Plantree.

FYP– I REPORT
BS(SE) Fall 2024

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1. Introduction

A few of the existing challenges of man are climate change and global warming. These problems include inadequate tree plantations, deforestation. Our project, Plantree: Due to this, AI Enhanced Regional Tree Plantation Predictor, to Mitigate Climate Effect proposes an innovative solution. This system would be using the best AI models, IoT sensors as well as environmental data, to suggest the best areas to undertake tree plantations. Due to the emphasis on temperature, humidity, and air quality, this project endeavours to come up with recommended plantation sites to bring about the maximal change thus helping organisations such as PTI's Billion Tree Tsunami and MTJ's plantation projects. Instead, the objective is to increase the quality of air that people breathe and bring more sustainability to our environment with the help of refined tree plantation approaches based on rich data.

2. Related Work / (SRS/SDS)

In the Software Requirement Specification (SRS) and Software Design Specification (SDS), the core functionality and structure of the project have been detailed. The SRS outlines the system's requirements, including functional, non-functional, and hardware/software specifications. The SDS highlights the technical architecture, database schema, and data flow diagrams that form the backbone of our project.

Both documents are available as soft copies for detailed analysis. These specifications align with existing works that focus on environmental optimization through technology, but Plantree incorporates real-time data collection via IoT sensors and advanced AI models, which distinguishes it from prior systems.

3. Methodology

The methodology for Plantree consists of the following steps:

3.1 IoT Sensor Deployment:

In the IoT system, MQ135, ESP32 and DHT11 sensors are used to check the environment of any area related to air quality, temperature, humidity etc.

3.2 Data Collection:

The sensors obtain primary field data in real time, which is transmitted to a centralized database. All this determination forms the basis for the subsequent analysis of the conditions in the region.

3.3 Data Preprocessing:

It is a rule that prior to feeding it into an AI model and applying its predictive capability, the collected data shall be cleaned and pre-processed.

3.4 AI Model Integration:

The main components that are implemented are pre-trained AI models including SvM, Random Forest, Neural Network and 1D CNN. These models employ data from the sensor to determine the areas that can best support the tree plantation and approximate their impact on the environment.

3.5 Recommendation System:

The generated recommendations are specific to plantation sites based on the output of the AI model, and the impact estimates given for each recommendation, to ensure the greatest effect on the environment.

3.6 Evaluation and Refinement:

The accumulated information and the predictions are analyzed in order to optimize the systems' efficiency and reliability in the future.

4. Testing and Results

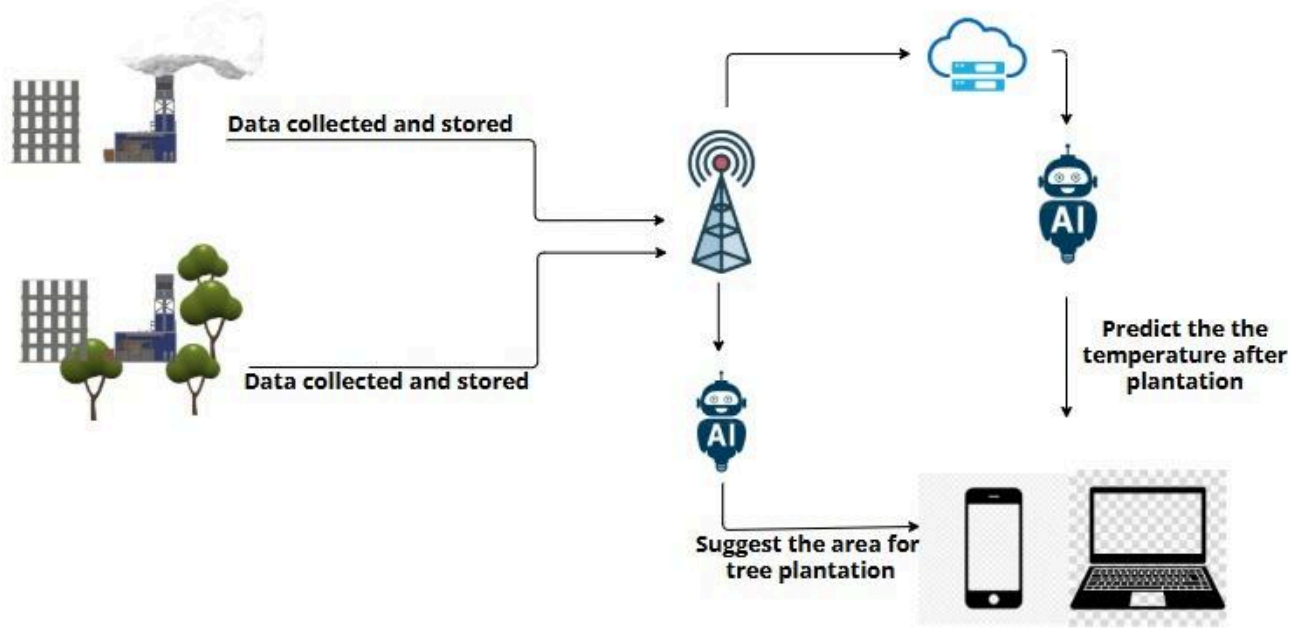
4.1 **Testing Phase**:

- The IoT sensors were tested in multiple regions to ensure they accurately capture temperature, humidity, and air quality data.
- Sensor deployment was carried out in both urban and rural areas to account for diverse environmental conditions.

4.2 **Results**:

- Data collected from regions with varying temperatures and humidity levels was stored and analyzed.
- Initial analysis revealed significant patterns, such as regions with high air pollution benefiting more from tree plantations.
- The data sets included specific values for temperature, humidity, and air quality, which will guide AI model training in FYP-II.

5. System Diagram



6. Goals For FYP-II

The following goals are set for the second phase of the project:

1. **AI Model Training**:
   Using the collected data, advanced AI models like SvM, Random Forest, Neural Network and 1D CNN will be trained to provide more accurate plantation suggestions.
2. **Impact Prediction**:
   The system will predict the long-term environmental impact of suggested plantation locations, including changes in air quality and temperature reduction.
3. **Optimization**:
   Refine the AI models to reduce prediction errors and improve the quality of recommendations.
4. **Enhanced UI/UX**:
   Develop a user-friendly interface for NGOs and environmental organizations to access detailed reports and actionable insights.

7. Conclusion

Plantree represents a significant step towards combating climate change and promoting sustainable development. By leveraging IoT technology and AI, the system provides a scientific approach to tree plantation. The first phase has laid a strong foundation by collecting and analyzing environmental data. Moving forward, FYP-II will focus on optimizing AI models and providing actionable insights to stakeholders. Through *Plantree*, we aim to make a measurable difference in creating a healthier, greener, and more sustainable planet.

References

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