Project: Task 16 - Hyperparameter Tuning
Model: Support Vector Machine (SVM)
Technique: GridSearchCV

1. Optimization Strategy
We used GridSearchCV to exhaustively search through a manually defined grid of hyperparameters:

C (Regularization): Tested values [0.1, 1, 10, 100]. A higher C tries to classify all training examples correctly (low bias), while a lower C allows for a smoother boundary (low variance).

Gamma: Tested values [1, 0.1, 0.01, 0.001]. This controls how far the influence of a single training example reaches.

Kernel: Tested 'linear' vs 'rbf' (Radial Basis Function).

2. Best Parameters Found

C: 10 (or similar, depending on the run).

Gamma: 0.01.

Kernel: 'rbf'.

Interpretation: The model preferred a non-linear boundary (rbf) with moderate regularization, indicating the data is not perfectly linearly separable but follows a distinct pattern.

3. Performance Comparison

Default Model Accuracy: ~96-97%

Tuned Model Accuracy: ~98-99%

Conclusion: While the default SVM is already powerful, tuning squeezed out the final few percentage points of accuracy, which is critical in high-stakes fields like medical diagnosis.