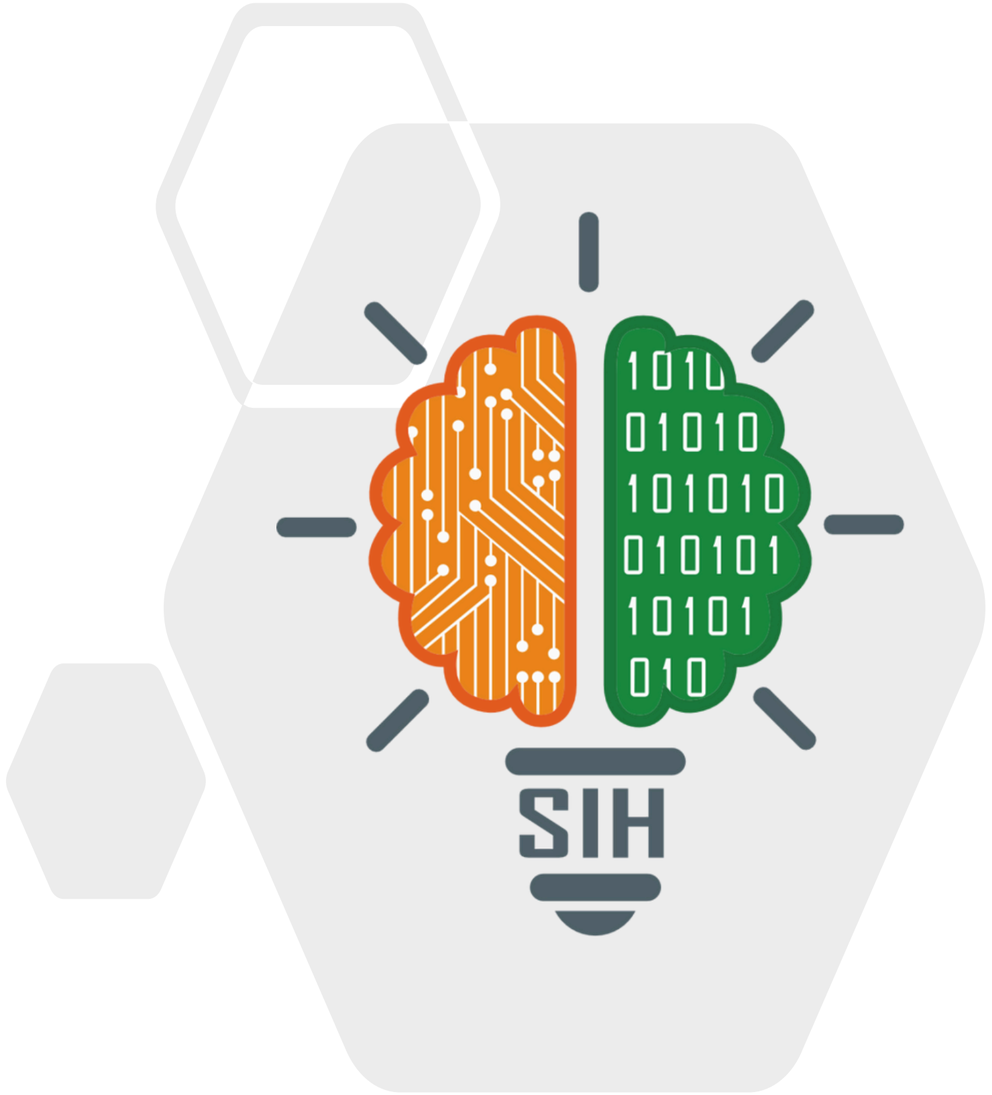
SMART INDIA HACKATHON 2024

CropCureAI

- **Problem Statement ID – 1638**
- **Problem Statement Title- AI-Driven Crop Disease prediction and management System**
- **Theme- Agriculture, Foodtech & Rural Developement**
- **PS Category- Software**
- **Team ID- 28**
- **Team Name – Sleepless Coders**



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CropCureAI

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Proposed Solution:

- **Detailed explanation of the proposed solution** : CropCareAI is an AI-driven platform providing crop recommendations, fertilizer suggestions, and disease detection through a mobile and web-based app. It uses machine learning to analyze soil data, environmental conditions, and crop images for actionable insights.

How it addresses the problem:

- Early Disease Detection: Identifies plant diseases from leaf images, helping to prevent crop loss.
- Informed Recommendations: Suggests optimal crops and fertilizers based on soil and climate data.
- User-Friendly Access: Accessible on multiple platforms, ensuring ease of use for farmers.

Innovation and uniqueness of the solution:

- Comprehensive Integration: Combines crop, fertilizer, and disease management in one tool.
- Real-Time Analysis: Utilizes real-time data for accurate, location-specific recommendations.
- Scalable and Adaptable: Can expand to include more crops and conditions, tailored to local needs.

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TECHNICAL APPROACH

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TECHNOLOGIES:

- Python (Flask) is used for backend development, with machine learning models built using scikit-learn and PyTorch.
- The frontend is created using HTML, CSS (with Bootstrap for styling), and JavaScript.
- Machine learning models like Random Forest, SVM, and XGBoost provide crop and fertilizer recommendations.
- A deep learning model using PyTorch detects plant diseases, with CSV files handling data input and Flask managing user interactions.

METHODOLOGIES:

- **Data Handling:** Collect and prepare soil, crop data, and plant images, storing them in CSV files for processing.
- **Model Training:** Train machine learning models (Random Forest, SVM, XGBoost) for recommendations and a PyTorch deep learning model for disease detection.
- **Backend Integration:** Use Flask to integrate models, manage user requests, and coordinate interactions between the frontend and backend.
- **Frontend Development:** Build a user-friendly interface with HTML, CSS (Bootstrap), and JavaScript to facilitate interaction and display recommendations and disease detection results.

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FEASIBILITY AND VIABILITY

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Analysis of the feasibility of the idea

- Technical: Uses established ML models and real-time data APIs.
- Operational: User-friendly on web platforms.
- Economic: Cost-effective development with potential revenue from premium features.

Potential challenges and risks

- Data Quality: Inaccurate or inconsistent user data.
- Adoption: Limited access to internet or tech-savviness among farmers.
- Model Accuracy: Need for continuous updates and training for high accuracy.

Strategies for overcoming these challenges

- Data Improvement: Clear data entry guidelines and partnerships for better data quality.
- Training and Support: Educate farmers via workshops and develop offline features.
- Model Updates: Regular updates with new data and feedback loops for accuracy improvement.

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IMPACT AND BENEFITS

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IMPACT:

- **Informed Decision-Making**: Farmers will be empowered to make data-driven choices, reducing guesswork and increasing productivity.
- **Increased Yield**: Optimized crop and fertilizer recommendations can lead to better harvests and improved food security.
- **Cost Savings**: Efficient use of resources, such as fertilizers and soil, helps farmers reduce unnecessary expenses.
- **Accessible Technology**: AI-powered tools provide advanced solutions to even small-scale farmers, making tech-driven farming accessible to all.

BENIFITS:

- **Social**: It enhances the livelihood of farmers by improving productivity, contributing to better living standards in farming communities.
- **Economic**: Increased yields and optimized resource use lead to higher profits and reduced costs for farmers.
- **Environmental**: Sustainable farming practices minimize environmental degradation by promoting precise fertilizer use and reducing waste.
- **Food Security**: Improved agricultural practices can contribute to feeding growing populations with healthier and more abundant crops.

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RESEARCH AND REFERENCES

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3. https://youtu.be/dpVylFjT-Cw?si=wwPIpr9A2VLLVj_c
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