Agriculture Commodity Price Prediction

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Abstract

The Agriculture Commodities Price Prediction project aims to leverage machine learning, specifically the Support Vector Machines (SVM) algorithm, to forecast crop prices based on a comprehensive government dataset. The objective is to provide farmers, traders, and policymakers with accurate and timely information to make informed decisions in the volatile agricultural commodities market. The project involves preprocessing and analyzing diverse data points such as historical prices, climate conditions, and economic indicators. Through the implementation of SVM, a powerful algorithm for classification and regression tasks, our model strives to capture complex relationships within the dataset to enhance prediction accuracy. The proposed system aims to contribute to the sustainability of the agricultural sector by assisting stakeholders in mitigating risks and optimizing resource allocation. The utilization of government datasets ensures the reliability and authenticity of the information, making the model a valuable tool for stakeholders involved in agriculture and related industries.

Keywords: Agriculture Commodities Price Prediction Machine Learning Support Vector Machines (SVM) Government Dataset Forecasting Crop Prices Data Preprocessing Historical Prices Climate Conditions Economic Indicators

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INTRODUCTION

The agricultural sector plays a pivotal role in global economies, supporting the livelihoods of millions and ensuring food security. However, the inherent volatility of agricultural commodities prices poses significant challenges for farmers, traders, and policymakers alike. To address this issue, we propose the "Agriculture Commodities Price Prediction" project, which employs advanced machine learning techniques, specifically the Support Vector Machines (SVM) algorithm. The primary goal of this project is to harness the power of SVM to predict crop prices using a robust government dataset. By integrating historical prices, climate conditions, and economic indicators, the model aims to uncover intricate patterns and relationships within the data. The utilization of government datasets ensures the reliability and authenticity of the information, enhancing the accuracy of our predictions. This initiative seeks to empower stakeholders in the agricultural domain with timely and precise insights, facilitating better decision-making, risk mitigation, and resource optimization in the ever-changing landscape of agricultural commodities markets.

LITURATURE SURVEY

Meta-Learning Based Adaptive Crop Price Prediction for Agriculture Application. 2021 5th International Conference on Electronics, Communication and Aerospace Technology (ICECA)
Author Name (Dhanasekaran K; Ramprasath M; Sathiyamoorthi V)
Dealing with unexpected changes in agricultural product prices that affect the farmers and the economic growth of a country is inevitable in the current day context. A unique approach is proposed for time-series prediction, which utilizes the power of crop price prediction and crop yield prediction of select crops to identify the relevant information with respect to the market prices, and crop yields. Many uncertain conditions such as climate changes, fluctuations in market, flooding, etc., cause problems to the agricultural process. In this work, the prices of selected essential crops analyzed for time-series prediction using meta-learning. The Self-Organized Map (S OM), LSTM (Long-Short Term Model), and this proposed Meta-Learning Based Adaptive Crop Price Prediction (MLACPP) was trained using crop price dataset, and crop yield dataset. Meta-learning function used in the approach utilizes the input, optimization-output, and task-related estimators for calculating meta-loss over multiple meta-network.

A Comparative study of Data Mining Techniques for Agriculture Crop Price Prediction, 2022 IEEE 7th International conference for Convergence in Technology (I2CT)
Authors: Jignesh Hirapara; Pratik Vanjara
Agriculture crop prices forecasting is a very interesting and high challenging process as it is fully dependent on upcoming production in entire country. Recently most available application is designed for price analysis rather than price forecasting. In India agriculture production, when it is calculated per farmer, it is very instable is there compare to rest of the world, when compared to individual farmer in various countries with stable environment, and without providing sufficient MSP it will not benefit farmers and agriculture fraternity. then poverty can be reduced in India. In advanced agriculture development, a large quantity of data is generated from the agriculture commodity market. Agriculture has a large amount of data, however regrettably, most of this data is not extracted to find out unseen information in data— crop price forecast is more beneficial to the farmers and agriculture fraternity to take proper and timely decisions. According to the output of process, Advanced data mining techniques play a pivotal role in analysis to discover a hidden pattern in data. Performance of data mining techniques is compared with past crop prices, weather, current market prices, stock availability and the upcoming production of the crop in recent years. The data mining that is a regression analysis, Tracking Patterns, Cluster Analysis, and visualization techniques are used to create an inventive representation to predict the agricultural crop pricet is very instable is there compare to rest of the world, when compared to individual farmer in various countries with stable environment, and without providing sufficient MSP it will not benefit farmers and agriculture fraternity. If the farmers and agriculture fraternity get an access to appropriate crop prices.

Smart Crop Prediction System 2019 International Conference on Advancements in Computing. Malabe, Sri Lanka
Authors: C.P.Wickramasinghe,P.L.N.Lakshitha,H.P.H.S. Hemapriya
Agricultural industry plays a major role in the process of economic development as well as the Gross Domestic Product of Sri Lanka. One of the significant issues in the industry is lacking an accurate way to identify the best crop that can be grown with the available soil fertility in a particular land. Since most of the farmers have a lack of knowledge about soil nutrients, they start cultivations by believing myths in society and few of them use scientific approaches. This research mainly focuses on suggesting the best crop according to soil fertility of landand also it recommends a fertilizer plan to optimize the amount of fertilizers

applied for suggested crops. The paper presents a tool with embedded sensors that measure soil fertility and developed a cross- platform mobile application to suggest the best crops according to available soil fertility. Further, a fertilizer plan will be suggested to optimize fertilizer usage in order to increase profitability and avoid soil degradation. To evaluate the final product, the same soil sample was tested in the lab and using sensors embedded tool. Results obtained by those tests proven that both generate approximately equal Nitrogen (N), Phosphorus (P) and Potassium (K) values.

AIM & OBJECTIVES

1. Implement a machine learning model, specifically leveraging the Support Vector Machines (SVM) algorithm, to accurately predict agricultural commodity prices.
2. Employ a comprehensive government dataset encompassing historical prices, climate conditions, and economic indicators to ensure the model's accuracy, reliability, and relevance.
3. Provide farmers, traders, and policymakers with timely and precise information to facilitate informed decision-making in the volatile agricultural commodities market.
4. Assist stakeholders in identifying and mitigating risks associated with fluctuating crop prices, thereby promoting sustainability and resilience in the agricultural sector.

MOTIVATION

The motivation behind the "Agriculture Commodities Price Prediction" project stems from the critical need to address the inherent uncertainties and challenges faced by stakeholders in the agricultural sector. Agricultural commodities markets are characterized by volatile price fluctuations influenced by a myriad of factors such as climate conditions, economic indicators, and global market dynamics. These fluctuations directly impact the livelihoods of farmers, traders, and have broader implications for food security and economic stability.

PROPOSED APPLICATION:

1. Farmers' Decision Support: Farmers can use the predictive model to make informed decisions on crop selection, planting and harvesting timings, and pricing strategies. This helps optimize their yield, minimize losses, and improve overall farm profitability.
2. Traders and Agribusinesses: Traders can leverage the model's predictions to develop effective trading strategies, manage inventory, and hedge against market risks. Agribusinesses can use the insights for supply chain optimization and procurement planning.
3. Policy Formulation: Policymakers can utilize the predictions to formulate effective agricultural policies and interventions. This includes implementing measures to stabilize markets, providing subsidies during price downturns, and ensuring food security through informed decision-making.

PROPOSED SYSTEM ARCHITECTURE

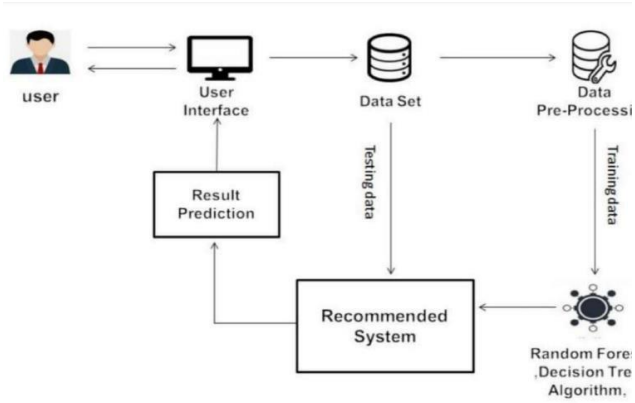


Fig -1: System Architecture Diagram

ADVANTAGES

- Enhanced Data Security
- User-Friendly Interface
- Scalability
- Compliance Features
- Integration Capabilities

FUNCTIONAL & NON-FUNCTIONALREQUIREMENTS

Functional Requirement:

Functional requirements for the Crop

Recommendation System:

. User Registration and Authentication:

- Users can create accounts and log in to the system.
- User roles should include farmers, agronomists, and administrators.

Data Input and Collection:

- Ability to input and collect data from various sources, including soil tests, climate information, historical crop yields, and expert knowledge.
- Data should be stored in a structured and secure database.

Data Processing:

- Utilize AI algorithms to process and analyze the collected data to derive insights and recommendations.

Soil Analysis:

- Analyze soil type and quality based on soil test data.
- Recommend suitable crops for a specific soil type.

Climate Analysis:

- Incorporate real-time or historical weather data to assessclimate conditions.
- Suggest crops that are well-suited to the current orpredicted weather patterns.

Crop Selection:

- Based on soil and climate analysis, recommendappropriate crop varieties and cultivars.
- Consider crop rotation and diversification recommendations to improve soil health and prevent pests

and diseases.

Non-functional requirements:Performance

Response Time: The system should provide recommendations in real-time or near-real-time to support farmers' decision-making.

Scalability: The system should be capable of handling a growing volume of data and users without a significant degradation in performance.

Reliability:

Availability: The system should have high availability, with minimal downtime, to ensure farmers can access recommendations when needed.

Security:

Data Security: Ensure that the sensitive agricultural data, including soil tests and climate information, is protected from unauthorized access or breaches.

Authentication and Authorization: Implement robust user authentication and authorization mechanisms to control access to the system.

Data Quality and Integration:

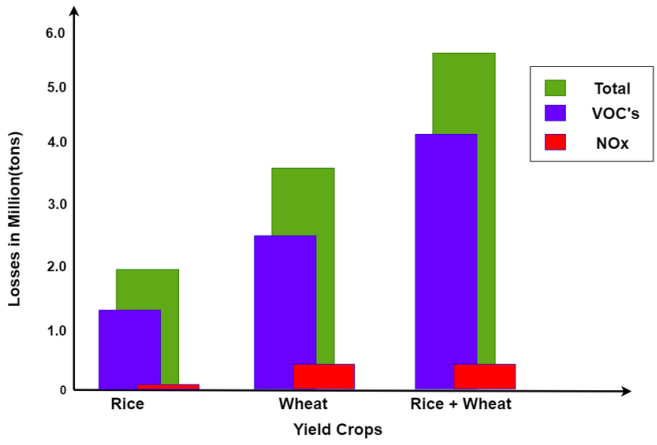
Data Accuracy: Ensure that the data from different sources (soil tests, climate data, and historical crop yields)is accurate and regularly updated.

Data Integration: The system should seamlessly integrate data from various sources, including data normalization and transformation.

Usability:

User-Friendly Interface: The user interface should be intuitive and easy to use, catering to a diverse audience offarmers with varying levels of technical expertise.

Accessibility: Ensure the system is accessible to users with disabilities, following accessibility standards.



SYSTEM REQUIREMENTS

Hardware Requirements:

1. Processor: Minimum i3 and above.
2. RAM: 1GB and above.
3. HDD: 256 or above.

Software Requirements:

1. Windows 7 and above.
2. HTML
3. CSS

4. Anaconda environment
5. Python
6. Python Libraries.

CONCLUSION

In conclusion, the "Agriculture Commodities Price Prediction" project represents a significant step towards addressing the complex challenges faced by stakeholders in the agricultural sector. By employing the Support Vector Machines (SVM) algorithm and leveraging a comprehensive government dataset, the predictive model developed in this project aims to provide accurate and timely insights into crop prices. The multifaceted applications of this model encompass decision support for farmers, risk mitigation for traders, and informed policymaking for governments, ultimately contributing to the overall resilience and sustainability of the agricultural supply chain.

FUTURE SCOPE

The future scope of the "Agriculture Commodities Price Prediction" project is promising, with avenues for continual improvement and expansion. Algorithmic refinements, including the exploration of advanced machine learning techniques, can enhance the model's predictive accuracy. Real-time prediction capabilities and the integration of additional features, such as satellite imagery or social media sentiment analysis, represent future directions for enriching the model's contextual understanding. Tailoring the model for regional variability, collaborating with AgTech companies for seamless integration, and exploring blockchain technology for data transparency are avenues to enhance reliability and applicability. Developing user-friendly mobile applications and collaborating with agricultural institutions can further extend the practical utility and impact of the model. Additionally, assessing environmental impacts and expanding the project's global reach to cover diverse crops and market dynamics contribute to a comprehensive vision for the continued development and relevance of the project in the dynamic landscape of agricultural economics..

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