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AI for Bharat Hackathon

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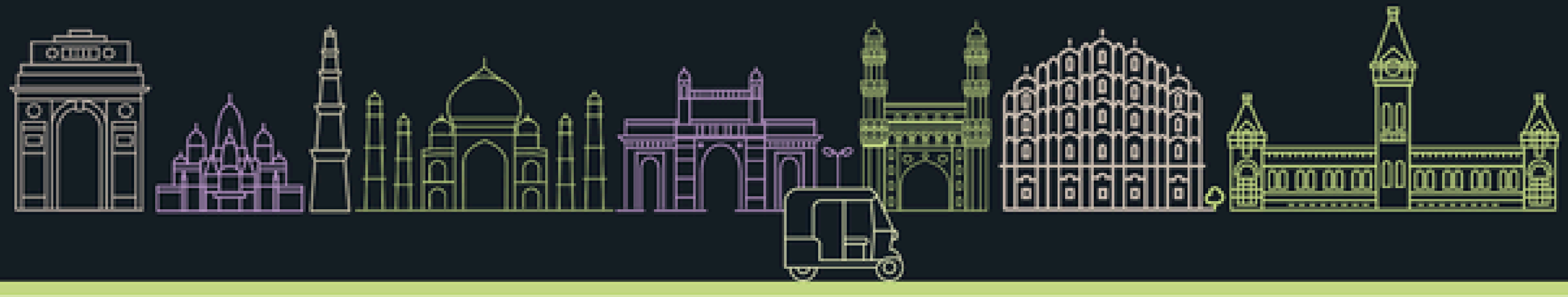


Team Name : GrootForce

Team Leader Name : Rajasi Barapatre

Problem Statement: Farmers know when something is going wrong in the field, but not when intervention actually pays off. Acting too late or too much increases costs and quietly erodes yield.

The Silent Erosion in Indian Farming

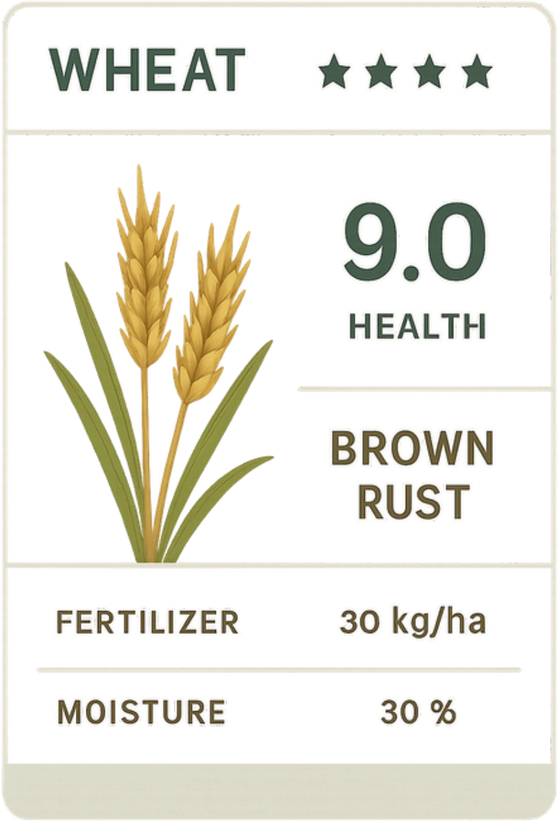
Meet Reshma, a wheat farmer.
She sees yellow spots on leaves.
She spends ₹4000 on pesticide… but yield was already lost.

She didn’t just need disease detection.
She needed to know:
“Is this treatment economically worth it, given all the environmental parameters?”

BRIEF OF THE IDEA

Fasal: An AI-powered **Digital Twin** for smarter farming decisions

- Instead of only detecting disease, the system simulates **future outcomes** of multiple **treatment actions** and recommends the most **profitable** and **sustainable** choice.
- Each farm field is represented as a **Digital Twin Card** that models crop condition, disease severity, soil health, crop stage, and weather.
- The AI twin predicts how the crop might **evolve under different actions**, such as no treatment, chemical spraying, or low-cost alternatives and **compares their yield impact, cost, and ROI**.
- The farmer receives a clear, **prescriptive** recommendation, not generic advice, in her **regional language**.



HOW IS OUR SOLUTION DIFFERENT FROM OTHER IDEAS ?

Existing Solutions	Our Solution
Disease detection only	**Prescriptive** decision-making
Generic treatment advice	Action-specific outcome simulation
No **cost** awareness	**ROI-based** recommendations
Reactive response	Predictive + preventive approach
High chemical usage	**Optimized**, minimal intervention

Fasal uses a learned neural **digital twin** to simulate future crop outcomes under different actions, **not static rules or fixed expert advice**.
Not just “What disease?” but “What action maximizes farmer profit?”

HOW WILL IT SOLVE THE PROBLEM ?

- Detects **disease severity** from crop images
- Builds a **neural digital twin** of the crop field
- Simulates future **crop states** for each action and **treatment** actions over future days
- Compares **yield impact** vs **cost** vs **profit**
- Recommends the **best ROI-positive intervention**, at the right time, with **reasoning**

Result:

Farmers **intervene** only when the intervention is economically justified.

Core Innovation: Neural Digital Twin + ROI Engine

Digital Twin based AI

Prescriptive AI recommendations

USP OF THE PROPOSED SOLUTION

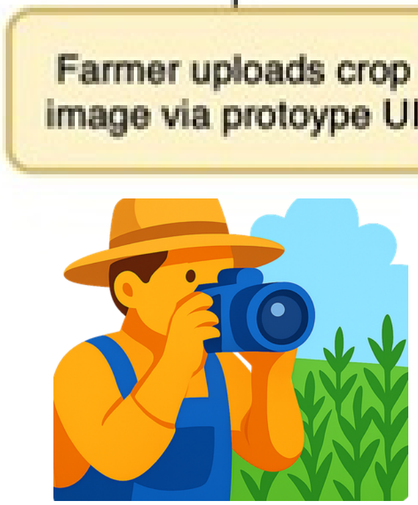
ROI-first intervention planning

Reduces chemical overuse & costs

FEATURES OFFERED BY THE SOLUTION

- Crop disease detection via images and regional voice input.
- Explainable AI reasoning for every recommendation
- Disease severity scoring (0–100%)
- What-if analysis for multiple actions
- Digital Twin Card per field
- Yield vs time visualization
- Weather-aware crop simulation
- Cost vs profit comparison table

PROCESS FLOW DIAGRAM



Farmer uploads crop image via prototype UI

95%

AI model detects disease type and severity

Farmer inputs crop stage and soil condition (sliders)

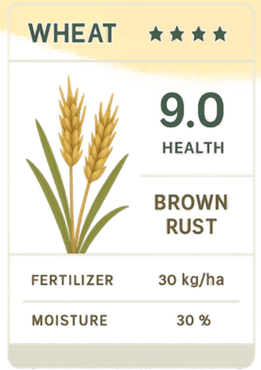
Weather forecast is fetched automatically

Neural Digital Twin simulates future crop states for each action

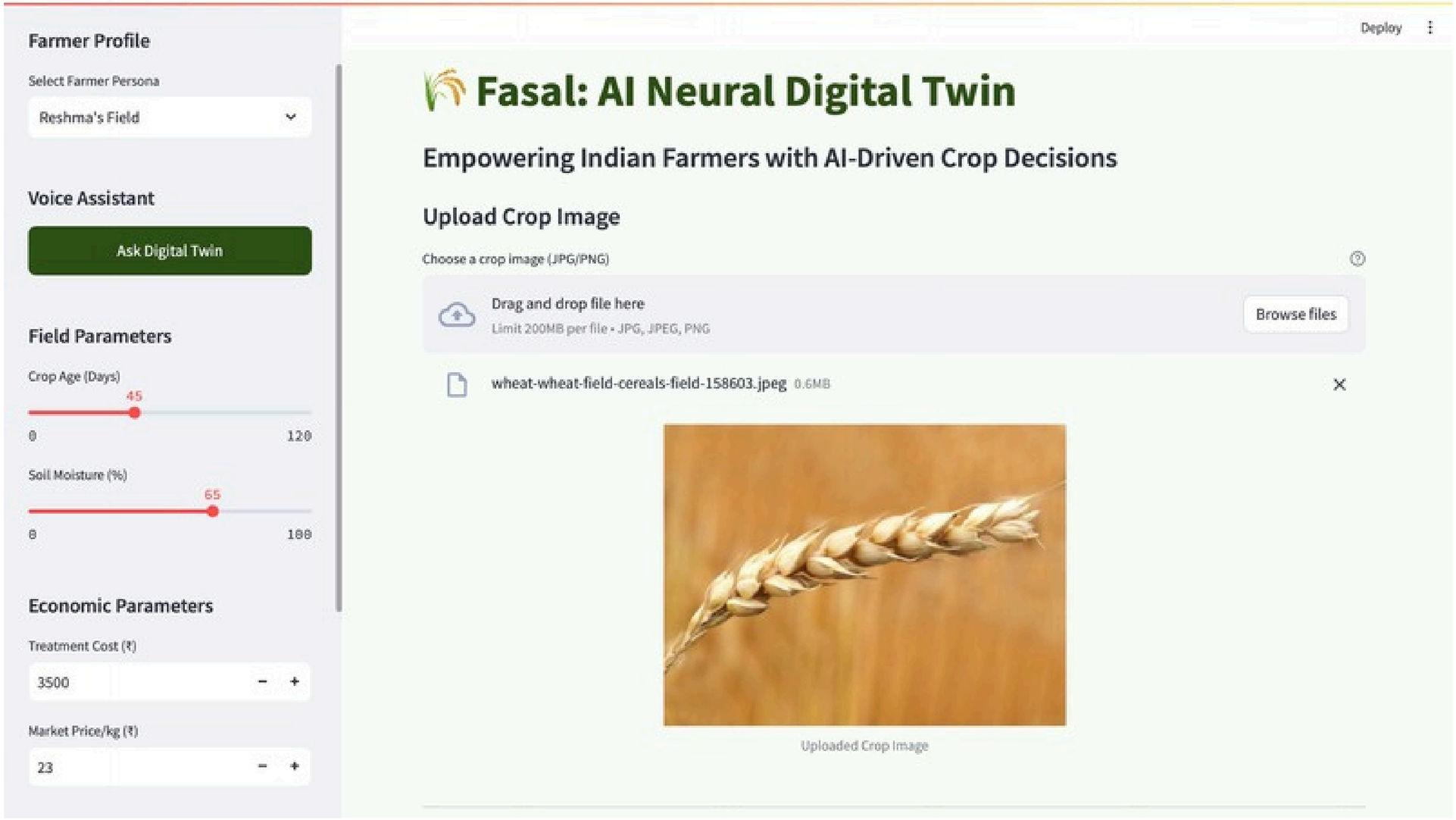
System compares yield impact and cost

Best action is recommended with explanation

Note: Amazon Bedrock generates explanation in local language



PROTOTYPE OF THE PROPOSED SOLUTION



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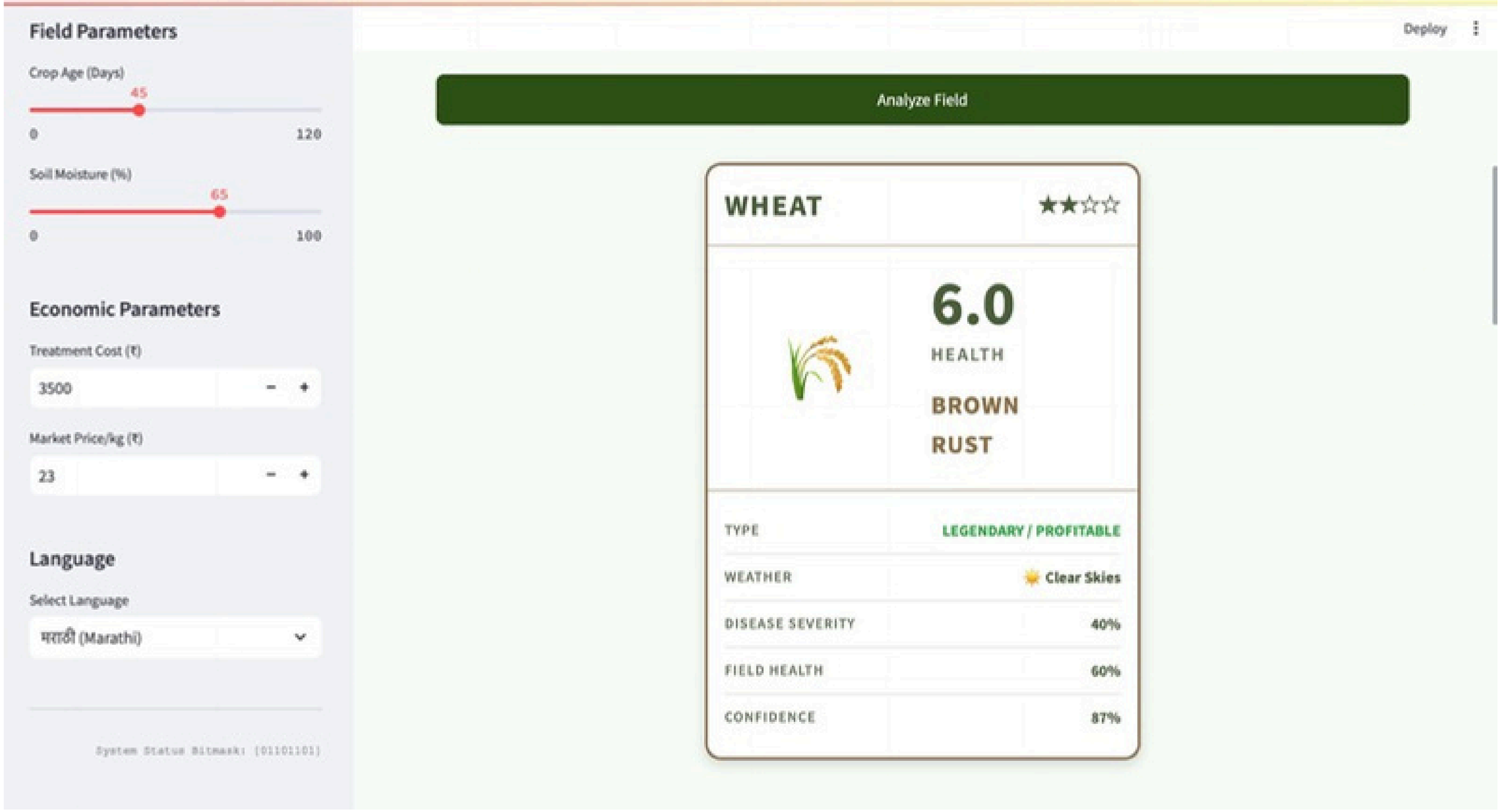

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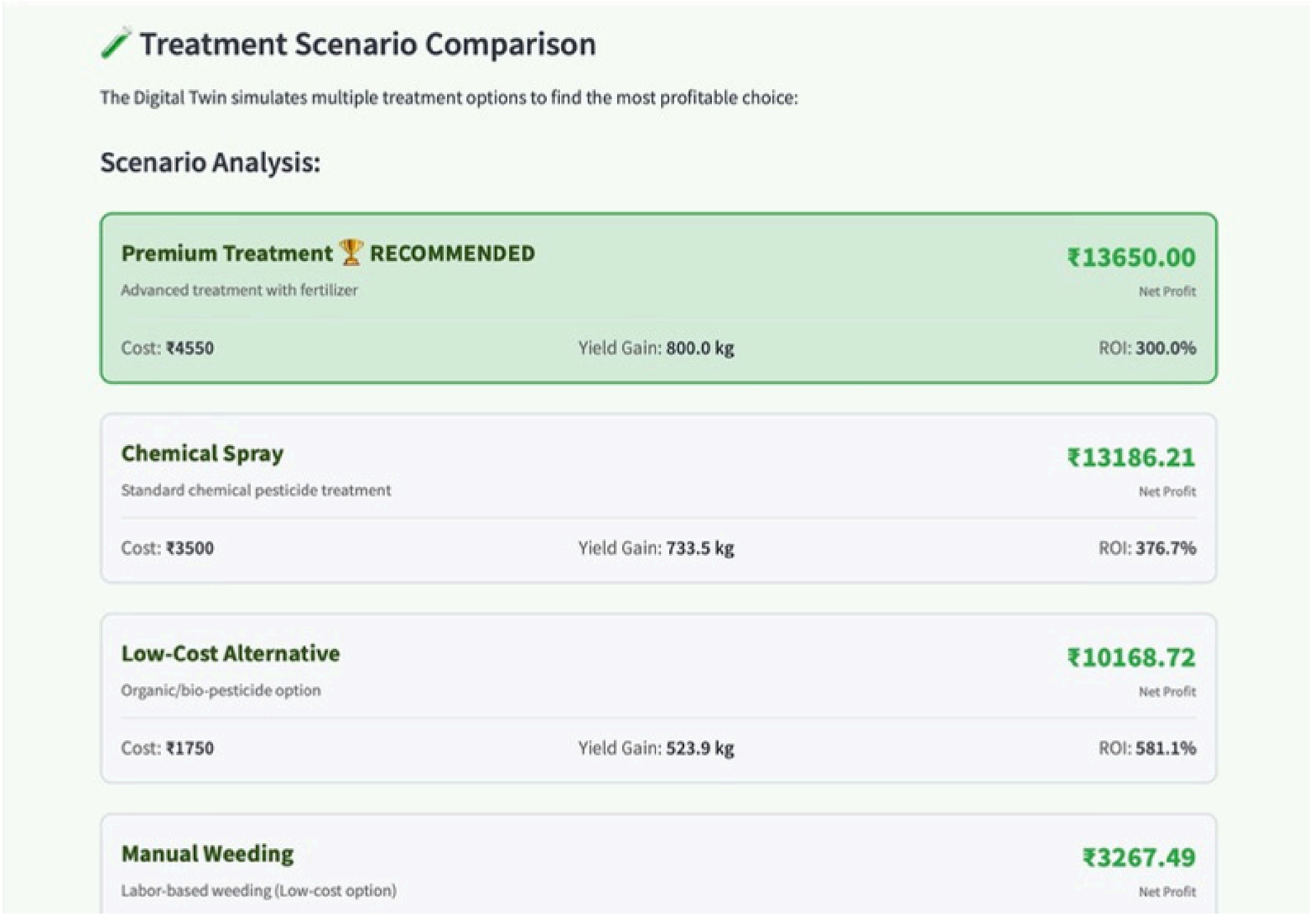

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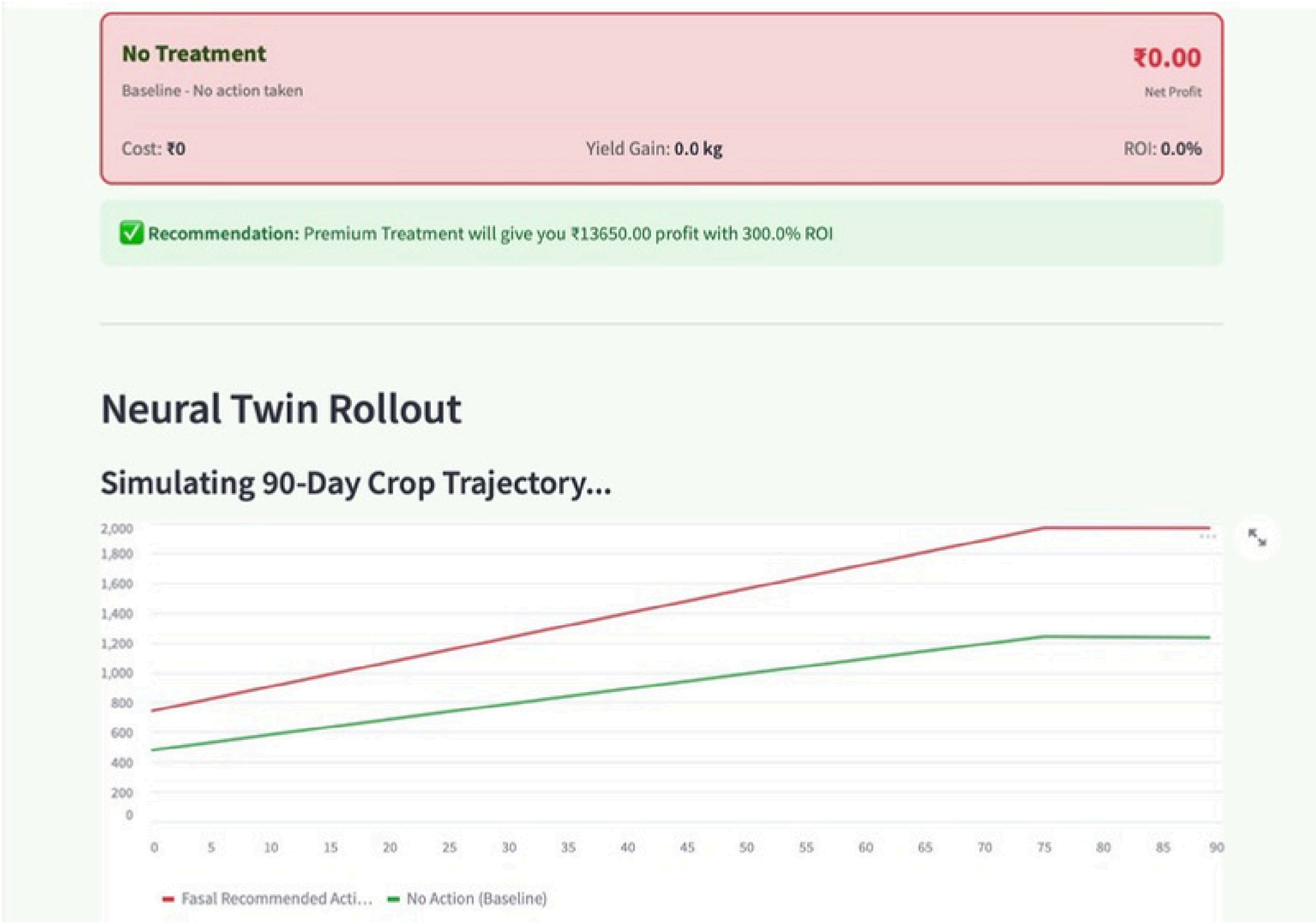

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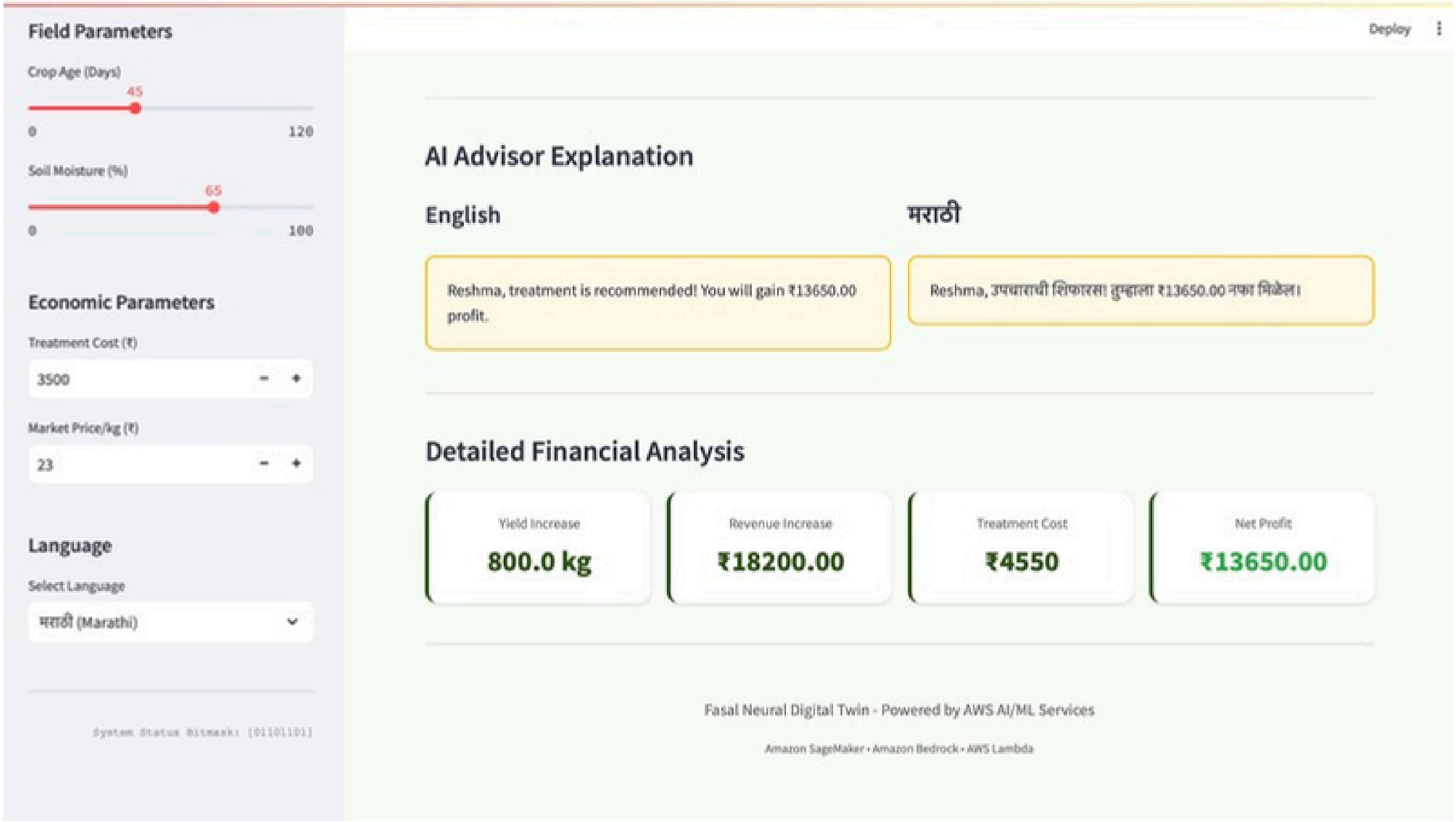
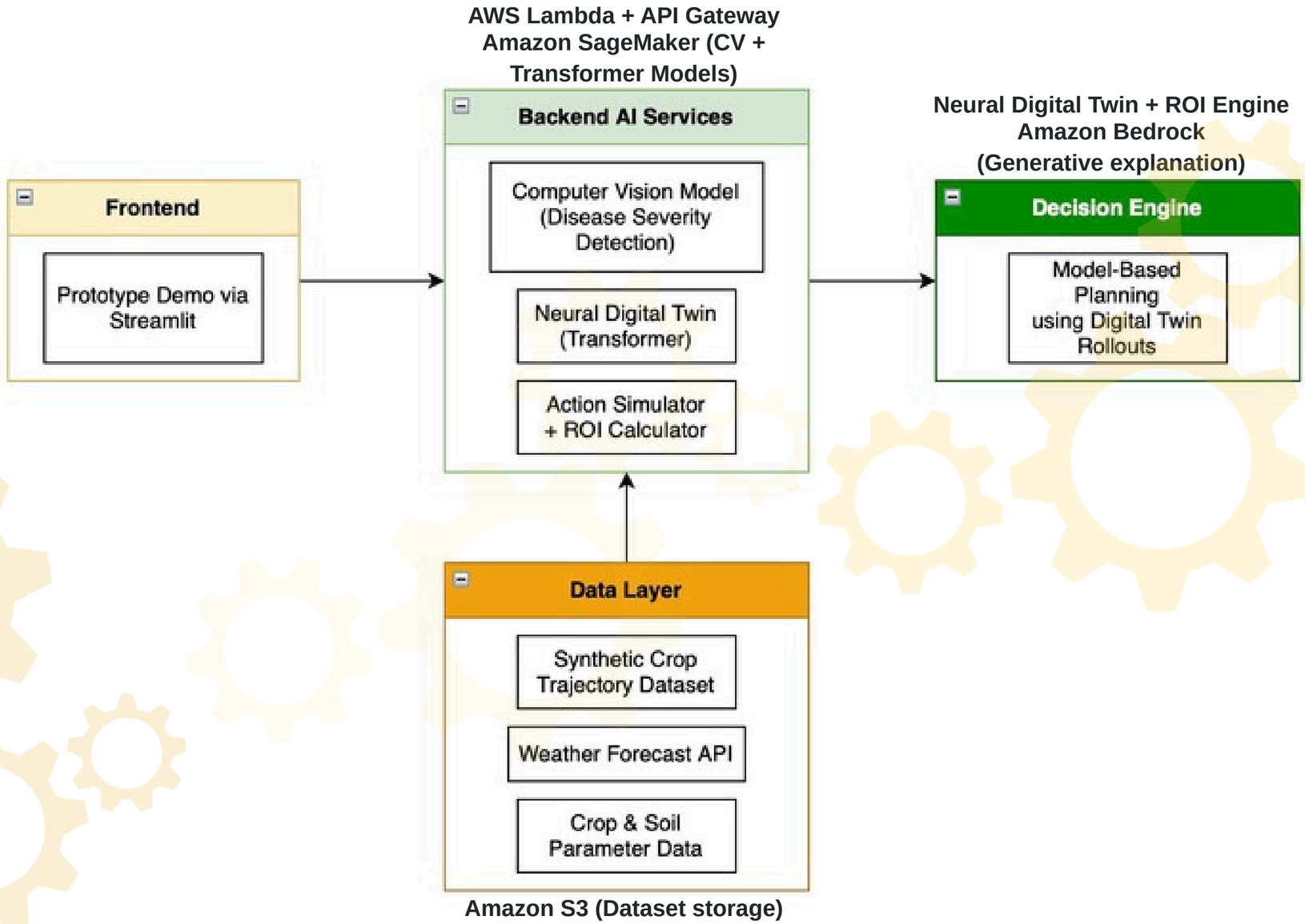
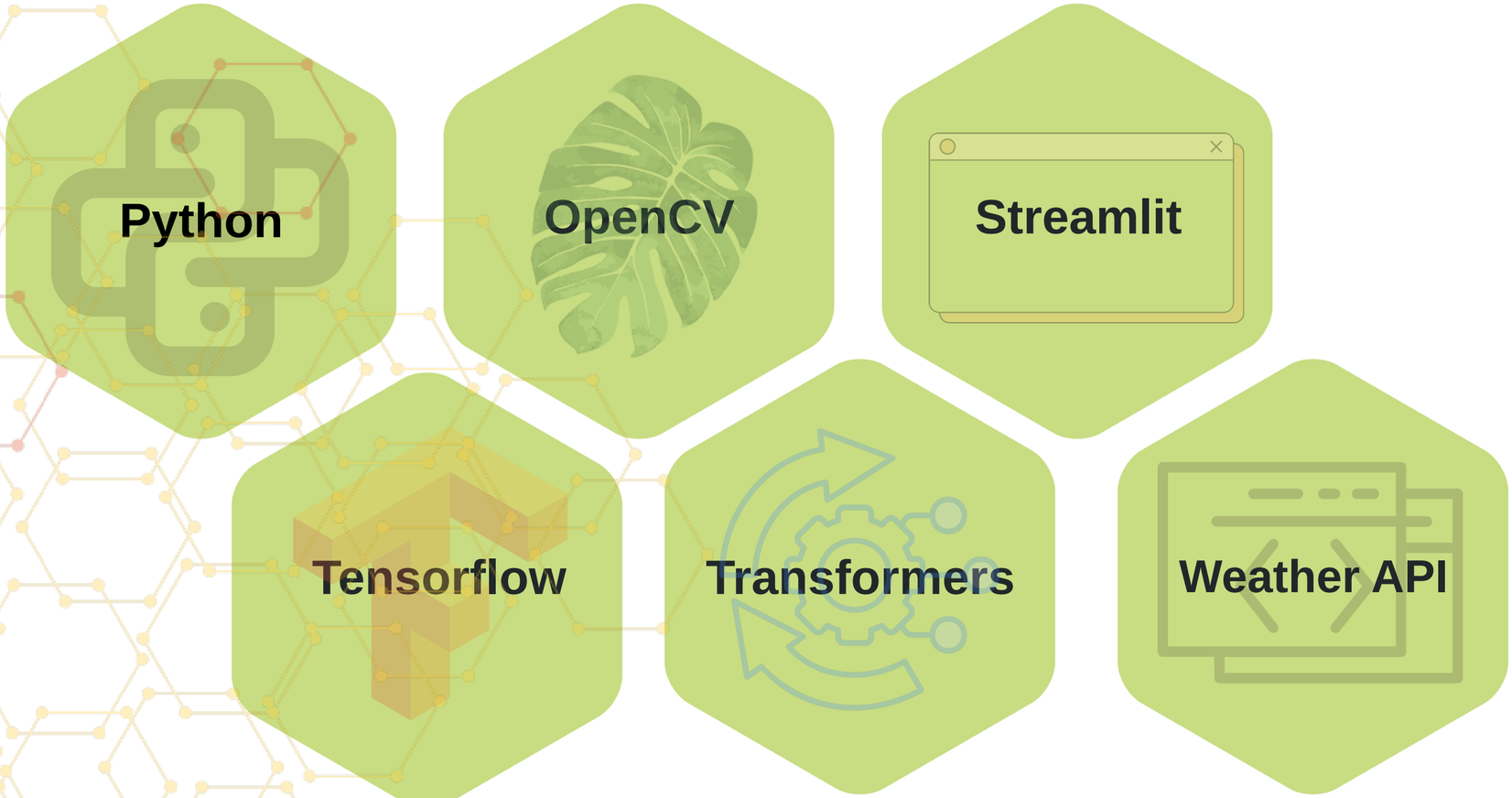


OVERVIEW OF THE ARCHITECTURE



TECHNOLOGIES USED IN THE SOLUTION

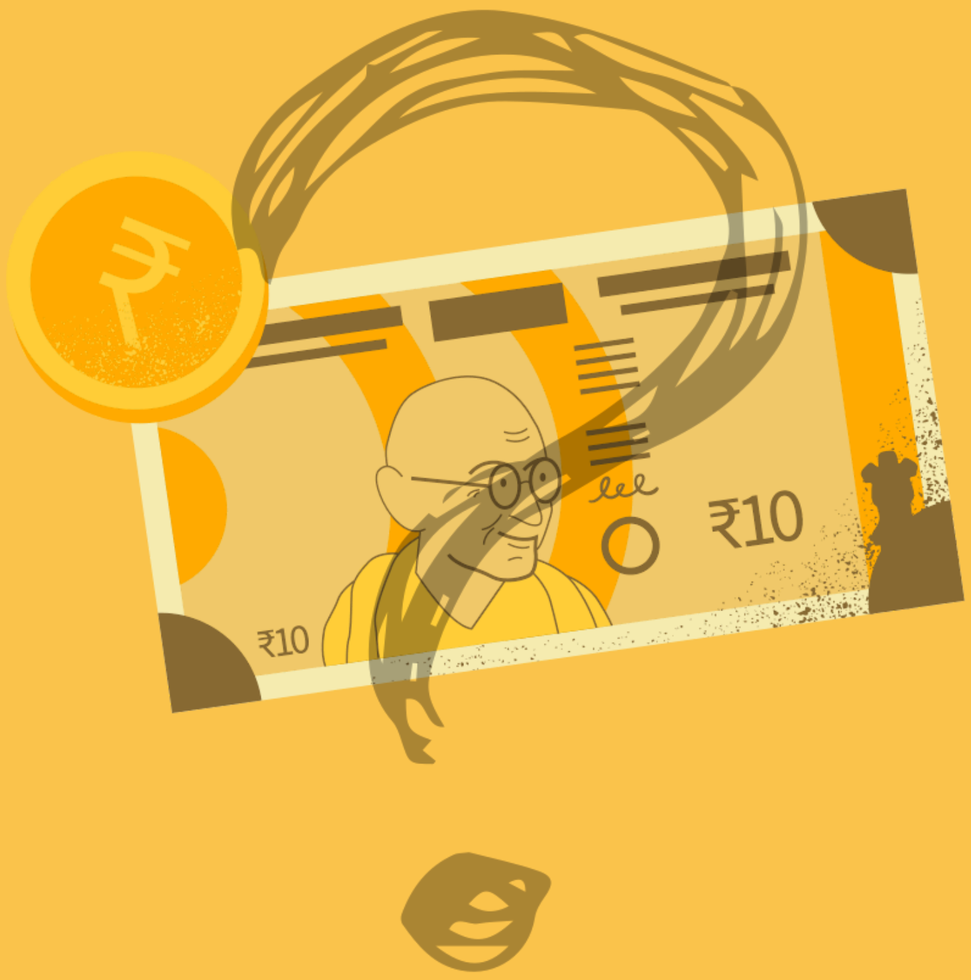


AWS Tech

- Amazon SageMaker
- Amazon Bedrock
- AWS Lambda
- Amazon S3

ESTIMATED IMPLEMENTATION COST

- Prototype: ₹0 – ₹5,000 (using open-source models and free tiers)
- Scaled deployment: Pay-as-you-go cloud infrastructure
- Designed to remain affordable for small farmers



Serverless AWS deployment keeps costs affordable for small farmers

WHY THIS FITS AI FOR BHARAT (AI for Rural Areas)

BUILT FOR FARMERS

- Small & marginal farmers
- ROI-based decision support, low risk

RURAL-READY AI

- Smartphone-first, low connectivity
- Multilingual, Language-agnostic, inclusive

SUSTAINABLE IMPACT

- Reduces chemical overuse
- AI decides when action is worth the cost

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Thank You