

# AI Chatbot for Farmers

## Project Proposal

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### **Abstract**

Agriculture plays a critical role in the global economy and food security, particularly in rural and developing regions. However, access to real-time expert advice for farmers remains limited. AgriBot is a GPT-2 powered AI chatbot designed to support farmers by providing immediate answers to a variety of agriculture-related questions. The chatbot leverages a pre-trained language model to generate human-like responses, accessible via a simple web interface. This project demonstrates how artificial intelligence can bridge the information gap in agriculture through affordable, easy-to-use tools.

### **1. Introduction**

Modern agriculture is increasingly reliant on data, technology, and timely information. However, many farmers in developing areas do not have direct access to agricultural experts or extension services. AgriBot addresses this problem by offering a conversational AI interface capable of answering a wide range of questions about farming, including crop recommendations, pest management, irrigation tips, fertilizer use, and seasonal planting advice.

### **2. Objective**

The main objective of this project is to design and implement an intelligent chatbot that can:

- Understand user queries related to agriculture using natural language.
- Generate meaningful and contextually appropriate answers using GPT-2.
- Provide an intuitive and accessible web-based interface for farmers.
- Demonstrate the practical application of AI in solving real-life agricultural problems.

### **3. Technologies Used**

- Python: The core programming language used for model integration and app logic.
- HuggingFace Transformers: Provides the GPT-2 model and tokenizer.
- Streamlit: Enables a simple and interactive web interface.
- pyngrok: Tunnels the local app for public access.
- Google Colab: Provides a free, cloud-based environment for running and testing the project.

### **4. System Architecture**

The architecture of AgriBot consists of three major components:

1. Input Interface: A Streamlit-powered web page where users enter their queries.

2. NLP Backend: A GPT-2 model processes the input and generates responses.
3. Output Display: The chatbot displays responses in real-time in the browser, simulating a chat experience.

The GPT-2 model is accessed from HuggingFace and executed in a Colab notebook. The app runs on a local web server and is made public via ngrok tunneling.

## 5. Features

- GPT-2 powered natural language understanding and response generation.
- Intuitive, user-friendly chat interface designed for accessibility.
- Dynamic responses to diverse farming queries (soil, crops, weather, fertilizers).
- Hosted entirely on the cloud without any installation or cost.
- Easily extensible for future upgrades such as speech input, image-based diagnosis, or local language support.

## 6. Use Cases

- A farmer queries about pest control methods for rice.
- A user asks what crops are suitable for dry season planting.
- A beginner in agriculture seeks advice on soil preparation.
- Real-time guidance during uncertain weather conditions or disease outbreaks.

## 7. Limitations

- GPT-2 is a general-purpose model and is not fine-tuned specifically for agriculture.
- The chatbot does not validate its answers against real-time data or expert knowledge.
- No memory of past interactions – each query is treated independently.
- Requires a stable internet connection and Google Colab to function.

## 8. Conclusion and Future Work

AgriBot showcases how AI and NLP technologies can be applied to support the agricultural sector. It provides on-demand knowledge to farmers and agriculture enthusiasts without needing an expert physically present. As a proof-of-concept, AgriBot demonstrates the feasibility of deploying conversational AI in rural support systems.

Future enhancements could include:

- Fine-tuning GPT-2 on agriculture-specific datasets
- Adding multilingual support for regional languages
- Incorporating weather APIs and market price data
- Voice recognition and offline chatbot integration
- Building a mobile-friendly version

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