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Growing Smarter: Using AI to Support Food Security

Introduction to the Problem

Imagine being able to predict exactly when and how to care for crops so they thrive.

Around the world, many communities face food insecurity because of drought, unpredictable weather, poor soil, and a lack of resources. Personally, I have always loved gardening, and last semester I built a website to track weather and soil conditions for my own garden. That small project made me realize how technology could help people grow more food efficiently, whether in a backyard garden or at a larger agricultural scale. Food security matters to me because I have seen how a well-planned garden can make a difference in daily life and strengthen a community.

Project Concept

For my project, I want to explore how generative artificial intelligence could help address food insecurity. Specifically, I would research how AI models could analyze environmental data, such as weather patterns, soil quality, nutrients, water pH, air quality, and sunlight, to provide guidance for planting and harvesting. Text generation models could offer easy-to-follow instructions or tips for gardeners and farmers. Image generation could create visualizations of ideal garden layouts or crop patterns. I plan to focus on designing sample outputs and mock-ups rather than building a full system. You could imagine this as a research

study that outlines what a real AI-powered gardening assistant could look like, who would use it, and how people might interact with it.

Potential Impact and Considerations

If applied in the real world, this AI system could help communities grow food more efficiently, reduce waste, and improve access to fresh produce. It could provide insights that individual gardeners or agencies might not have on their own. At the same time, there are limitations. AI could give inaccurate recommendations if the data is incomplete or biased. Some communities might not have access to enough information, and over-reliance on AI could reduce local knowledge and intuition. To address these challenges, the system could incorporate local datasets, allow for user feedback, and keep the interface accessible. Multilingual support and simple dashboards could help ensure fair and responsible use.

Next Steps

This semester, I plan to focus on research, design planning, and creating sample outputs that demonstrate how AI could guide gardening decisions. I will investigate existing datasets, explore generative AI models, and draft mock-ups of interfaces or reports. Success would look like a research-based prototype that clearly shows how AI could help gardeners and agencies improve food production, along with an analysis of potential benefits, limitations, and ethical considerations.