

Project Development Phase

Performance Testing

Date	19 February 2026
Team ID	LTVIP2026TMIDS77028
Project Name	Rising Waters – A Machine Learning Approach to Flood Prediction
Maximum Marks	5 Marks

Performance Testing – Model Building & Training

Objective

The objective of performance testing during model building and training is to:

- Evaluate the accuracy of the classification model
- Measure training time
- Validate prediction efficiency
- Ensure model stability and reliability

Model Training Performance

Training Configuration

- Algorithm Used: XGBoost / Random Forest (Classification Model)
- Dataset Size: ~50,000 samples
- Features: Rainfall & Climate Parameters
- Target Variable: Flood (0 – No Flood, 1 – Flood)
- Train-Test Split: 80% Training, 20% Testing

Performance Metrics Used

To evaluate classification model performance, the following metrics were used:

Accuracy Score

Measures overall correct predictions made by the model.
Higher value indicates better performance.

Precision

Measures correctness of positive flood predictions.
Important to reduce false flood alerts.

Recall

Measures how well the model detects actual flood cases.
Critical for disaster management systems.

F1-Score

Harmonic mean of Precision and Recall.
Balances false positives and false negatives.

Confusion Matrix

Provides detailed breakdown of:

- True Positives
- True Negatives
- False Positives
- False Negatives

Training Time Performance

- Model training completed within a few seconds.
- Efficient ensemble algorithms used.
- Suitable for rapid retraining if dataset updates.
- Lightweight preprocessing pipeline ensures fast execution.

Prediction Performance

- Prediction response time: < 2 seconds
- Model loads quickly using serialized (.pkl) file
- Efficient preprocessing using StandardScaler
- Real-time prediction through Flask web application

Stability Testing

- Model tested with multiple rainfall input combinations.
- Verified consistent prediction results.
- Validated input range handling.
- Tested edge cases (extreme rainfall values).

Conclusion of Performance Testing

The classification model demonstrates:

- High prediction accuracy
- Balanced precision and recall
- Fast training time
- Real-time prediction capability
- Stable performance under multiple test cases