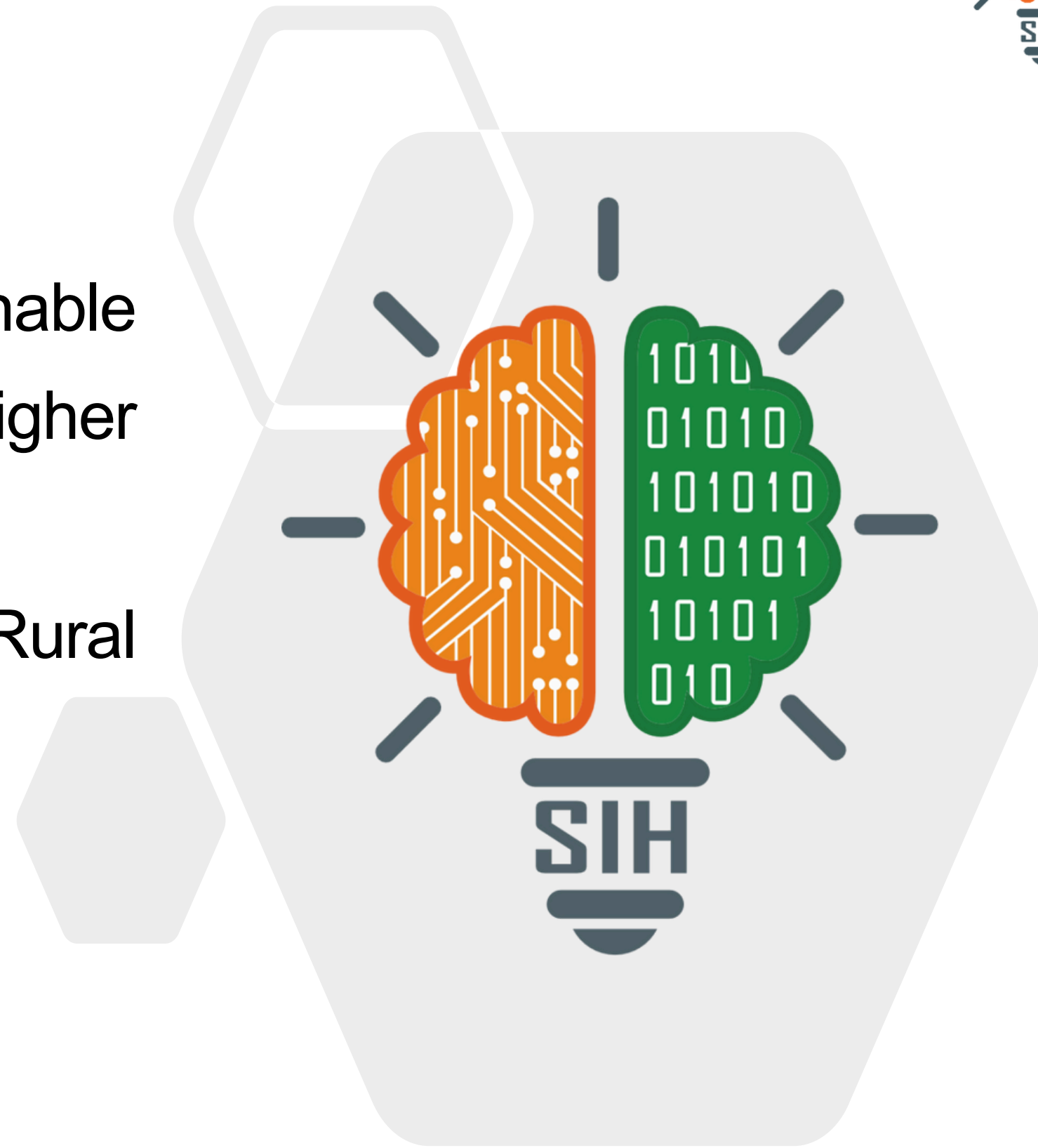# SMART INDIA HACKATHON 2024



- **Problem Statement ID  -** 1639

- **Problem Statement Title -** Sustainable Fertilizer Usage Optimizer for Higher Yield

- **Theme -** Agriculture, Food-Tech & Rural Development

- **PS Category-** Software

- **Team ID-** 20

- **Team Name -** Sic Mundus

# Idea/ Approach Details

We are aiming to build a web based application that will serve as a bridge between farmers to access knowledge about the optimal use of fertilizers for their farming purposes.

➤ Firstly data containing soil content , pH level , Environmental conditions and the location of the land was collected from trustworthy government sources

➤ Data processing and manipulation was done to avoid outliers and generate processable values.

➤ Parameters Used:
- Soil content
  - Nitrogen, Phosphorus, Potassium
- Environmental factors
  - pH level, Rainfall, Humidity
- Geographical factors
  - State, City

➤ ML Models such as Random Forest , XGBoost , Decision tree etc were used to predict the possible fertilizers that can be applied .

➤ **People can check the crop details along with the fertilizer details to gain more information and take educated guesses in future.**
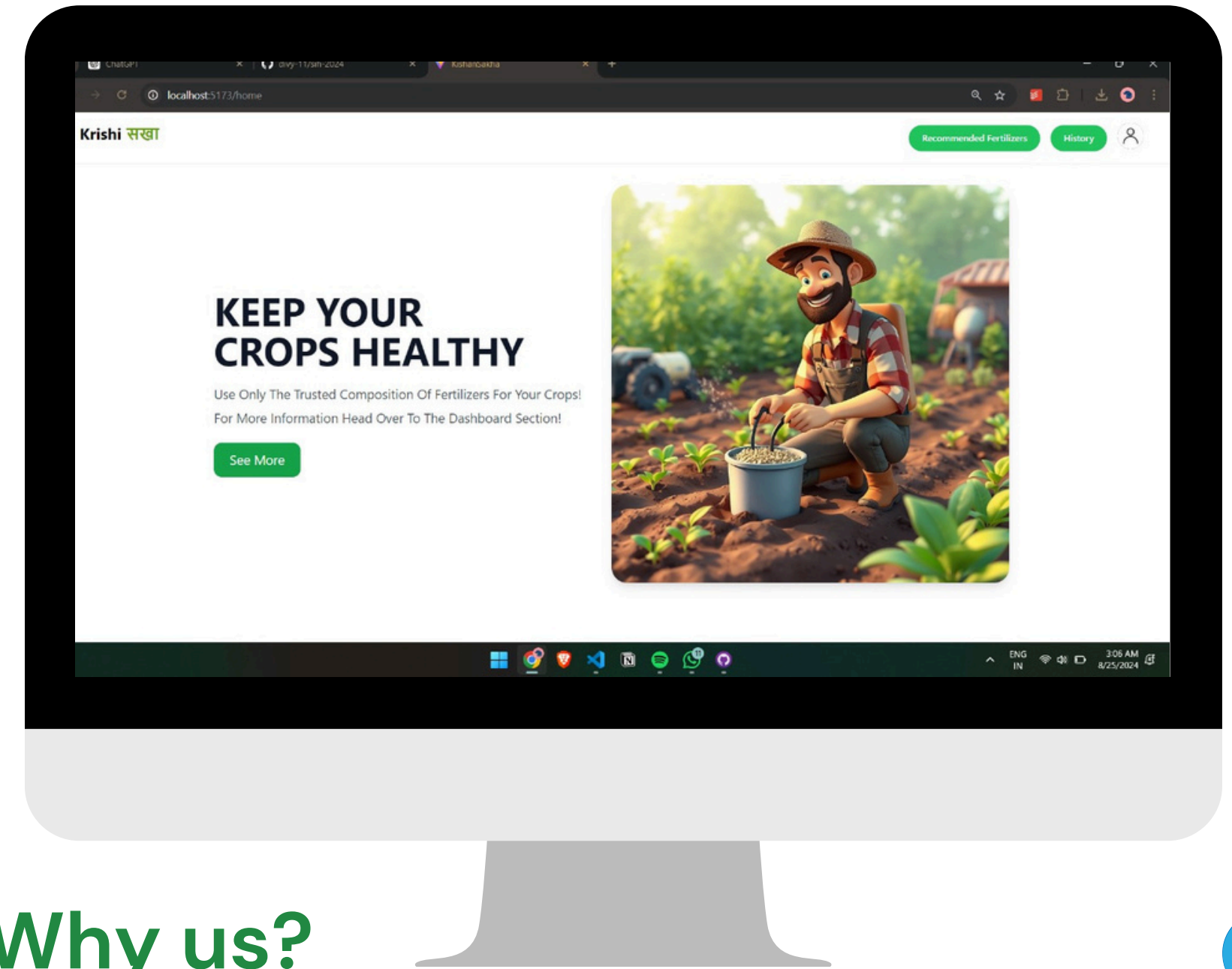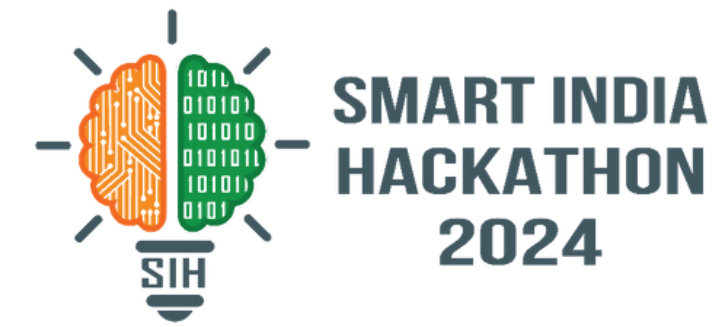


## Why us?

Our solution uniquely combines advanced ML models with comprehensive data to provide **personalized, precise & fast fertilizer recommendations**. Designed for easy use by Indian farmers, it includes a **rich educational content library** and **supports sustainable, scalable farming practices**.

# Technical Approach

## Tech Stack
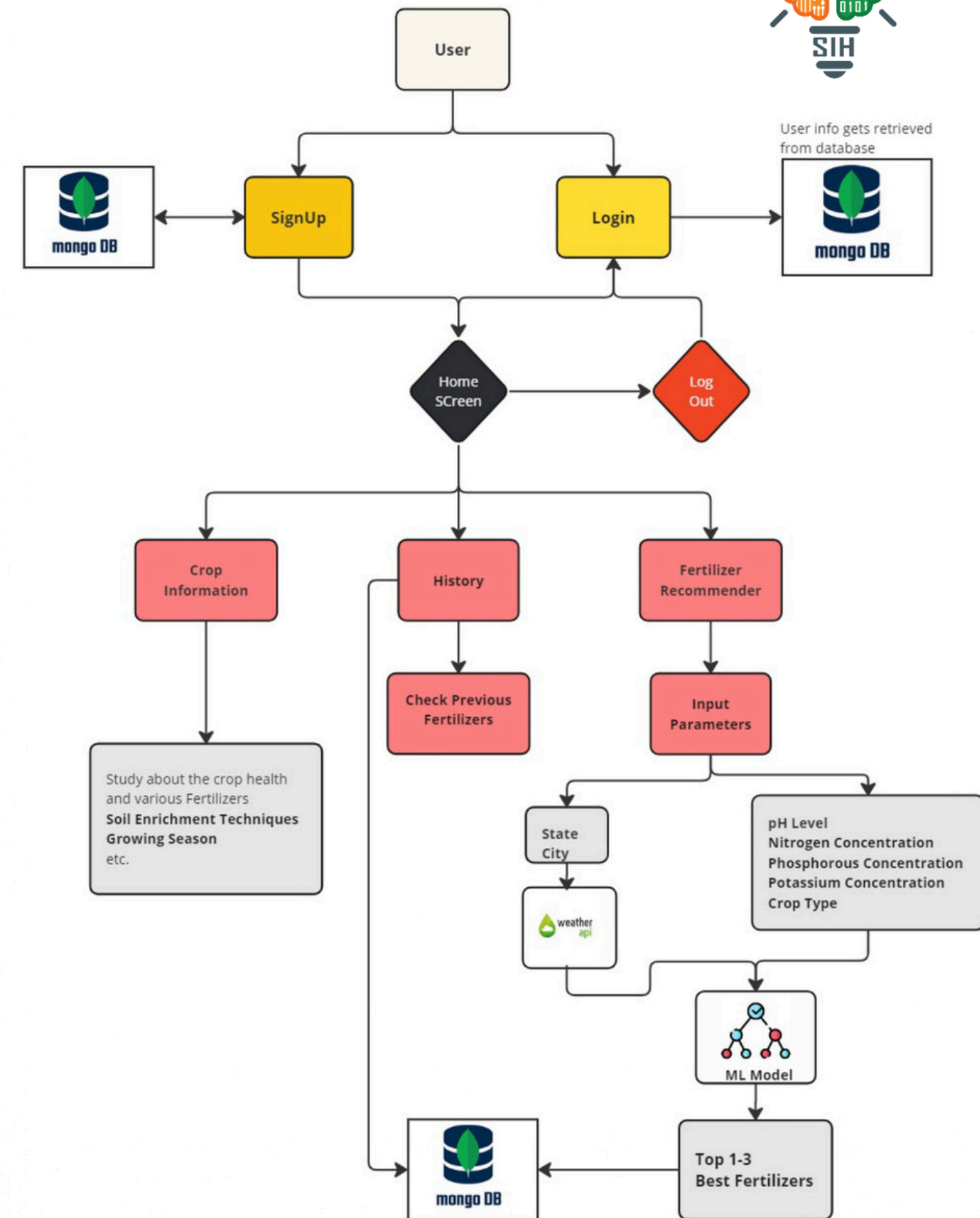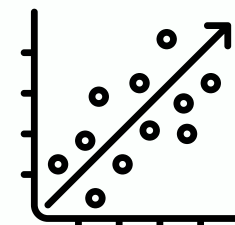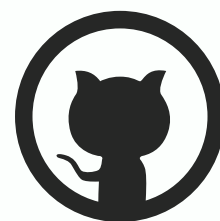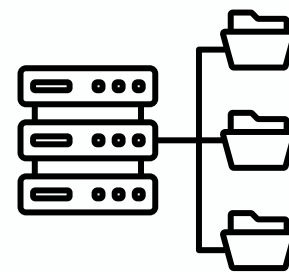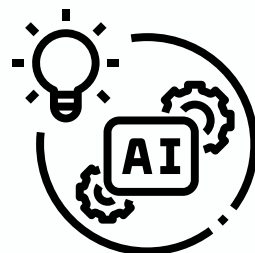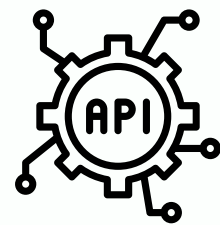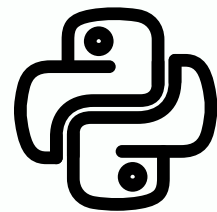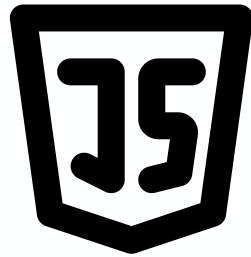
# FEASIBILITY AND VIABILITY

## FEASIBILITY

### Economic Feasibility

- Uses open-source tools and cloud infrastructure to minimize development and operational costs.
- Optimizes crop yields and reduces input costs, increasing farmer profitability.

### Social Feasibility

- Enhances agricultural productivity and sustainability, benefiting both individual farmers and local communities.

### Technical Feasibility

- Utilizes robust algorithms like Random Forest and XGBoost to provide precise fertilizer recommendations.
- Combines soil health, weather data, and local agricultural practices for accurate, context-specific advice.

## Challenges & Risks

- Farmer Adoption
- Inadequate Data
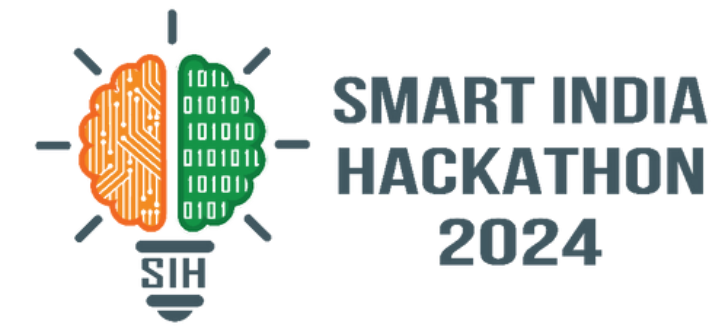- Pricing misinformation
- Model Inaccuracy

## How to Solve those?

- Add multilingual support for farmers
- Continuous updation of data through reliable sources & model changes.
- Price the fertilizers based on ML models such as LSTM , ARIMA , FB Prophet etc to provide the farmers with adequate costs

# IMPACT AND BENEFITS

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## Target Audience

- Farmers
- Environmental Specialists
- Government Bodies that deals with soil studies
- Any Curious Mind!

## Social Impact

- **Enhanced Farmer Education**
- **Improved Community Practices**
- **Increased Accessibility**

## Economic Impact

- **Saves money by reducing excessive fertilizer use**
- **Boosts crop yield for higher productivity**
- **Reserves soil health, ensuring long-term productivity**

## Environmental Impact

- **Reduced Pollution**
- **Effective Waste Management**
- **Healthier and Sustainable Practices**

## Benefits

- Data-Driven Decisions
- Cost Savings
- Increased Crop Yields
- Educational Value:
- Scalability
- Economic Opportunities
- Community Impact

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References

- National Academy of Agricultural Sciences (Executive Council 2009)
- STCR Research  - Crop wise recommendation
- data.gov.in
- ICAR,2010-2022