Crop Disease Diagnosis for Maize and Coffee

1. **Use Case Description**

- **Problem**: Farmers in Rwanda and across Africa face significant challenges in identifying and managing diseases in maize and coffee crops. These diseases lead to reduced yields, economic losses, and food insecurity.
- **Solution**: A digital tool for diagnosing crop diseases and recommending treatments.
- **Relevance**:
    - Maize and coffee are critical crops for food security and economic stability in Rwanda.
    - Early diagnosis and treatment can prevent yield losses and improve farmers' livelihoods.
    - The tool will empower farmers with limited access to agricultural experts.

2. **Stakeholders**

Stakeholders are individuals or groups who have an interest in or are affected by the crop disease diagnosis system. Here's a detailed breakdown:

Primary Stakeholders:

a) **Farmers**:
    - **Role**: End-users of the diagnostic tool.
    - **Needs**: Accurate and timely disease diagnosis, affordable treatment options, and easy-to-use tools.
b) **Agricultural Experts**:
    - **Role**: Provide knowledge on disease symptoms, treatments, and prevention methods.
    - **Needs**: A reliable system to disseminate their expertise to farmers.
c) **Government Agencies**:
    - **Role**: Support agricultural development and food security initiatives.
    - **Needs**: Data on disease prevalence to inform policy decisions and allocate resources.
d) **NGOs/Development Organizations**:
    - **Role**: Promote sustainable farming practices and provide support to farmers.
    - **Needs**: Tools to enhance their outreach and impact.
e) **Technology Providers**:
    - **Role**: Develop and maintain the diagnostic tool.
    - **Needs**: Clear requirements and feedback to improve the system.

Secondary Stakeholders:

a) **Local Communities**:
   - **Role**: Benefit from improved food security and economic stability.
b) **Researchers**:
   - **Role**: Study disease patterns and develop improved solutions.
c) **Input Suppliers**:
   - **Role**: Provide seeds, fertilizers, and pesticides recommended by the system

3. **Identified Rules (IF-THEN Rules)**

- **Maize Diseases**:
  a) **IF** leaves have grayish lesions with yellow halos, **THEN** it is **Northern Leaf Blight**.
     - **Treatment**: Apply fungicides containing chlorothalonil or mancozeb.
  b) **IF** leaves have small, oval, or elongated spots with a gray center, **THEN** it is **Gray Leaf Spot**.
     - **Treatment**: Use resistant maize varieties and apply fungicides.
  c) **IF** the stalk has internal discoloration and rot, **THEN** it is **Stalk Rot**.
     - **Treatment**: Improve field drainage and avoid over-fertilization.
- **Coffee Diseases**:
  a) **IF** leaves have orange rust spots, **THEN** it is **Coffee Leaf Rust**.
     - **Treatment**: Apply copper-based fungicides and prune infected leaves.
  b) **IF** berries have dark, sunken lesions, **THEN** it is **Coffee Berry Disease**.
     - **Treatment**: Use fungicides like carbendazim and practice good field hygiene.
  c) **IF** leaves show yellowing and wilting, **THEN** it is **Fusarium Wilt**.
     - **Treatment**: Remove and destroy infected plants, and use resistant varieties.