**Chapter 3**

**Requirement Engineering**

**3.1 Introduction**

In the area of agricultural technology, the search for efficient and accurate disease detection in tomato crops has led to the development of advanced solutions through Requirement Engineering. This process involves systematically capturing, analyzing, and defining the needs and specifications for a technology or system customize to detect diseases in tomatoes. Understanding the specific requirements is crucial for designing effective solutions that address the challenges faced by farmers in managing crop health.

From the types of diseases common in tomato plants to the technological capabilities required for timely detection, Requirement Engineering serves as the foundation for developing strong and user-friendly Tomato Disease Detection systems.

This introduction sets the stage for exploring the detailed requirements essential for creating effective and impactful solutions in the domain of tomato crop health management.

**3.2 Problem Scenarios**

**3.2.1 Context:**

In tomato farming, farmers often face challenges in timely identifying and managing diseases that affect their crops. The lack of an efficient system for disease detection leads to increased crop losses and poses a threat to overall crop health.

**3.2.2 Problem:**

The absence of a reliable and quick disease detection system makes it difficult for the farmer to take prompt action. There is a need for a technology solution that can accurately identify the type of disease affecting the tomato plants, enabling the farmer to implement timely and targeted interventions to mitigate the spread of the disease.

**3.2.3 Goals:**

Develop a Tomato Disease Detection System that can accurately identify various diseases based on visual cues from tomato plant leaves.

Ensure the system is user-friendly and accessible to farmers with varying levels of technological expertise. Enable timely detection of diseases to facilitate proactive measures, reducing crop losses and promoting overall crop health.

Enhance the efficiency of disease management practices through the integration of advanced technologies, such as machine learning and computer vision.

* 1. **Functional Requirements**

**3.3.1 User / Farmer**

|  |  |
| --- | --- |
| **ID** | **Requirements** |
| **1.1** | User shall be able to Sign Up. |
| **1.2** | User shall be able to login to their account. |
| **1.3** | User shall be able to view and edit their profile. |
| **1.4** | User can upload images for disease detection. |
| **1.6** | User can access a personalized calendar for plant care. |
| **1.7** | User can give feedback. |
| **1.8** | User can also interact with the FAQs. It will provide relevant answers. |
| **1.9** | User can also view the reports. |

* + 1. **Admin**

|  |  |
| --- | --- |
| **ID** | **Requirements** |
| **2.1** | Admin shall be able to login into the system. |
| **2.2** | Admin shall be able to Add, edit or remove diseases. |
| **2.3** | Admin shall be able to manage treatments. |
| **2.4** | Admin shall be able to view and manage user’s profiles. |
| **2.5** | Admin can also manage localized alerts. |
| **2.6** | Admin can review the reports. |
| **2.7** | Admin shall be able to manage the FAQs. |

**3.4 Non-Functional Requirements**

**3.4.1 Performance:**

The system should provide real-time or near-real-time processing for disease detection to ensure prompt results for farmers.

Response time for uploading images and receiving results should be within an acceptable range.

**3.4.2 Security:**

User authentication and authorization mechanisms should be implemented to ensure that only authorized users (farmers and admins) can access the system.

Data privacy and integrity must be maintained, especially for sensitive information related to the farmer's crops.

**3.5 SQA activities: Defect Detection**

**3.5.1 Test Case Design**

**TD: Test Data**

|  |  |
| --- | --- |
| **Test Data** | TD-1 |
| **Form** | Login |
| **Stakeholder** | User |
| **Field** | Phone Number |
| **Technique** | Equivalence Partitioning |
| **Valid** | * Correct Length * Include Numeric Characters * Country Code * No Space or Special Character |
| **Invalid** | * Not contains ‘@’ * Include characters * Special characters * Not End with ‘.’ |

|  |  |
| --- | --- |
| **Test Data** | TD-2 |
| **Form** | Login |
| **Stakeholder** | User |
| **Field** | Password |
| **Technique** | Equivalence Partitioning |
| **Valid** | * Password length should be >=9 * Includes two special characters * Includes uppercase and lowercase character * Includes one numeric character |
| **Invalid** | * Password length < 9 * No uppercase and lowercase characters * No special character * No numeric character |