

Final Report Template

1. INTRODUCTION

1.1 Project Overview

This project focuses on the **Exploratory Analysis of Rainfall Data in India for Agriculture**. The objective is to predict rainfall based on weather features using machine learning and provide actionable insights for farmers.

1.2 Purpose

The purpose of this project is to develop a predictive system that helps in planning agricultural activities based on expected rainfall patterns.

2. IDEATION PHASE

2.1 Problem Statement

Unpredictable rainfall affects crop yield and farming decisions. There is a need for a system that can accurately predict rainfall using historical weather data.

2.2 Empathy Map Canvas

- **Think & Feel:** Farmers need accurate weather predictions.
- **See:** Current weather reports lack localized accuracy.
- **Hear:** Farmers are often misinformed about upcoming rains.
- **Say & Do:** Plan farming activities, sowing, and irrigation.

2.3 Brainstorming

- Machine learning models for rainfall prediction.
 - Data visualization for trend analysis.
 - Web-based interface for easy access.
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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

- Farmers input local weather parameters.
- Receive rainfall prediction.
- Plan agricultural activities accordingly.

3.2 Solution Requirement

- Input weather data.

- Predict rain or no rain.
- User-friendly web interface.
- Accurate ML model predictions.

3.3 Data Flow Diagram

```
User Input --> Flask App --> ML Model --> Prediction --> Result Display
```

3.4 Technology Stack

- Python, Flask, HTML/CSS
- Machine Learning (scikit-learn)
- pandas, numpy
- Deployment: Local server / Cloud

4. PROJECT DESIGN

4.1 Problem Solution Fit

- Problem: Farmers need rainfall prediction.
- Solution: ML-based predictive web app provides accurate forecasts.

4.2 Proposed Solution

- Collect historical weather data.
- Train ML model.
- Build Flask web app for prediction.

4.3 Solution Architecture

```
User (Web Form) --> Flask Backend --> ML Model (Pickle) --> Prediction Result
--> Frontend Display
```

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

- Week 1-2: Data Collection & Cleaning
- Week 3: Model Training & Evaluation
- Week 4: Flask App Development
- Week 5: Testing & Deployment

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

- Validated model accuracy with test dataset.
 - Tested Flask app with multiple inputs.
 - Ensured response time < 2 seconds per request.
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7. RESULTS

7.1 Output Screenshots

- Home Page: index.html
 - Prediction Page (Chance of Rain): chance.html
 - Prediction Page (No Rain): nochance.html
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8. ADVANTAGES & DISADVANTAGES

Advantages: - Helps farmers plan better. - Web-based and easy to use. - Fast and responsive predictions.

Disadvantages: - Accuracy depends on quality of dataset. - Model may not predict extreme weather events.

9. CONCLUSION

The project successfully predicts rainfall using historical weather data and provides a web interface for users to input weather features and get predictions.

10. FUTURE SCOPE

- Integrate real-time weather API.
 - Include geolocation-based prediction.
 - Deploy on cloud for wider access.
 - Provide weekly and monthly rainfall trends.
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11. APPENDIX

- **Source Code:** Available in GitHub repository
- **Dataset Link:** /content/drive/MyDrive/weatherAUS.csv
- **GitHub & Project Demo Link:** <https://github.com/divyabhuma/Exploratory-Analysis-of-Rain-Fall-Data-in-India-for-Agriculture>