Breast Cancer Classification Using Random Forest

1. Program Explanation This Python program uses the Random Forest Classifier from Scikit-Learn to classify breast cancer cases based on the Breast Cancer Wisconsin dataset. It performs hyperparameter tuning using GridSearchCV to optimize the model, evaluates performance using cross-validation, and computes key classification metrics such as accuracy, precision, recall, and F1-score.

2. GitHub Repository
https://github.com/yaman-aljnadi/Breast-Cancer-Diagnosis-using-Random-Forest

3. Screenshot of Results

```
# Print results
print("Accuracy:", accuracy)
print("F1-score:", f1)
print("Precision:", precision)
print("Sensitivity (Recall):", sensitivity)
print("Specificity:", specificity)
```

[12] ✓ 0.0s

```
Accuracy: 0.9707602339181286
F1-score: 0.9771689497716894
Precision: 0.963963963963964
Sensitivity (Recall): 0.9907407407407407
Specificity: 0.9365079365079365
```

4. Evaluation Metrics Explanation and Assessment

- **Accuracy:** Measures the proportion of correctly classified instances. A high accuracy score suggests the model performs well overall.
- **Precision:** The proportion of true positive predictions among all positive predictions. A high precision score indicates fewer false positives.
- **Recall (Sensitivity):** The proportion of true positive cases detected out of all actual positive cases. A high recall score suggests fewer false negatives.
- **F1-score:** The harmonic mean of precision and recall, balancing both metrics. A high F1-score indicates strong model performance in both precision and recall.