AI Devilops

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No. of Team Members: 1

Mentor Name (if any) : N/A

Team Details: Deepak Kaura will handle all aspects of the project, including data collection, model development, market price forecasting, and deployment of the solution.

College Name: E&ICT Academy, IIT Guwahati

Domain & Problem Statement

- Domain - Agriculture (AG)
- Problem Statement -

Develop a solution that helps farmers adapt to climate change :- Climate change threatens agriculture, particularly for farmers facing extreme weather and changing growing conditions. Develop solutions such as software that can suggest drought-resistant crops, a system that manages extreme weather conditions or advanced irrigation systems to help farmers adapt. By promoting climate-smart technologies, the goal is to enhance agricultural resilience, ensure food security, and support sustainable farming practices for long-term economic stability.

Idea/Solution

- Briefly explain your solution and your approach. :-
- We will be building a **multi-target** based **Market Price Forecasting** tool for the **particular** Commodity for specific **State's District**, integrating historical price data with climate variables such as temperature, rainfall, and humidity. This solution helps farmers adapt to climate change by predicting future prices and recommending the best times to sell crops based on weather conditions.

- **Approach:**

1. **Data Collection:** We will be gathering historical market prices and climate data relevant to Kerala's agricultural conditions.
2. **Forecasting Model:** Using time series models like **Fb-Prophet** and machine learning algorithms (e.g., **XGBoost**), we forecast future prices..
3. **Climate-Resilient Insights:** The model captures the impact of extreme weather on prices, providing farmers with actionable insights to mitigate climate risks.
4. **Deployment:** Our tool is accessible via a web platform, offering real-time forecasts and recommendations, empowering farmers to make informed decisions.

Existing Vs Proposed System

- Briefly explain of your solution is different from the existing systems.
- Other's doing single target variable forecasting/prediction for Market Price and on the other I'm will be doing multi-target forecast.
- Many have not considered weather data, seasons, and holidays data for model training, on the other hand I will be considering it.
- Many out there not able to give informative Market Price forecasting/prediction in terms of sequential data form due to lack of data and its quality, but I will be handling it.

Motivation

- Address the problem's real-world significance and why solving it matters to you or society

- Climate change threatens agriculture, especially for small-scale farmers, by causing unpredictable weather like droughts and floods that disrupt crop yields and market prices. This leads to economic instability and food insecurity. Our tool integrates market price forecasts with climate data, helping farmers make informed decisions, boost productivity, and protect their livelihoods against climate risks.
- Solving this issue matters to me because agriculture forms the backbone of rural economies, and climate change is already affecting millions of farmers worldwide. Providing farmers with tools to adapt to these challenges can help ensure food security, enhance their economic stability, and promote sustainable farming practices. This not only supports individual farmers but contributes to the overall well-being of society by ensuring a steady food supply and reducing poverty in agricultural communities.

Objective & Scope of Solution

- Define the key goals of your solution and outline its primary features and boundaries -

- **Key Goals:**

1. **Market Price Forecasting:** Provide accurate forecasts for the particular commodity in specific state's district, enabling farmers to sell at optimal times.
2. **Climate Risk Mitigation:** Help farmers adapt to climate change by integrating weather data into price predictions, offering insights on how weather conditions impact prices.
3. **Decision Support for Farmers:** Empower farmers with actionable insights to maximize profitability and reduce risks due to extreme weather events.

- **Primary Features:**

1. **Data-Driven Price Forecasting:** Uses historical price data and weather conditions (temperature, precipitation, etc.) to predict future market prices.
2. **Climate Impact Analysis:** Analyzes the influence of weather events like droughts and floods on commodity prices.
3. **User-Friendly Interface:** Provides a simple web platform for farmers to access price forecasts and recommendations tailored to their district and commodity.
4. **Real-Time Recommendations:** Offers dynamic advice on optimal selling times based on predicted prices and weather trends.

Resources Required

- List the technologies and tools you will be using

- **IDE -** Colab
- **Programming Language -** Python
- **Data exploration and visualization -** Pandas, Numpy, Matplotlib, Seaborn/Plotly, Datetime, Holiday
- **Handling missing values and outliers -** Anyone technique from pandas to handle missing values and anyone statistical method to handle outliers
- **Data Pre-processing and modeling -** Pandas (dummies), sklearn (label encoder, R2 score, MSE, MAE), **For model -** Random Forest Regressor, XGBoost Regressor, CatBoost Regressor, LightGBM Regressor or Fb-Prophet
- **Deployment (if require) -** Streamlit or Flask.

Thank You!