SECJ3553 - SEC 16
Artificial Intelligence
Lecturer: Dr. Liyana Adilla

Project Proposal

Agriculture - **AgriNINE.11**

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AI SOLUTION

Agriculture remains vital to Malaysia's economy, yet many farmers still rely on traditional experience to decide what to plant. These choices often ignore soil conditions and climate changes, causing low yields and wasted effort.

AgriNINE.11 aims to solve this by creating an AI-based Crop Recommendation System that uses soil nutrients (N, P, K), pH, temperature, and rainfall to suggest the best crop. Through Design Thinking, especially the Empathize and Define stages, our project focuses on understanding farmers' real needs and turning them into an effective, data-driven solution.

GOAL OF AI SOLUTION

By processing this information through AI models, the system will predict which crops have the highest chance of success, taking into account both agronomic and economic aspects such as expected yield, soil health, and current market demand.

In addition to improving decision-making, **AgriNINE.11** focuses on trust, explainability, and accessibility. Users often hesitate to adopt AI because they don't understand how it works or how reliable it is. Therefore, AgriNINE.11 is designed to provide clear explanations for every recommendation showing farmers why a certain crop is suggested. This helps build confidence and transparency, ensuring that farmers view AI as a supportive tool, not a replacement for their knowledge.

The system's long-term goal is to empower farmers, enhance food security, and promote sustainable agricultural growth in Malaysia. By encouraging smart farming practices, AgriNINE.11 contributes to reducing environmental impact while improving farmers' income and productivity.

The goals of **AgriNINE.11** are:

1. **Increase productivity and yield**:
   By recommending crops that match soil nutrients, weather, and water conditions, reducing the risk of crop failure.

2. **Reduce resource waste**:
   By avoiding unsuitable crops that require excessive fertilizer or water, promoting efficient land use.

3. **Enhance farmers' confidence and trust in AI**:
   By providing clear and simple explanations for recommendations.

4. **Support sustainable farming practices**:
    By promoting crop diversity and soil health preservation.

5. **Bridge the technology gap**:
    By providing an easy-to-use mobile or web app suitable for farmers with minimal technical background.

6. **Contribute to national agricultural resilience**:
    By using AI to improve decision-making and ensure long-term food sustainability in Malaysia.

Through these goals, **AgriNINE.11** not only introduces technology into agriculture but also focuses on human-centered AI design, ensuring that innovation truly meets farmers' real needs and improves their daily lives.

DESIGN THINKING

Empathize Stage

The Empathize stage focuses on understanding people and their real experiences before designing any solution. To ground our AI project in reality, we interviewed professionals from two Malaysian software firms **Sage42** and **Astral** both specializing in AI-driven business solutions.

From these interviews, several patterns emerged:

○ **AI adoption challenges:**
  Both companies highlighted that many clients still lack awareness of how AI can truly improve operations. They often view AI as a "universal fix" instead of a tool that must align with their business goals.

○ **Perception and trust:**
  There is a mix of excitement and hesitation among clients. Some fear that AI may replace jobs, while others feel pressure to adopt it to stay competitive.

○ **Human-AI balance:**
  Developers at Sage42 noted that while automation can replace repetitive tasks, it cannot substitute human creativity, empathy, and judgment. Astral also emphasized AI's complementary role in assisting workers rather than replacing them.

○ **Ethics and privacy:**
  Both companies stressed the importance of data protection. Sage42 uses synthetic data generation to protect user information, while Astral encourages transparency and recommends in-house AI systems for higher security.

By empathizing with these professionals, we gained a clearer understanding of how people working with AI experience both its promise and its problems. This insight shaped how we see the human side of AI adoption where trust, transparency, and purpose alignment matter as much as technical performance.

DESIGN THINKING

Define Stage

From our interviews, we identified a recurring issue:
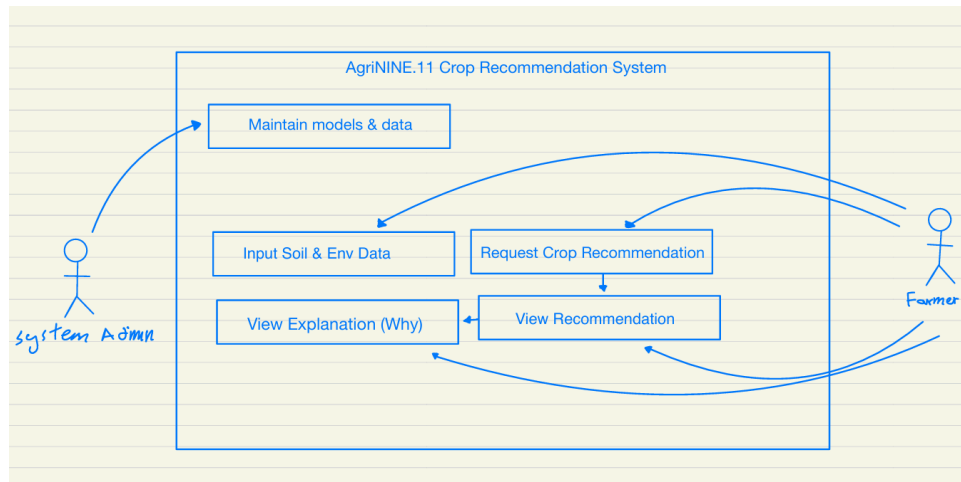AI solutions often fail when users don't fully understand or trust them.

Using this insight, we defined our problem statement as:
Many organizations and individuals struggle to adopt AI effectively because of limited awareness, lack of trust, and fear of job replacement resulting in underused or misaligned AI systems.

This definition helps direct our project's focus on designing AI solutions that are understandable, reliable, and human-centered. For **AgriNINE.11**'s Crop Recommendation System, this means ensuring that farmers can easily understand why the AI recommends certain crops, not just *what* it recommends.

The Define phase clarified that success depends not only on accuracy but also on explainability, accessibility, and confidence in AI decisions.
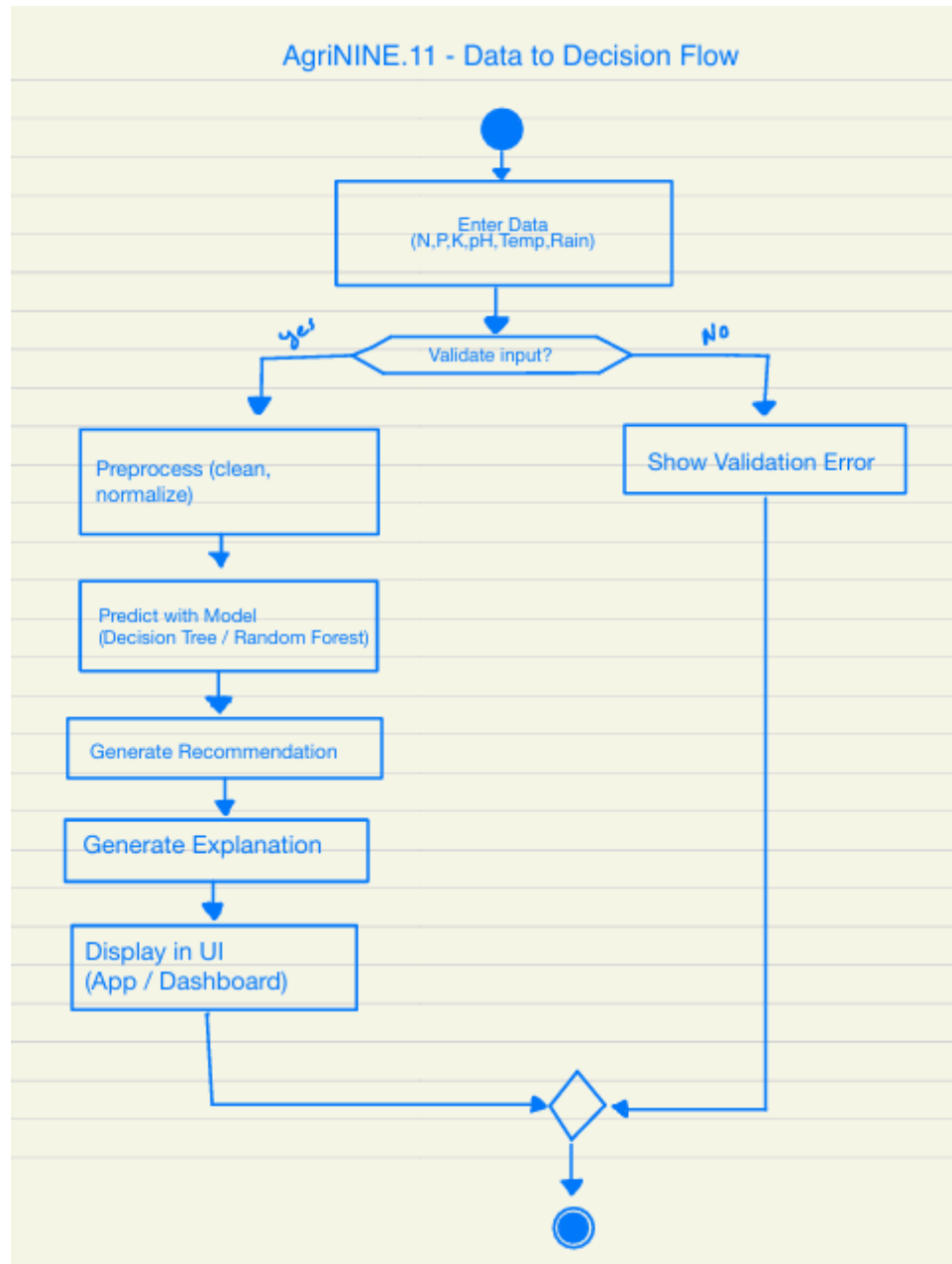
DESIGN THINKING

Appendix

Use Case Diagram

This Use Case diagram illustrates how the Farmer interacts with the **AgriNINE.11** system to input soil and environmental data, request recommendations, and receive AI-generated crop suggestions. It also shows the System Admin maintaining the underlying data and model.

AgriNINE.11 - Data to Decision Flow

Enter Data
(N,P,K,pH,Temp,Rain)

Validate input?

yes

No

Preprocess (clean, normalize)

Show Validation Error

Predict with Model
(Decision Tree / Random Forest)

Generate Recommendation

Generate Explanation

Display in UI
(App / Dashboard)

Decision Digram

This flowchart outlines the step-by-step process within **AgriNINE.11**, from farmer data input through data validation and model prediction to generating and displaying the final crop recommendation with explanation.