataset:

SVM with LINEAR Kernel PES2UG23CS343

	precision	recall	f1-score	support
0	0.85	0.89	0.87	75
1	0.89	0.84	0.86	75
accuracy			0.87	150
macro avg	0.87	0.87	0.87	150
weighted avg	0.87	0.87	0.87	150

SVM with RBF Kernel PES2UG23CS343

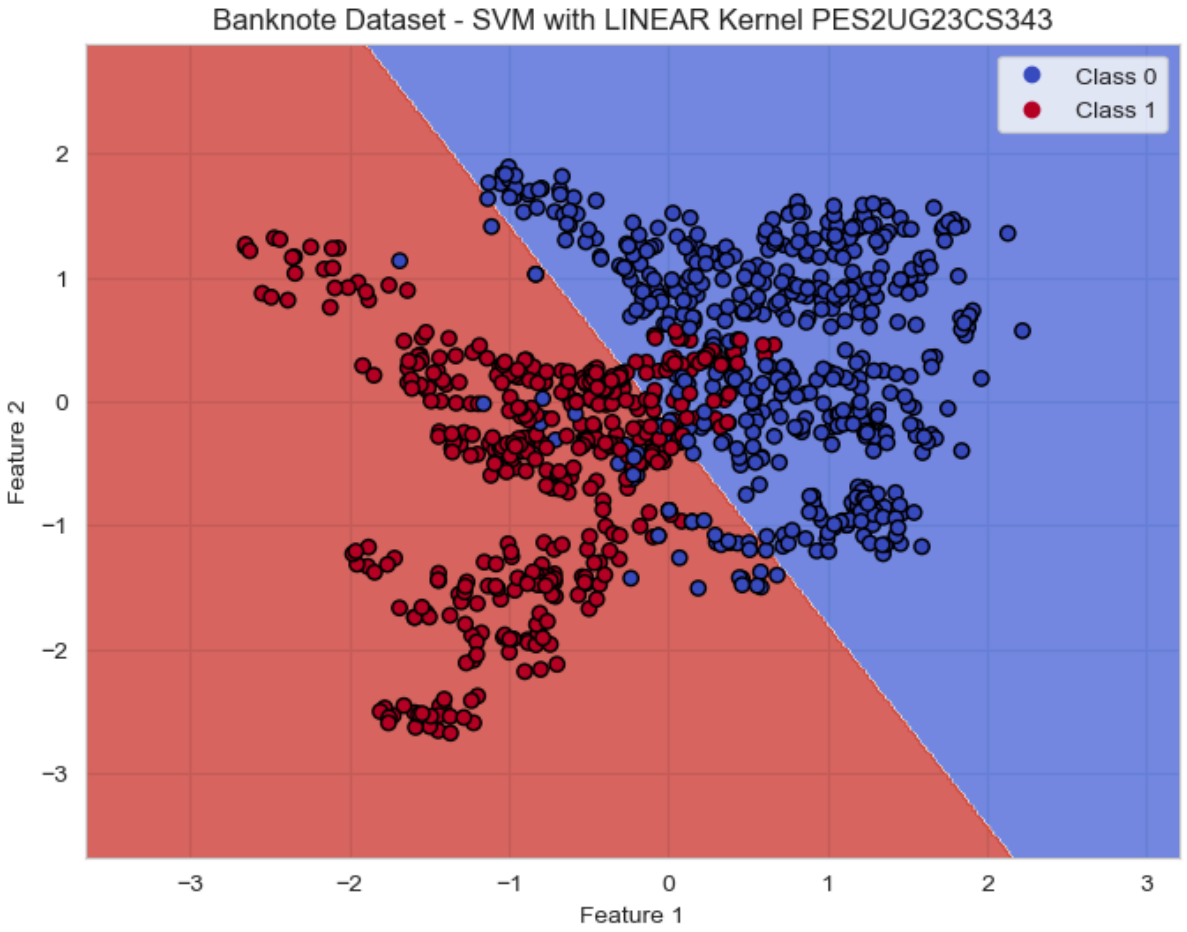
	precision	recall	f1-score	support
0	0.95	1.00	0.97	75
1	1.00	0.95	0.97	75
accuracy			0.97	150
macro avg	0.97	0.97	0.97	150
weighted avg	0.97	0.97	0.97	150

SVM with POLY Kernel PES2UG23CS343

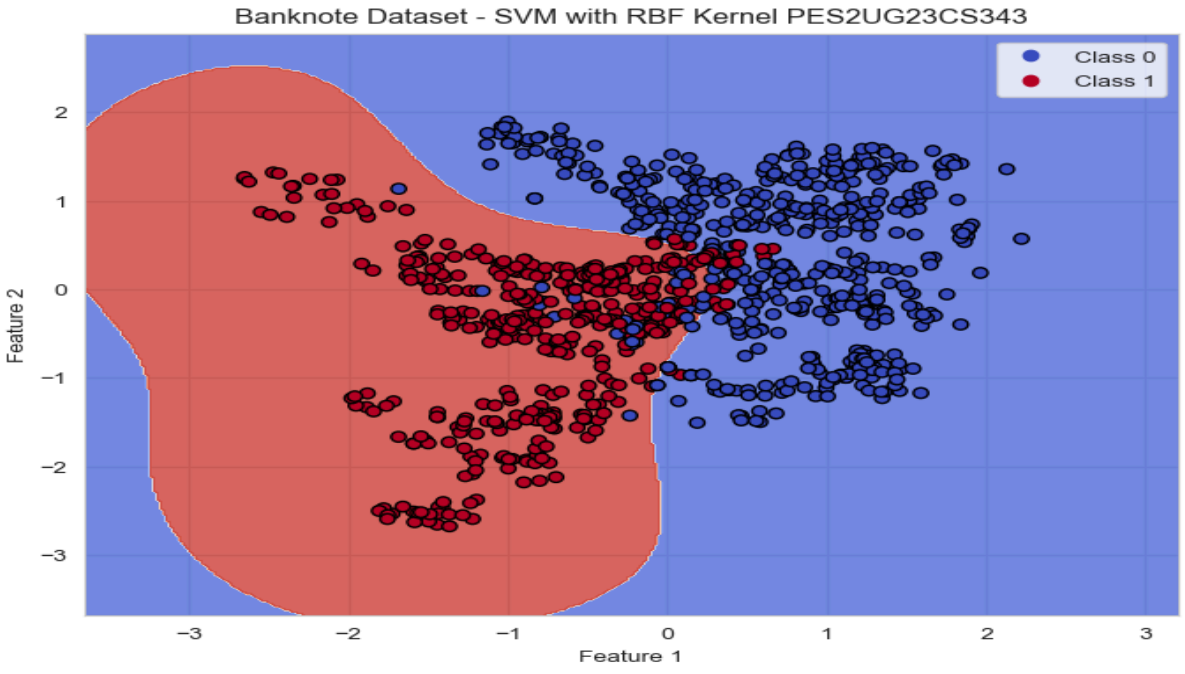
weighted avg	0.89	0.89	0.89	150

Bank Authentication Dataset:

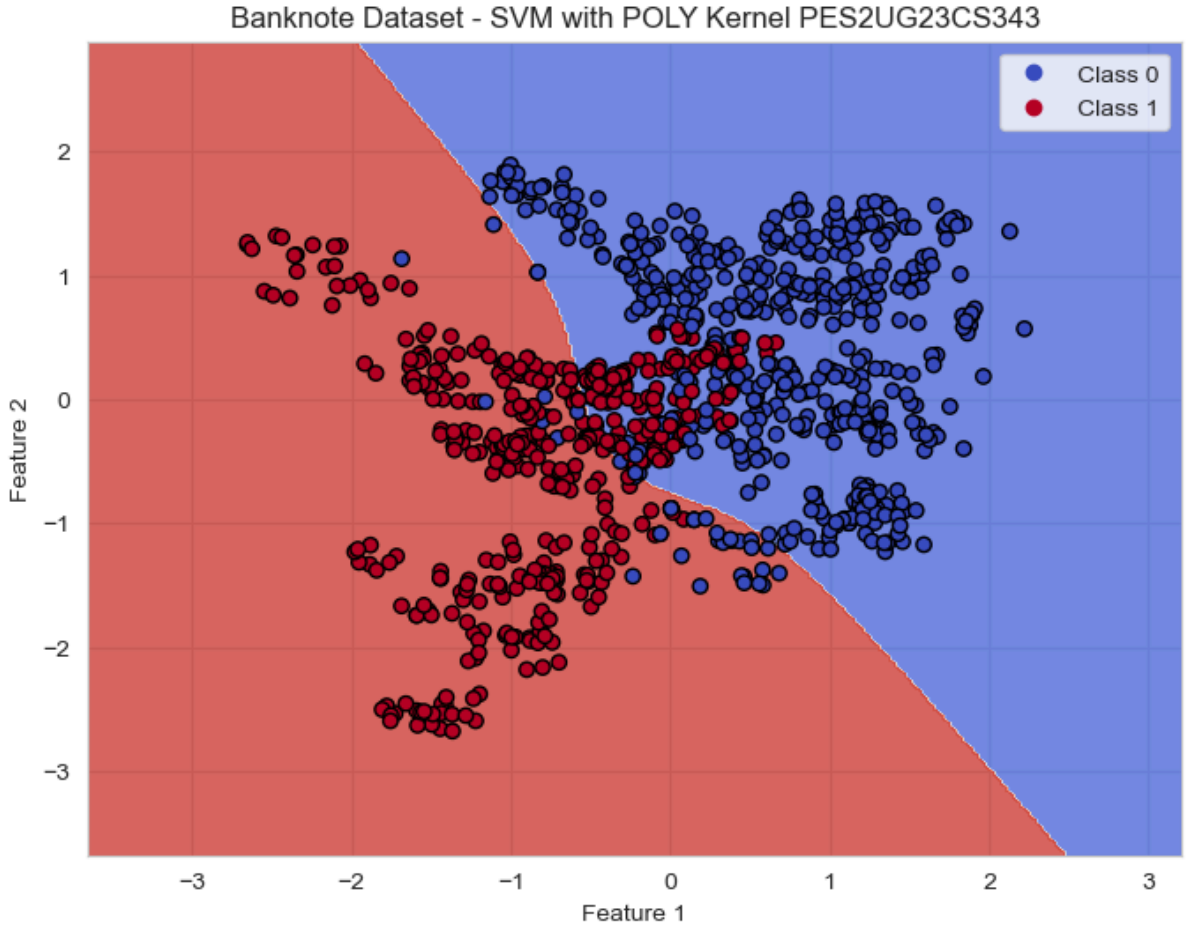
1. Classification Report for SVM with LINEAR Kernel:



2. Classification Report for SVM with RBF Kernel:



3. Classification Report for SVM with POLY Kernel:



Classification Report for Bank Authentication Dataset:

SVM with LINEAR Kernel PES2UG23CS343

	precision	recall	f1-score	support
Forged	0.90	0.88	0.89	229
Genuine	0.86	0.88	0.87	183
accuracy			0.88	412
macro avg	0.88	0.88	0.88	412
weighted avg	0.88	0.88	0.88	412

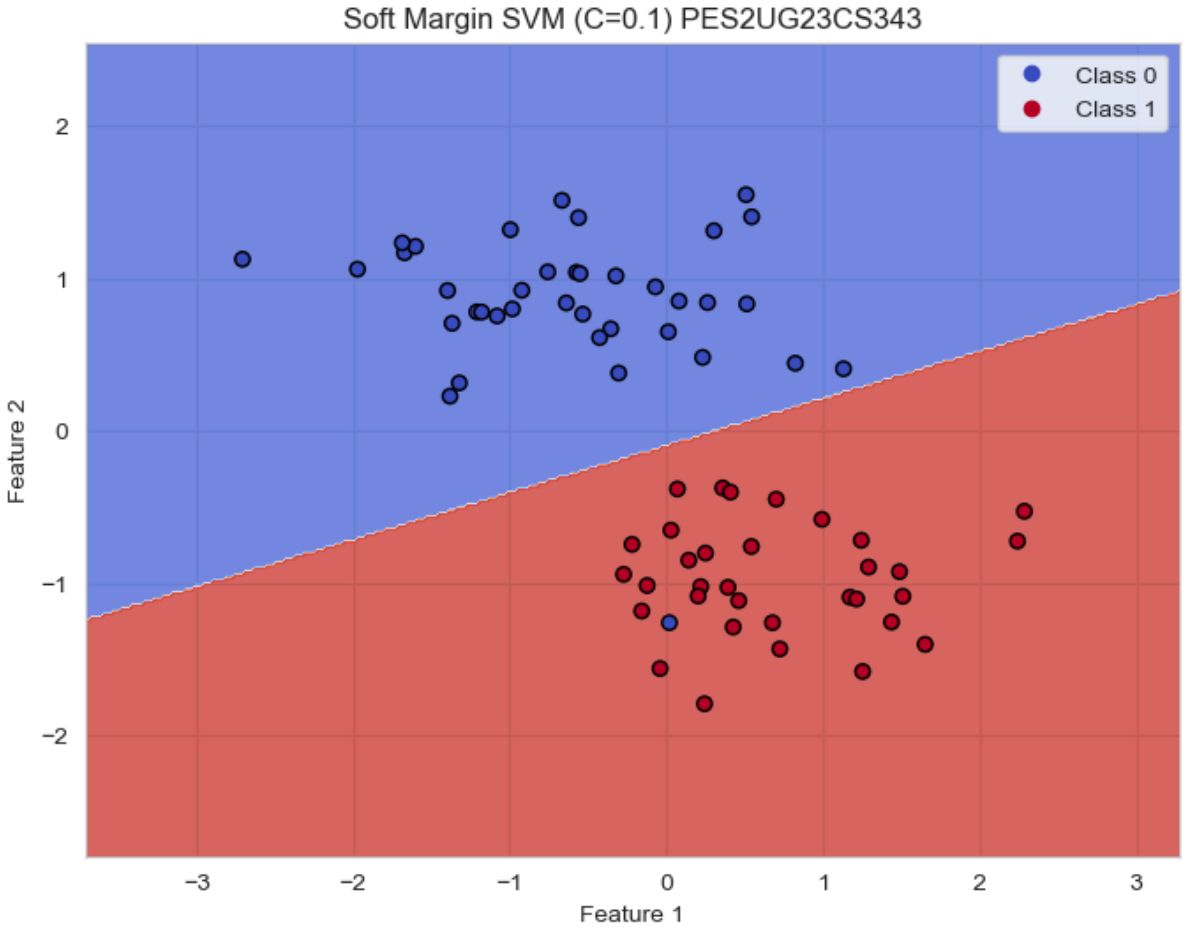
SVM with RBF Kernel PES2UG23CS343

	precision	recall	f1-score	support
Forged	0.96	0.91	0.94	229
Genuine	0.90	0.96	0.93	183
accuracy			0.93	412
macro avg	0.93	0.93	0.93	412
weighted avg	0.93	0.93	0.93	412

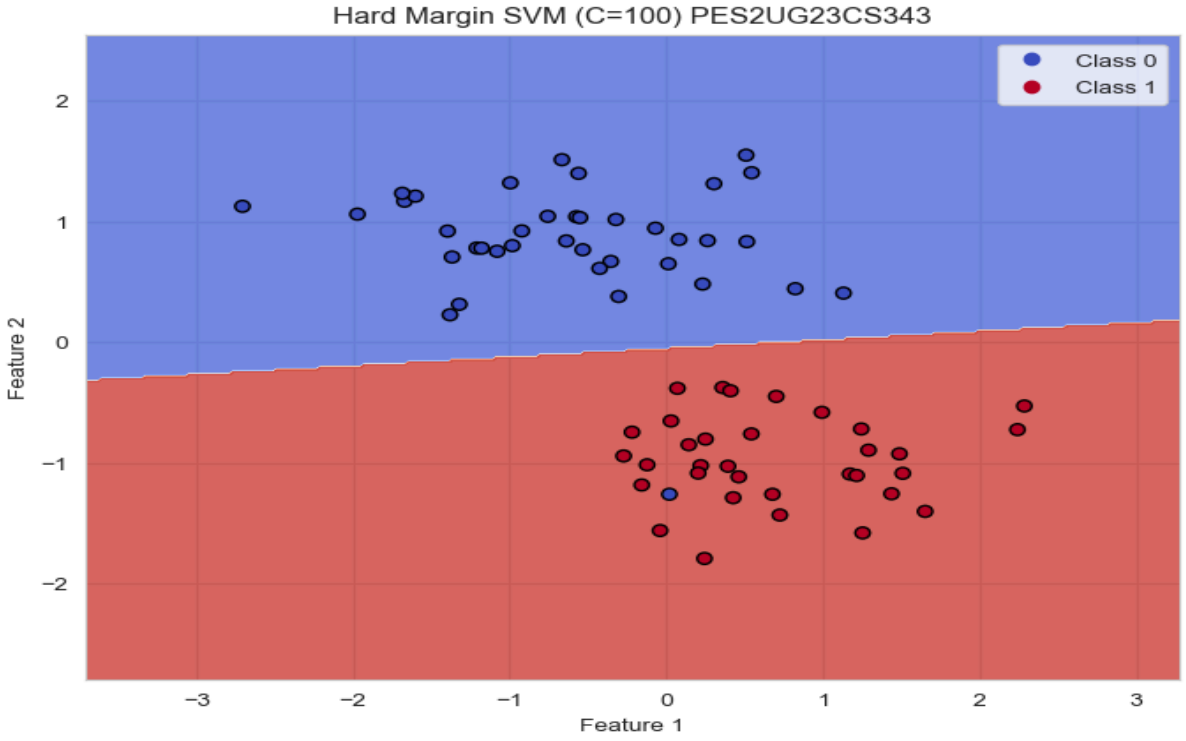
SVM with POLY Kernel PES2UG23CS343

weighted avg	0.85	0.84	0.84	412

Soft-Margin SVM:



Hard-Margin SVM:



Analysis Questions:

Moon Dataset:

1. ***Which kernel was most effective for this dataset?***

   Ans: *RBF kernel, because it can draw curved boundaries that fit the moon-shaped data well.*

2. ***Why might the Polynomial kernel have underperformed here?***

   Ans: *It makes the boundary too complex and overfits the data.*

Banknote Dataset:

1. ***Which kernel was most effective for this dataset?***

   Ans: *Linear kernel, since the data can be easily separated by a straight line.*

2. ***Why might the Polynomial kernel have underperformed here?***

   Ans: *It adds unnecessary complexity for data that's already linearly separable.*

Hard vs. Soft Margin:

1. ***Which margin (soft or hard) is wider?***

   Ans: *Soft margin (C=0.1) is wider because it allows some errors for a bigger gap.*

2. ***Why does the soft margin model allow "mistakes"?***

   Ans: *It accepts small errors to better generalize and handle noisy data.*

3. ***Which model is more likely to be overfitting and why?***

Ans: *Hard margin (C=100), because it tries to fit every point perfectly.*

4. ***Which model would you trust more for new data and why?***

   Ans: *Soft margin, as it's more flexible and performs better on unseen data.*