Software Design Specification

Automated Potato Disease Detection Android application

Project - ICT 3206

Bachelor of Information and Communication Technology

(BICT) Degree Programme

Department of Information and Communication Technology

Faculty of Technology

Rajarata University of Sri Lanka

Mihintale

Details of the Project

Project Title : Automated Potato Disease Detection Android application

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Submission Date : 03/27/2024

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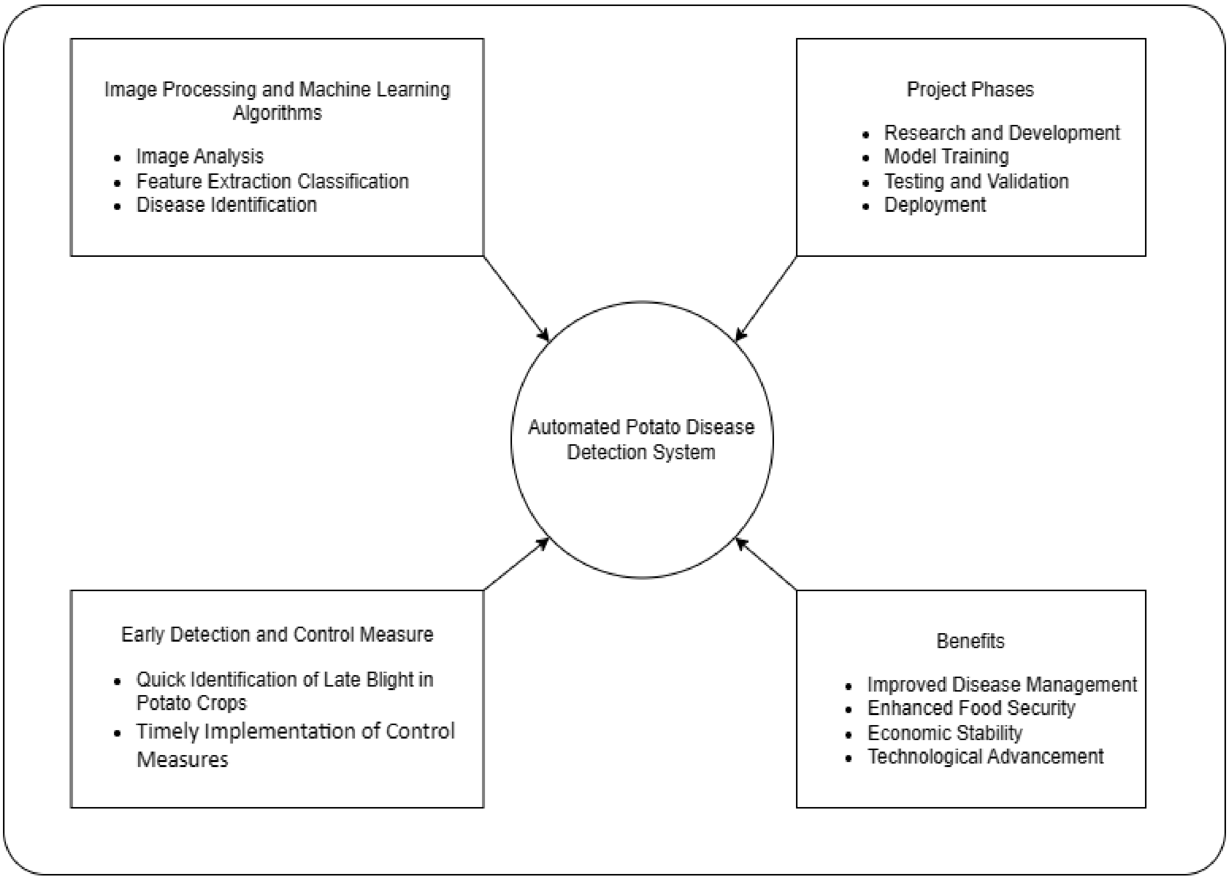

Figure 1 : Scope overview diagram

2. Process flow diagram

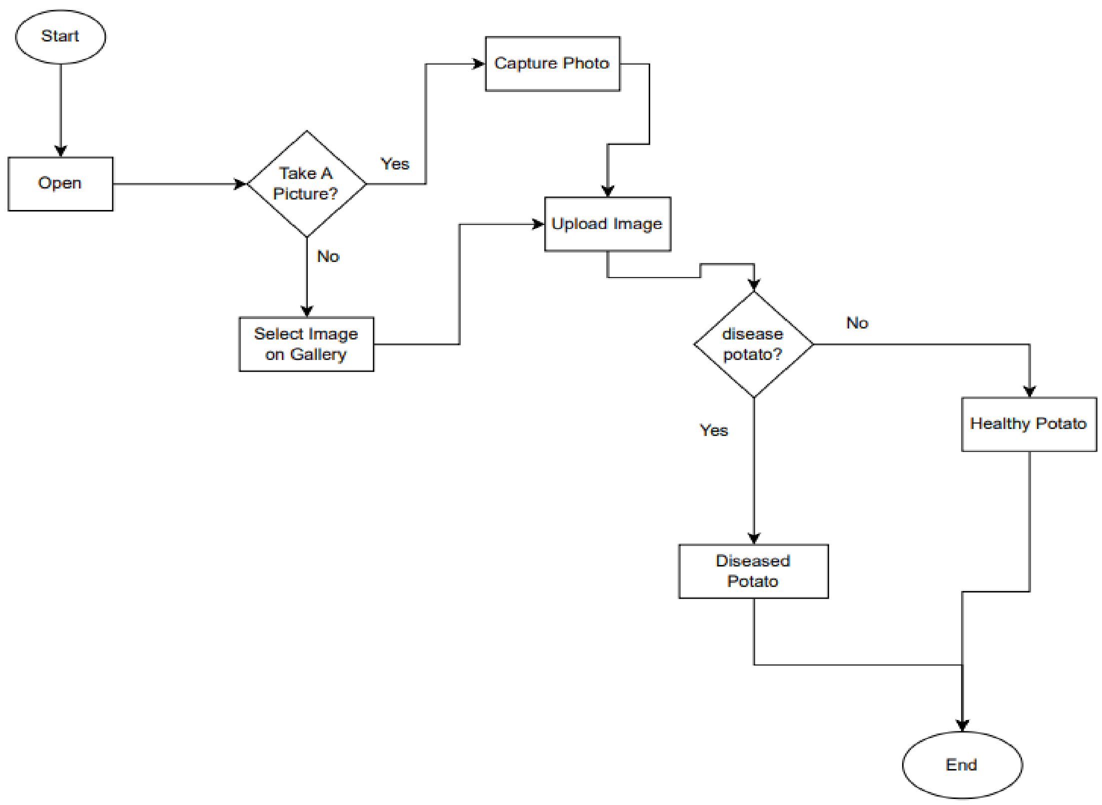

Figure 2: Process flow diagram

3. System Architecture Designs

3.1. System Architecture Diagrams

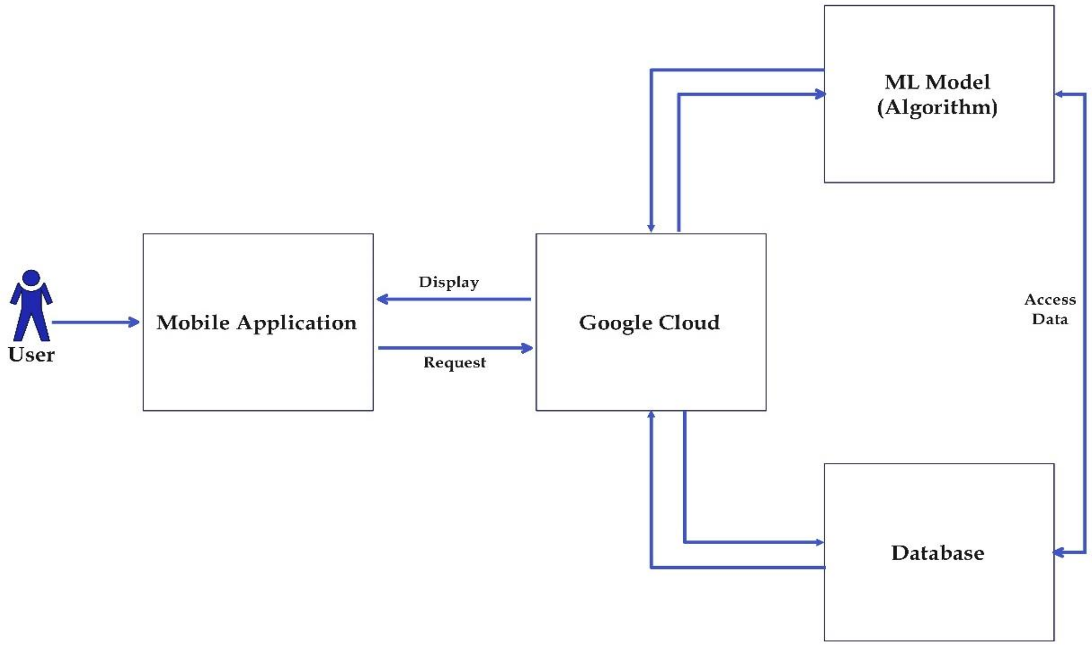

Figure 3: System Architecture

3.2. Hardware Architecture

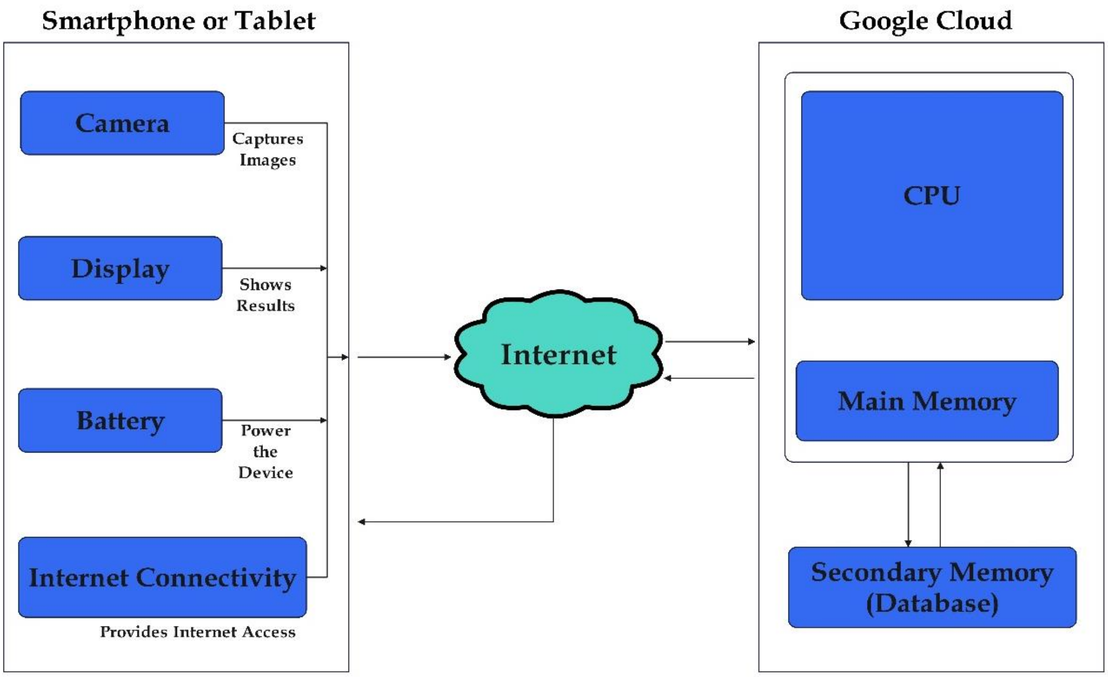

Figure 4: Hardware Architecture

3.3.Software Architecture

The software architecture for the Potato Disease Detection Android App encompasses various components crucial for its functionality and performance.

- **Programming Language:**
  The choice of programming language depends on the specific application requirements. Common languages for machine learning implementation include Python, R, and Java.
- **Deep Learning Frameworks:**
  Frameworks like TensorFlow, PyTorch, and Keras are essential for developing and training deep learning models, crucial for image analysis and disease detection.
- **Computer Vision Libraries:**
  Libraries such as OpenCV, scikit-image, and Pillow provide tools for image processing and analysis, enabling the app to process images of potato plant leaves.
- **Data Visualization Libraries:**
  Libraries like Matplotlib, Seaborn, and Plotly aid in visualizing data, facilitating the interpretation of results and patterns in the dataset.
- **Model Interpretation Libraries:**
  Tools like Lime, SHAP, and TensorBoard help in interpreting machine learning models, providing insights into their predictions and decision-making processes.

In addition to these software requirements, the specific software that is used will also depend on the specific application and the hardware that is available. For

- **Algorithm Choice:**
  The selection of algorithms depends on the specific application and available data. CNNs are suitable for image classification but can be resource-intensive. SVMs and random forests are less computationally expensive but may sacrifice some accuracy.
- **Data Quality and Quantity:**
  The performance of the machine learning model is heavily influenced by the quality and quantity of the data. Proper labeling and representation of the patient population are crucial for accurate diagnosis.

- **Software Selection:**
  Jupyter Notebook is ideal for rapid prototyping and experimentation, but for production deployments, other libraries like Scikit-learn may be more suitable, depending on the project's needs.
- **Hardware Selection:**
  The choice of hardware depends on the project's requirements. Sufficient processing power and memory are necessary for running the machine-learning model and displaying high-quality images of the eye.

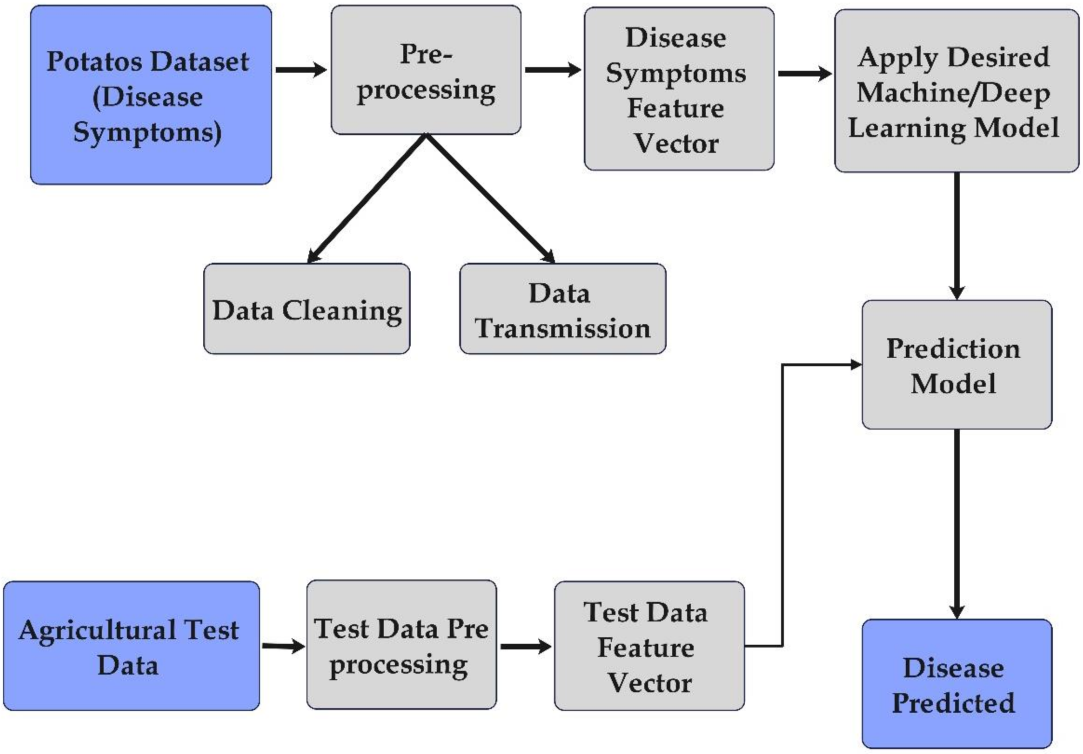

Figure 5 : Software Architecture

4. Use Case Description

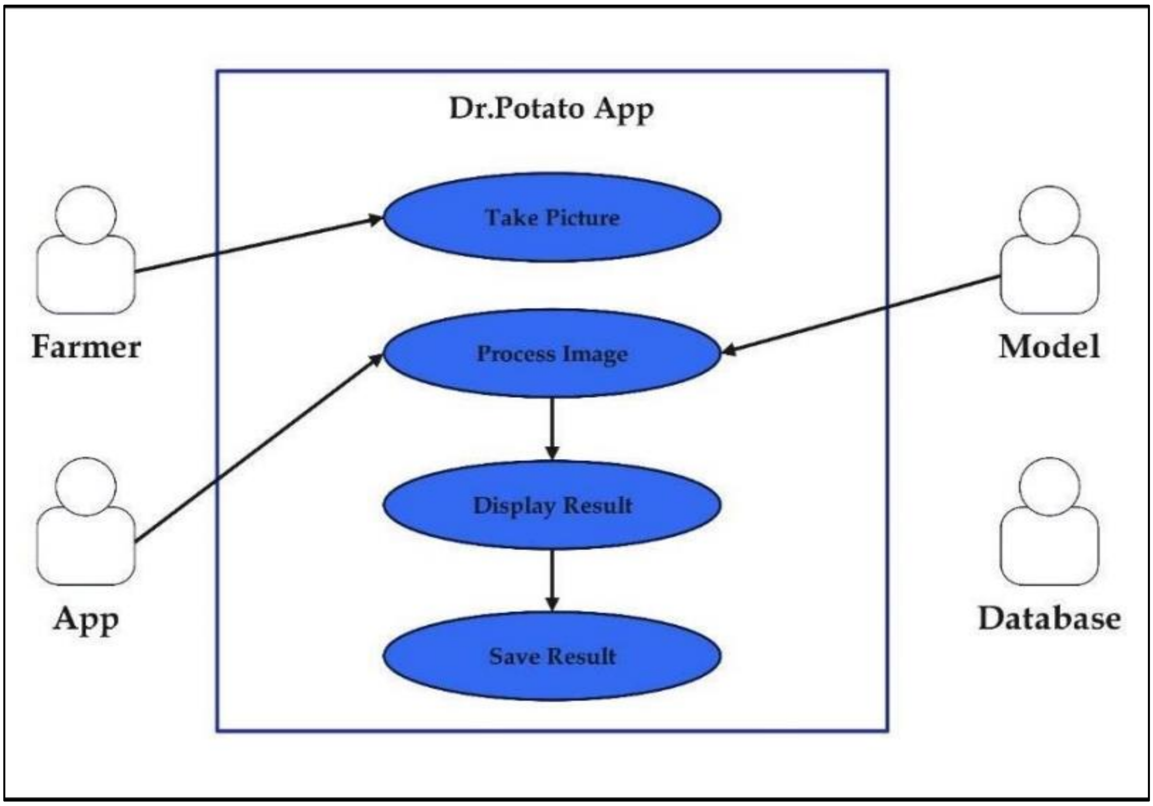

Figure 6 : Use case diagram

The potato disease detection application is designed to assist farmers in identifying potential diseases affecting their potato plants efficiently. The main actors in this system include the farmer, who interacts with the app, and the machine learning model utilized for disease detection. Additionally, there's a database component where the results of the analysis are stored for future reference and analysis.

The application comprises several essential use cases to facilitate the disease detection process. Firstly, the farmer can use the app to capture an image of a potato plant leaf. Subsequently, the captured image undergoes processing via the machine learning model embedded within the application. Once the analysis is complete, the app displays the result, indicating whether the plant is healthy or diseased. Furthermore, the outcome is saved in the database, ensuring a record of the assessment for later evaluation or comparison.

In the normal scenario, the farmer seamlessly employs the app to capture the image, process it, and receives an accurate diagnosis, enabling them to take appropriate action promptly. However, there's provision for alternate scenarios where inaccuracies may occur in the diagnosis. In such cases, where the app erroneously identifies the plant's health status, the farmer might receive misleading information. Consequently, the farmer may need to seek additional advice or employ alternative methods to verify the plant's condition, ensuring the accuracy of subsequent actions taken.

5. Class Diagram

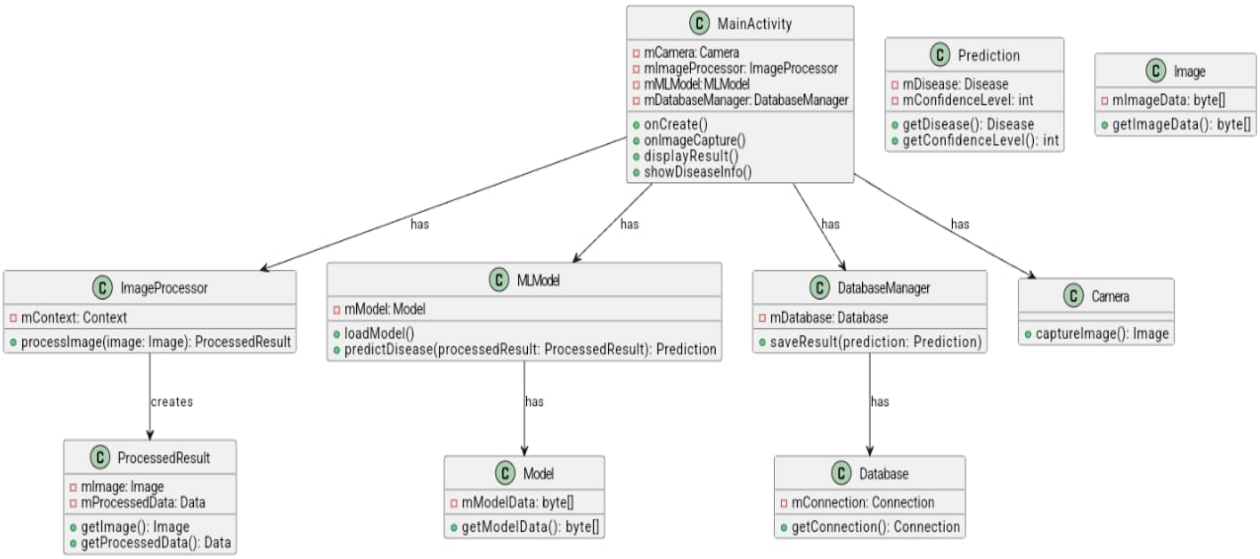

Figure 7 : Class Diagram

6. Activity Diagram

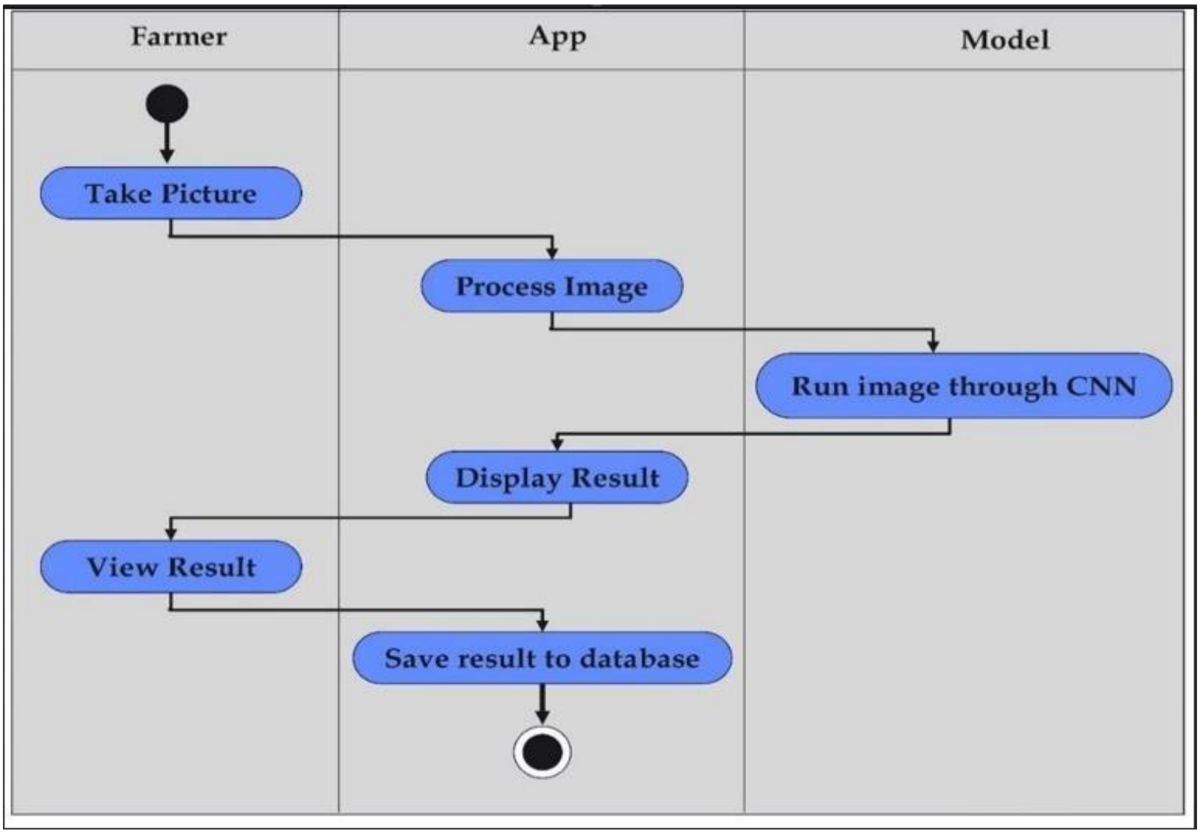

Figure 8 : Activity Diagram

7. Sequence Diagram

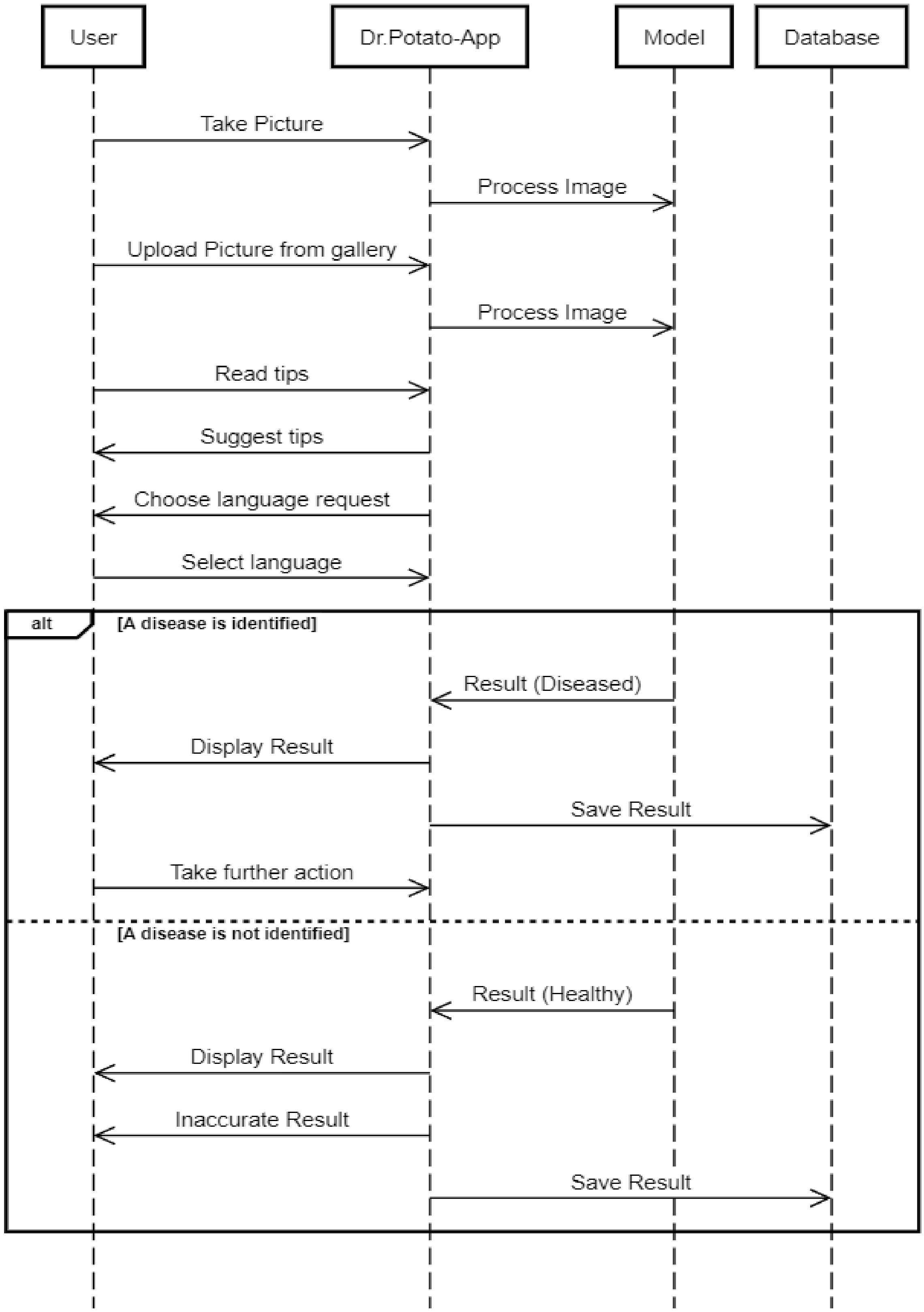

Figure 9 : Sequence Diagram

8. ER Diagram

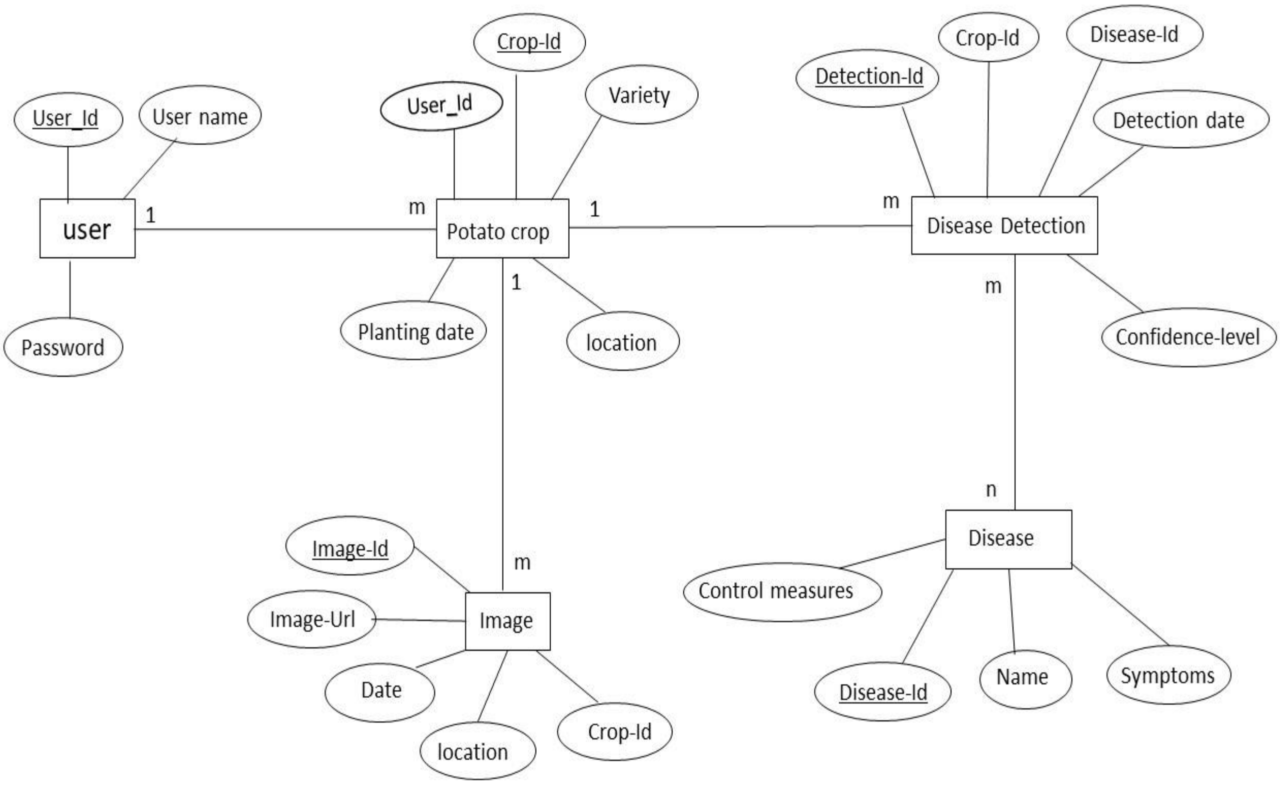

Figure 10 : ER Diagram

9. System Design

9.1. User interfaces & Software interfaces

9.1.1. Logo Design

Figure 11 : Logo Design

9.1.2. Lo-Fi Wire Frames

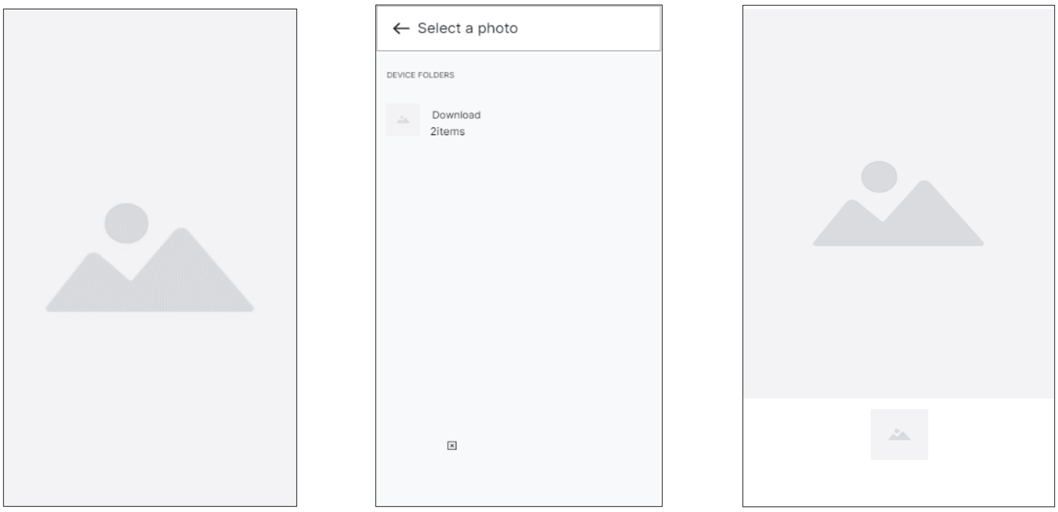

Figure 12 : Lo-Fi Wire Frames

9.1.3. UI Design

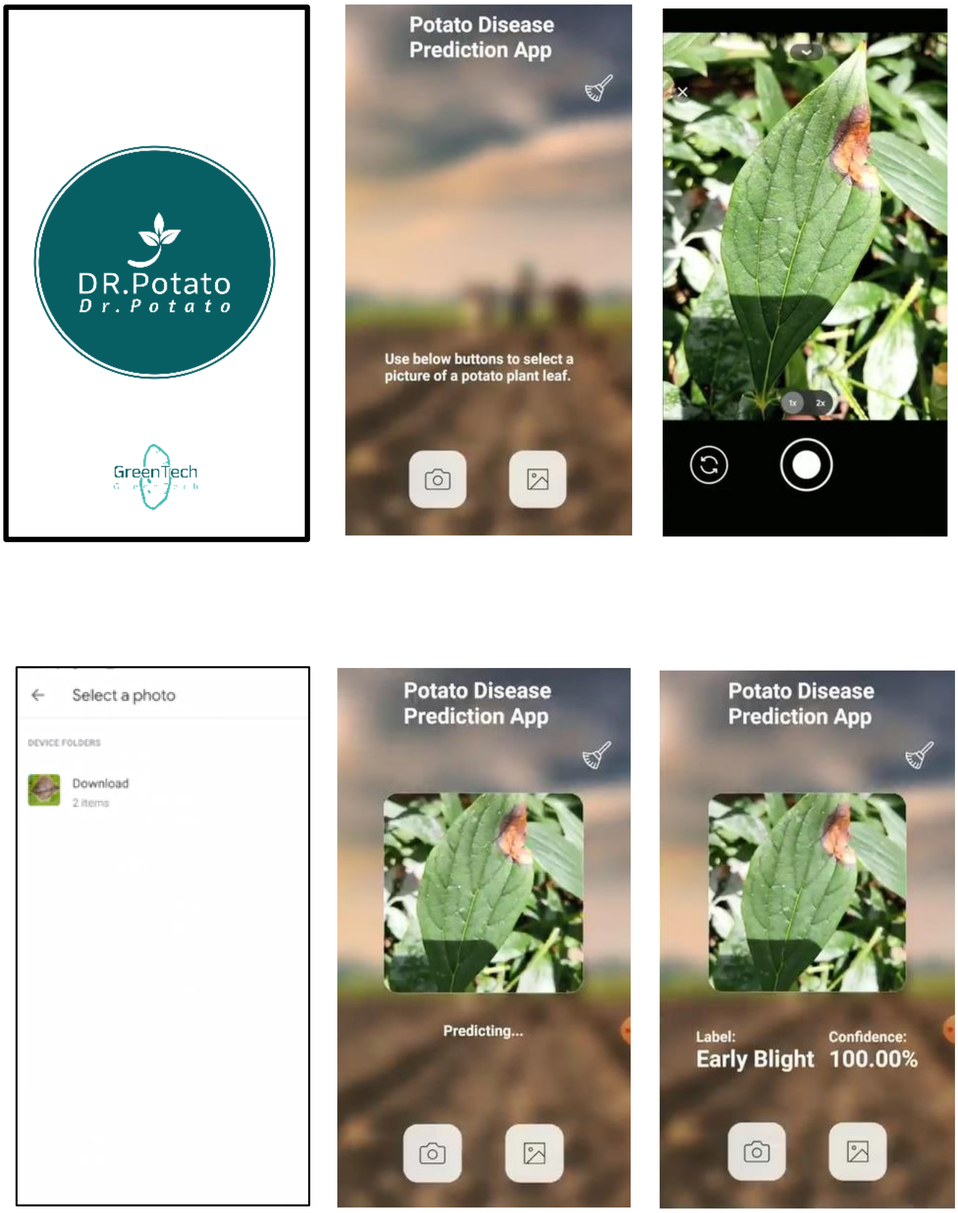

Figure 13 : UI Designs

9.1.4. Mobile view

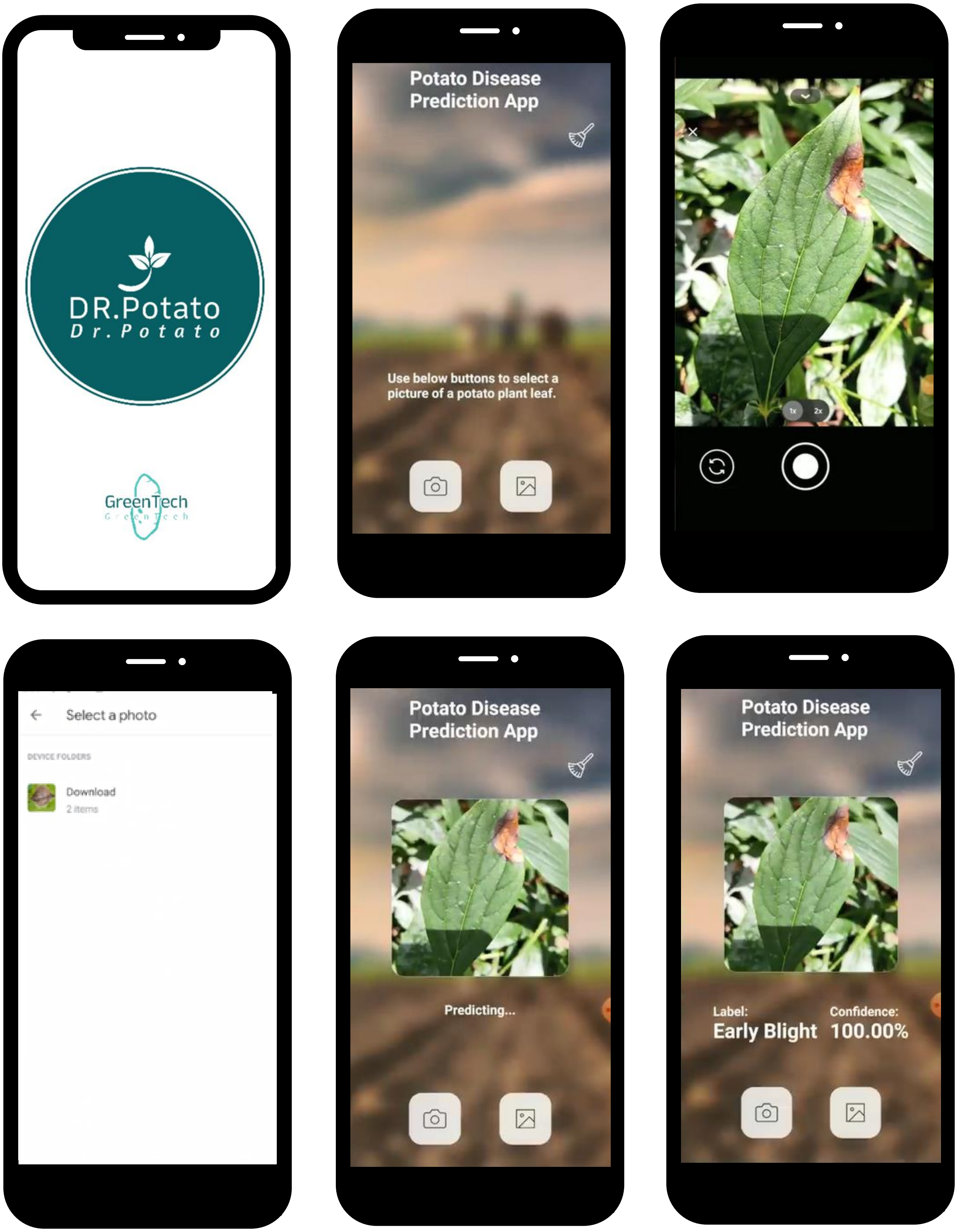

Figure 14 : Mobile Views

10. Summary

The Automated Potato Disease Detection web-based System heralds a transformative era in Sri Lanka's agricultural landscape, particularly in the realm of potato farming. By seamlessly integrating image processing technology, the system empowers farmers with a proactive approach to combatting late blight disease, a significant threat to crop health and productivity. Through its user-friendly interface and real-time analysis capabilities, farmers can swiftly identify disease symptoms, enabling prompt intervention measures to mitigate losses and preserve crop yields. Beyond its immediate benefits, the system fosters a culture of knowledge-sharing and empowerment, equipping farmers with the tools and insights needed to navigate the complexities of disease management effectively. As a result, the system not only enhances agricultural resilience but also underscores the vital role of technological innovation in ensuring food security and sustainable livelihoods for generations to come.