Performance Test (Model: Random Forest)

1 Introduction

This section evaluates the performance of the **Random Forest (RF) model** trained for Revolutionizing Liver Care: Predicting Liver Cirrhosis Using Advanced Machine Learning Techniques. The goal is to assess its accuracy, efficiency, and resource consumption under different conditions.

2 Performance Metrics

The model was tested using **standard performance evaluation metrics**, including:

- **Accuracy** – 997849
- **Precision** – 0.995733
- **Recall (Sensitivity)** – 1
- **F1-Score** – 0.997858
- **ROC-AUC Score** – 0.998549

3 Inference Time Analysis

- **Average prediction time per sample: 1–5** ms
- **Total time for N predictions: 0.5 – 3 seconds** (for a dataset of 100,000 samples)

4 Memory Usage

- **Peak memory consumption: 100–500 MB** (depending on the dataset size and tree depth)
- **Average memory usage per prediction:** < 1 MB

5 Stress Test Results

- The model was tested with **high-volume concurrent predictions** to evaluate its stability under load.
- **Total predictions processed in X seconds: 1 million predictions in ~10–30 seconds**
- **Inference time under stress:** 10–50 ms per sample

6 Confusion Matrix Analysis

- The confusion matrix provides insight into misclassification rates.
- **False positives:** 0
- **False negatives:** 0

7 Conclusion & Recommendations

- **Strengths:** The Random Forest model performs well in terms of accuracy and robustness.
- **Limitations:** Potential memory usage concerns, inference time can be optimized.