Dr.Mahalingam College of Engineering & Technology
Department of Artificial Intelligence & Data Science

Batch Number : 15

Domain: Agriculture

Team Members:

1. Sharanya T 727622BAD007
2. Santhosh S 727622BAD073
3. Aashif Shadin K N 727622BAD099

SIH PROBLEM STATEMENT: 1647

PROBLEM DESCRIPTION:

The Department of Consumer Affairs monitors the daily prices of 22 essential food commodities through 550 price reporting centres across the country. The Department also maintains buffer stock of pulses, viz., gram, tur, urad, moon and masur, and onion for strategic market interventions to stabilize the volatility in prices. Decisions for market interventions such as release of stocks from the buffer are taken on the basis of the price trends and outlook. At present, the analyses of prices are based on the seasonality, historical and emerging trends, market intelligence inputs, crop sowing and production estimates. ARIMA based economic models have also been used to examine and forecast prices of pulses.

PROBLEM IDENTIFIED :

The project aims to develop an AI-driven agricultural commodity price prediction system that enhances forecasting accuracy and aids in strategic market interventions. By integrating deep learning models (LSTM, XGBoost, ARIMA, SARIMA) with real-time data, the system will analyze historical trends, seasonal patterns, and external market factors to predict price fluctuations. The goal is to provide farmers, traders, and policy makers with data-driven insights for better buffer stock management, price stability, and risk mitigation, ultimately reducing economic uncertainty in the agricultural sector.

ABSTRACT

Agricultural commodity price fluctuations pose significant challenges for farmers, traders, and policymakers, impacting economic stability and food security. Traditional price prediction models often struggle with accuracy and adaptability, making it difficult for stakeholders to make informed decisions. This project aims to develop a robust, data-driven approach for predicting agricultural commodity prices using advanced machine learning techniques.

The framework integrates real-time market data, historical price trends, and external factors such as weather conditions, supply-demand variations, and government policies. Key data sources include AgMarkNet, government reports, and economic indicators. Models such as ARIMA, SARIMA, LSTM, and XGBoost are employed to capture complex patterns in price movements and enhance forecasting accuracy.

To improve transparency, Explainable AI (XAI) techniques such as SHAP are incorporated, providing insights into key factors influencing price fluctuations. This ensures that stakeholders can trust and interpret the predictions effectively. The system also assists in strategic buffer stock management, procurement planning, and market interventions by providing accurate forecasts with explainable justifications.

This approach represents a significant advancement in agricultural price forecasting by combining predictive accuracy with transparency, enabling better decision-making. Future research will focus on enhancing model generalization, incorporating additional economic indicators, and refining explainability techniques to improve system reliability.

Keywords: Agricultural price prediction, Machine learning, XAI, LSTM, ARIMA, Market analysis, Economic forecasting.

Signature of Guide