🌱Farmer Agent for Tailored Assistance - Hackathon Project

🌾Problem Statement

Farmer Agent for Tailored Assistance\ Develop an AI-powered farmer assistant that provides personalized, accessible, and timely agricultural support to small-scale farmers globally. This solution also supports regular users with plant identification and care recommendations using AI and voice interaction.

💐Brief About the Idea

This project delivers a multilingual AI assistant tailored for farmers, combining OpenRouter GPT-4 chatbot, deep learning-based leaf disease detection, and crop recommendation using scikit-learn. It enables users to interact via voice and text, and supports offline usage by embedding trained models locally.

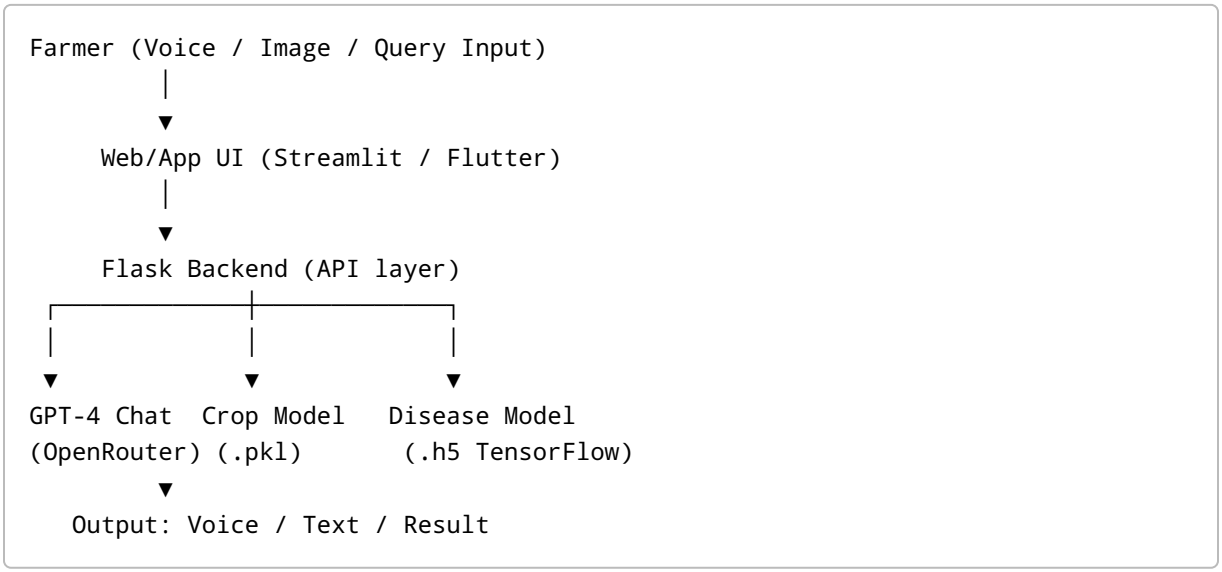
Key Highlights:

- 🧠GPT-4 Chatbot trained for agriculture Q&A
- 💘Disease detection from leaf images (CNN)
- 😸Crop suggestion based on nutrients, weather, and soil (sklearn)
- 🗣️Voice input/output in regional language (Tamil supported)
- 👐🏽Offline fallback and mobile-ready structure

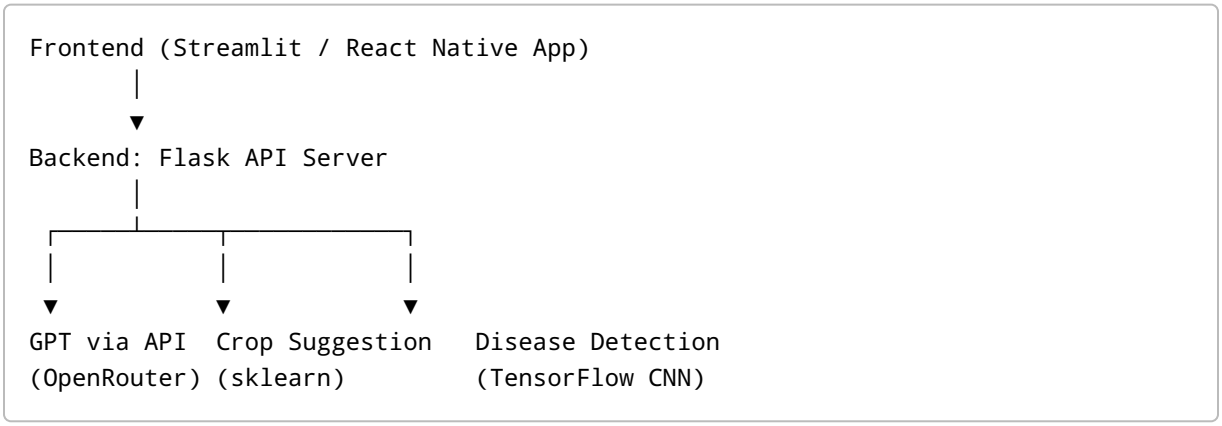
🦜Features Summary

Feature	Description
Chatbot	OpenRouter GPT-4 powered farming advice
Disease Detection	Upload leaf image → Predict disease using CNN
Crop Recommendation	Input soil/weather → ML-based suggestion
Voice Assistant	Listen + Speak (via gTTS and Google Speech)
Regional Language	Tamil support for speech output
Modular API	Flask backend endpoints (`/chatbot`, `/predict_disease`, `/recommend_crop`)

🪱Process Flow Diagram



🌓System Architecture



🦠Technologies Used

- 🧠**AI/ML:** OpenRouter GPT-4, TensorFlow, scikit-learn
- 😺**Models:** `crop_model.pkl`, `leaf_disease_model.h5`
- 🙃**API:** Flask (Python)
- 👋🏽**Frontend:** Streamlit (Web), ready for Flutter deployment
- 🗣️**Voice:** Google Speech Recognition + gTTS
- 👎**Utilities:** PIL, NumPy, Joblib, Tempfile

🐃Cost Estimation

Component	Cost (INR)
Model Training (GPU/cloud)	₹5,000
Backend Deployment	₹1,000/mo
GPT API Quota (OpenRouter)	₹2,000/mo
App UI Dev (Flutter/Web)	₹10,000 (one-time)
Edge Device Kit	₹5,000/unit

🕊️Files Included in Submission

- `farmer_assistant.py` – Full code (chatbot, CNN, crop model, Flask, Streamlit)
- `crop_model.pkl` – Trained RandomForest crop predictor
- `leaf_disease_model.h5` – CNN plant disease detection model
- `README.md` – Setup instructions
- PPT – Hackathon Idea Slides

🍁Testing and Field Trial Plan

- 👈Conduct usability testing with farmers in Tamil Nadu
- 👈Field trials with 5–10 farmers for leaf upload and voice use
- 👈Evaluate accuracy of disease/crop model vs real outcomes
- 👈Gather farmer feedback on language and ease-of-use

🌀Final Outcome

A fully functional MVP (minimum viable product) is built with:

- AI models hosted and tested
- Modular architecture for future expansion
- Real-time voice-enabled support for rural users
- Live-ready demo in Streamlit with Flask backend APIs

This project is ready to be adopted and scaled through partnerships with agriculture boards, NGOs, and rural digital platforms.

Thank You!

Empowering Bharat’s Farmers with AI, One Query at a Time. 🙀😮