**Day 23 – Monday, 21 July 2025**

**Topic:** Model Optimization and Evaluation  
**Objective:** Improve model accuracy and evaluate performance.

**Summary:**  
Today I focused on improving the accuracy of my *Student Performance Prediction* model. The initial Random Forest model gave decent results, but I performed **hyperparameter tuning** to enhance performance. I experimented with parameters such as the number of estimators (n\_estimators), tree depth (max\_depth), and minimum samples per split. Using **GridSearchCV** for optimization and **cross-validation**, I identified the best configuration for the model.

After tuning, I evaluated the model using key metrics such as **accuracy, precision, recall, and F1-score** to ensure a balanced performance across all classes. The optimized model showed a noticeable improvement in prediction accuracy, demonstrating its ability to generalize well on unseen data.

**Additional Notes:**

* Used **Scikit-learn** for model training and evaluation.
* Created a **confusion matrix** and **classification report** to visualize results.
* This step was crucial in preparing the model for deployment, ensuring it performs reliably for various student data inputs.