Bean Care: Design and Implementation of Diseases Diagnosis System for Beans

Project ID: TMP-2023-24-103

Project Proposal Report

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25th August 2023

Declaration of the candidate & Supervisor

To the best of our knowledge and belief, this proposal does not contain any previously published or written by another person material, except where the acknowledgement is made in the text. We declare that this is our own work, and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning.

Name	Student ID	Signature
Devinda K K D	**IT20249502**	

The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

……. 2023/08/23

Signature of the supervisor: Date:

Abstract

This project proposal outlines the development of a weather prediction system tailored for bean growing areas. The proposed system aims to provide accurate and timely weather forecasts to bean farmers, enabling them to make informed decisions about cultivation practices and crop management.

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1. Introduction

1. Introduction:*

Weather conditions play a pivotal role in agricultural productivity. The proposed system focuses on predicting weather conditions in bean growing areas, providing farmers with critical information that can influence their planting, irrigation, and harvesting strategies.

1.1 Motivation:*

The motivation behind this project is to equip bean farmers with reliable weather forecasts that are specific to their cultivation regions. Accurate weather predictions can help farmers mitigate risks associated with adverse weather events, optimize resource utilization, and ultimately enhance their crop yield and quality.

1.2 Importance of Using a Web Application:

A web application serves as an accessible and interactive platform for farmers to access weather forecasts. By presenting weather information in a user-friendly manner, the application empowers farmers to make timely decisions based on the latest weather data, ensuring the successful growth of their bean crops.

2. Background and Literature Survey

2.1 Background

Weather variability and unpredictability can significantly impact bean cultivation. By analyzing historical weather data and identifying patterns, the proposed system aims to provide farmers with insights into the typical weather conditions in their growing areas..

2.2 Literature Review

Existing literature emphasizes the significance of weather prediction in agriculture. Advanced weather forecasting models have been applied to various crops, aiding farmers in risk management and yield optimization. However, a specialized weather prediction system for beans is currently lacking, which this project seeks to address.

3. Research Gap & Research Problem

3.1.Research Gap

(Chart: Gap No. and Features to be Expanded)

Gap No.	Features to be Expanded
1	Limited availability of bean-specific weather prediction systems.
2	Insufficient integration of weather forecasts into bean farming practices.
3	Lack of user-friendly platforms for accessing localized weather predictions.
4	Inadequate utilization of historical weather data for predictive modeling.

3.2.Research Problem

The research problem is to develop a weather prediction system that leverages historical weather data and advanced modeling techniques to provide accurate and region-specific forecasts for bean growing areas. The system needs to be user-friendly and accessible through a web application.

4. Objectives

4.1.Main Objective

, The main objective is to develop a weather prediction system that offers accurate and localized forecasts for bean growing areas..

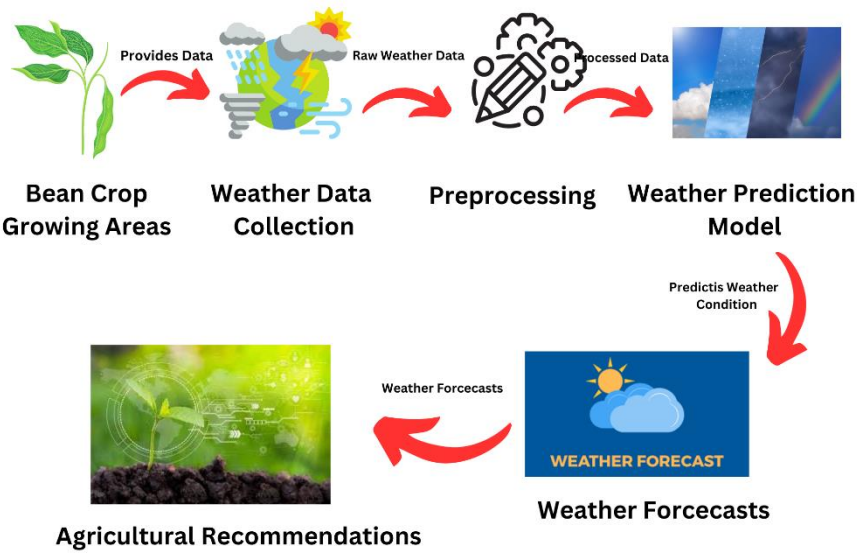
4.2.Specific Objectives

1. Collect and preprocess historical weather data for relevant bean cultivation regions.
2. Implement advanced weather prediction models suitable for localized forecasts.
3. Design and develop a user-friendly web application for farmers to access weather forecasts.
4. Validate the accuracy of weather predictions by comparing them with real-time data.

5. Methodology

5.1.Functional Requirements

5.1.1. Overall System Overview



(Mermaid code or description of the diagram)

Figure 5.1.1.1 **System Overview**

5.1.2. System Overview for Instruction / Treatments Releasing.

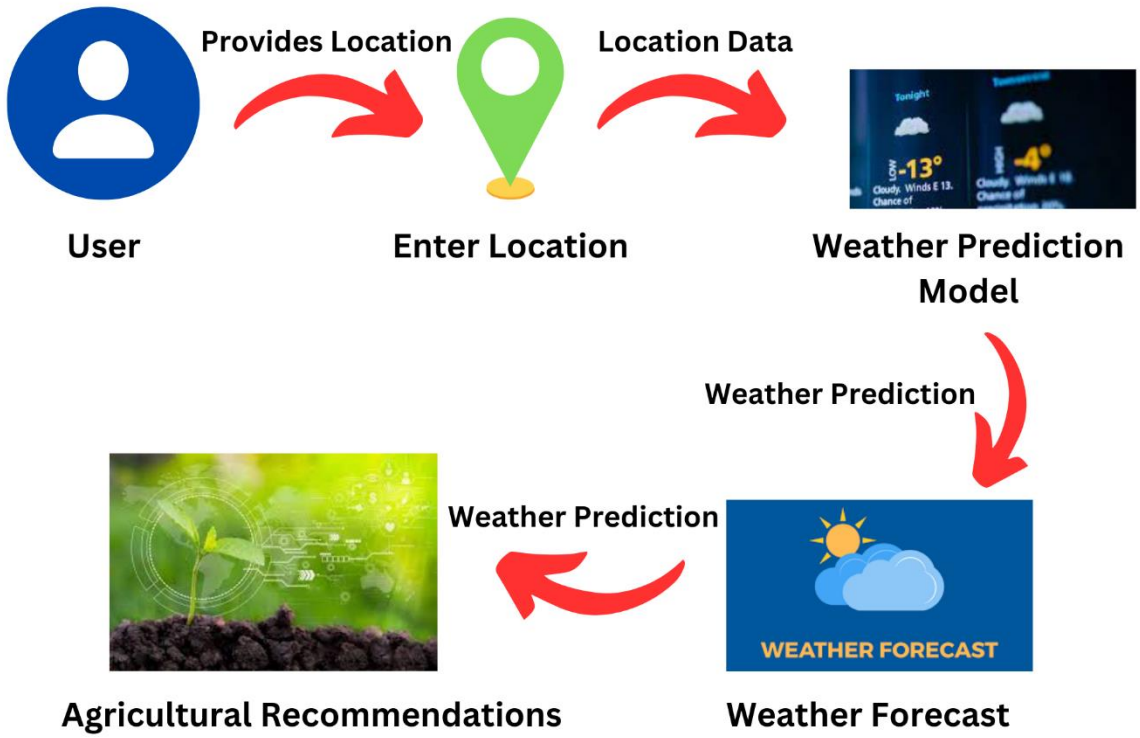


Figure 5.1.2.1 **System Overview for Instruction / Treatments**

D 1. *Bean Crop Growing Areas (A)*: Represents the geographical regions where bean crops are cultivated. These areas provide the data required for weather prediction.

2. *Weather Data Collection (B)*: Raw weather data from various sources (e.g., meteorological stations, satellite data) is collected for the bean crop growing areas.

3. *Preprocessing (C)*: The collected raw weather data is preprocessed to clean and prepare it for analysis. Preprocessing includes tasks like handling missing values, removing noise, and standardizing the data.

4. *Weather Prediction Model (D)*: The model uses machine learning techniques to analyze the preprocessed weather data and predict future weather conditions for the bean crop growing areas.

5. *Weather Forecasts (E)*: The Weather Prediction Model generates forecasts for upcoming weather conditions, including factors like temperature, humidity, and precipitation.

6. *Agricultural Recommendations (F)*: Based on the weather forecasts, the system provides agricultural recommendations to farmers. For example, if heavy rainfall is predicted, the system might recommend delaying certain farming activities.

Raw weather data is collected from bean crop growing areas, preprocessed for analysis, and then used by the Weather Prediction Model to generate forecasts. These forecasts lead to valuable agricultural recommendations that can help farmers plan their activities more effectively

5.2.Application of Key Pillars

The application of key pillars involves data preprocessing, model development, web application design, and real-time data integration.

5.3.Tools and Technologies

Tools and Technologies	Explanation

| Python | Programming language for model development and data analysis. |

| Flask | Web framework for building the user interface and handling data. |

| Pandas, NumPy | Libraries for data manipulation and analysis. |

| Machine Learning | Algorithms for weather prediction model development. |

| HTML/CSS/JavaScript | Front-end technologies for the web application. |

Table 5.3.1 **Tools and Technologies chart**

6. Evaluation Criteria

6.1.Gantt Chart

Figure 6.1.1 **Gantt chart**

6.2.Work Breakdown Structure

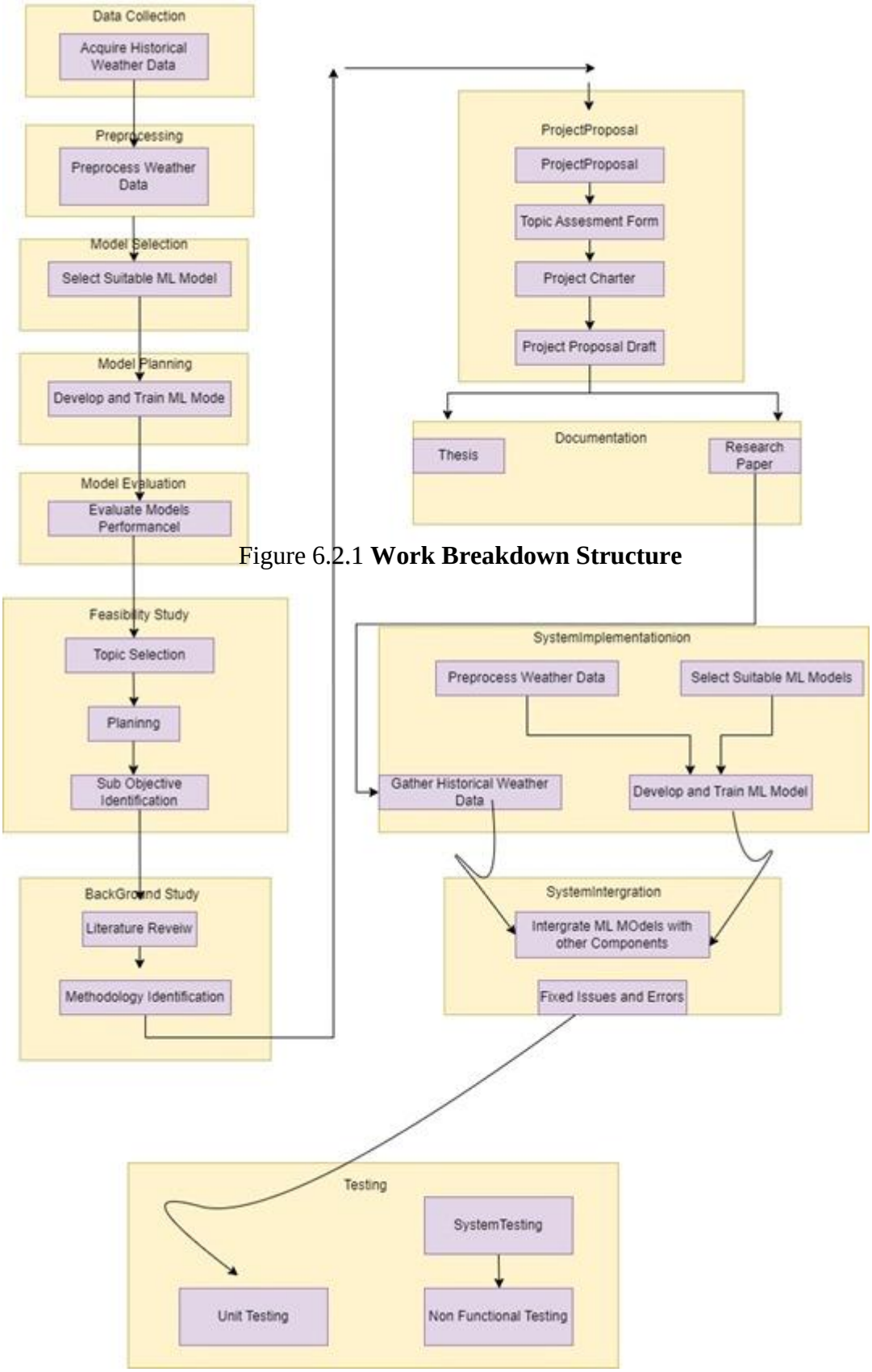


Figure 6.2.1 **Work Breakdown Structure**

7. Commercialization

The commercialization strategy involves offering subscription plans to farmers for access to the Weather Prediction System. Subscription tiers will provide varying levels of access to forecast accuracy, frequency, and additional features.

8. Description of Personal and Facilities

IT Number	Member	Task
IT20249502	Devinda K K D	Design and implement weather condition prediction.

Table 8.1: Description of personal and facilities

8.1. User Requirements

- Accurate and localized weather forecasts.
- Intuitive and user-friendly interface.
- Real-time updates and notifications.

8.2. Software Requirements

- Python environment for model development.
- Web development tools for the application.

8.3.Functional Requirement

- Accurate weather predictions for specific regions.
- Interactive and responsive web application.
- Integration with real-time weather data sources.

8.4.Non-Functional requirement

- Reliable system performance.
- Data security and privacy measures.

9. Budget and Budget Justification

Activities	Amount (Rs.)
Development Resources	2000
Data Acquisition	2000
Infrastructure	1000
Marketing	1500
Maintenance	2000
Miscellaneous	1000
Total	**9500/=**

Table 9.1: Estimate Budget

References

1. *Ahmed, K. F., Rafi, M., & Rafi, K. (2018). Weather forecasting using machine learning techniques: A comprehensive review. Future Generation Computer Systems, 86, 82-97.*

This comprehensive review discusses the application of machine learning techniques in weather forecasting, which aligns with the objective of predicting weather conditions for bean-growing areas.

2. *Hong, X., Li, W., & Li, H. (2019). Short-term wind speed forecasting using a hybrid model based on empirical mode decomposition and extreme learning machine. Energy Conversion and Management, 198, 111874.*

This paper presents a hybrid model for short-term wind speed forecasting, which could offer insights into forecasting methods applicable to predicting weather conditions in bean-growing areas.

3. *Kaptan, K., & Goktas, S. (2018). A survey on time series forecasting and dynamic pricing models in cloud computing. Journal of King Saud University-Computer and Information Sciences.*

This survey covers time series forecasting, which is relevant to predicting weather conditions. It can provide valuable information about forecasting techniques and their applications.

4. *Zhang, X., Song, Y., Wang, L., Wang, Y., & Xue, Y. (2019). A deep learning model with high flexibility for weather forecasting. Atmospheric Research, 226, 18-27.*

This paper introduces a deep learning model for weather forecasting, which could provide insights into advanced techniques applicable to predicting weather conditions in bean-growing areas.

5. *Ghorbani, A., Ayani, R., & Raahemifar, K. (2021). A review of machine learning and artificial intelligence techniques for weather forecasting. Progress in Earth and Planetary Science, 8(1), 1-14.*

This review article discusses the use of machine learning and AI techniques for weather forecasting, providing a broad overview of methods that can be employed for predicting weather conditions.