Crop Survival and Price Prediction

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Abstract - The Crop Survival model is a machine learning tool that analyses market trends and predicts crop viability in specific regions based on historical data from the past eight years. It leverages diverse variables, including weather patterns, soil quality, irrigation methods, pest infestation rates, and socioeconomic indicators, to forecast which crops are most likely to thrive in particular areas and seasons. The model adapts to changing agricultural conditions, incorporating new data and refining its algorithms to remain effective despite unpredictable factors like climate change, economic fluctuations, and technological advancements. This adaptability allows it to provide accurate, real-time predictions that evolve as conditions change. Beyond helping farmers make informed crop selections, the model is also valuable for policymakers, agricultural researchers, and market analysts. It provides comprehensive insights into crop survival probabilities and market dynamics, supporting strategic planning, resource allocation, and risk management in the agricultural sector, ultimately improving decision-making and agricultural practices.

***Key Words*:** Machine Learning, Crop Prediction, Decision Tree, SVM, Rainfall Prediction, Crop Recommendation.

1.INTRODUCTION

The Crop Survival is a Machine Learning model in which an individual will the analysis of market overview and prediction of crop that are supposed to harvest in particular area. At its core, the Crop Survival model utilizes a diverse range of variables collected over the years, encompassing factors such as weather patterns, soil quality, irrigation methods, pest infestation rates, and socioeconomic indicators. By analyzing this rich dataset, the model can generate accurate predictions regarding which crops are most likely to thrive in a given area during a particular season.

One of the key strengths of the Crop Survival model lies in its adaptability to variable conditions. Agricultural ecosystems are inherently dynamic, influenced by numerous unpredictable factors such as climate change, economic fluctuations, and technological advancements. Therefore, the model continuously learns and evolves, incorporating new data and refining its algorithms to stay relevant and effective in changing environments.

Crop cultivation prediction and sales price forecasting are essential for modern agriculture, enabling farmers, traders, and policymakers to make informed decisions. By utilizing advanced technologies such as machine learning, artificial intelligence (AI), remote sensing, and big data analytics, these predictions enhance agricultural productivity and market stability. Crop cultivation prediction involves analyzing factors like soil quality, weather conditions, historical yield data, pest infestations, and farming techniques to estimate crop output accurately. With AI-driven models and satellite imagery, farmers can determine the best time for sowing, irrigation, and harvesting, minimizing risks and optimizing resource use.

Sales price forecasting, on the other hand, helps in predicting market trends and price fluctuations based on demand-supply dynamics, economic factors, competitor strategies, seasonal variations, and logistics costs. By analyzing these parameters, farmers can anticipate price changes, choose optimal selling times, and negotiate better market deals, ensuring financial stability.

The integration of data-driven insights into agriculture benefits all stakeholders by optimizing resource allocation, stabilizing markets, enhancing food security, and promoting economic growth. With accurate forecasting, farmers can maximize yields, increase revenue, and contribute to a more resilient agricultural sector.

2. RELATED WORK

In paper [1] Author states that Data mining and machine learning techniques assist farmers in selecting suitable crops and implementing best practices to achieve the expected yield. By analyzing extensive historical datasets, data mining identifies patterns that provide valuable insights for crop selection based on various influencing factors. Additionally, it helps estimate crop production. The study utilized the linear regression method for prediction and compared its performance with the K-Nearest Neighbor (K-NN) algorithm. Results indicated that linear regression provided more accurate predictions for certain crops compared to the K-NN approach.

Paper [2] states that Crop yield prediction involves estimating future crop production using historical data, considering factors such as temperature, humidity, pH levels, rainfall, and crop type. The study applied data mining methods alongside the random forest machine learning algorithm to enhance prediction accuracy. This approach aids farmers in understanding crop demand and pricing trends, enabling them to make informed decisions regarding crop selection and cultivation strategies. By leveraging these techniques, farmers can optimize yield potential and improve agricultural planning.

In [3] Author used the study considers parameters such as state, district, season, and cultivated area, allowing users to predict crop yield for a specified year. To improve accuracy, advanced regression techniques, including Kernel Ridge, Lasso, and Elastic Net (ENet) algorithms, were utilized. Additionally, the concept of Stacking Regression was implemented to enhance predictive performance. The effectiveness of the model was evaluated using Root Mean Square Error (RMSE) as the performance metric.

K. Priyadharshini [4] provides assistance to farmers in determining the suitability of specific crops for different seasons and estimating crop prices. The study employs various machine learning techniques, including linear regression, Support Vector Machine (SVM), K-Nearest Neighbor (KNN), and decision tree algorithms. Utilizing auxiliary data, the research introduces an innovative method to generate effective support vectors for SVM classification. This optimized approach is applied in real-time agricultural scenarios, improving precision in classification and enhancing production management. The proposed SVM model demonstrates higher accuracy compared to existing systems. The study concludes that this method can be integrated into government sectors such as APMC and Kissan Call Centers, enabling both farmers and policymakers to access valuable insights on future crop yields and market prices.

3. SYSTEM ARCHITECTURE

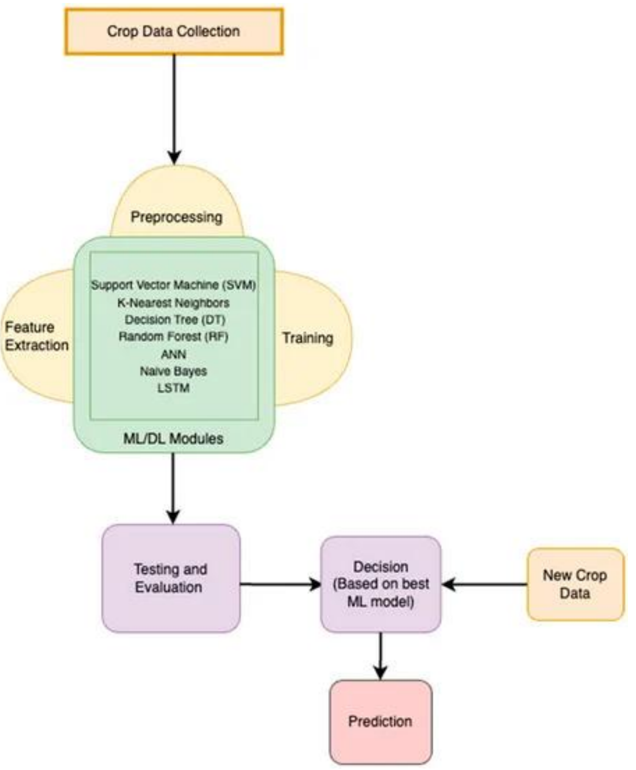

Fig-3.1: System Architecture

4. RESULT AND DISCUSSION

1. **Dashboard**: A **Dashboard** provides an interactive and visual display of key information, typically in charts, graphs, and tables. It's often used to give a quick overview of data, track metrics, or support decision-making. In the context of agriculture, a dashboard can be used to monitor crop health, weather conditions, soil quality, and more.

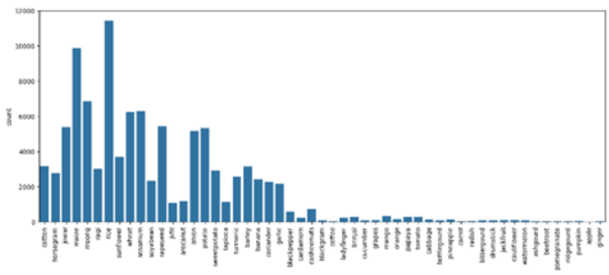

Fig-4.1: Count of Crops

2. **Extraction of crop data:** The data is extracted from kaggle.com and Google. The data extracted further aligned as per the requirement.

3. **Prediction of Crop Cultivation data:** Using data such as soil type, weather conditions, moisture levels, and historical crop yields, models (often powered by machine learning) can predict which crops are most suitable for a given location. This could help farmers optimize their resources and maximize yield.

Fig-4.2: Prediction of Crop

4. **Images of Crops**: Incorporating images of crops in dashboards can serve several purposes.

5. **Import-Export Data:** Agricultural import-export data tracks the movement of crops and agricultural products between countries or regions.

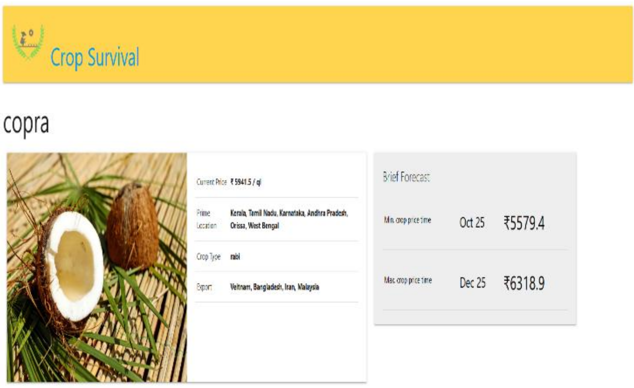

Fig-4.3: Crop data of import-export

6. **Training the model:** The model is further trained as per the requirement. In the first phase the model gave accuracy of 40.12%. After this increasing the number of epoch. It gave around 62 – 67%.

Forecast Trends

Month	Price (per Qtl.)	Change
Mar 25	₹5946.6	0.09% ▲
Apr 25	₹5880.3	-1.03% ▼
May 25	₹5910.9	-0.52% ▼
Jun 25	₹5773.2	-2.83% ▼
Jul 25	₹5671.2	-4.55% ▼
Aug 25	₹5650.8	-4.89% ▼
Sep 25	₹5650.8	-4.89% ▼
Oct 25	₹5579.4	-6.09% ▼
Nov 25	₹5814.0	-2.15% ▼
Dec 25	₹6318.9	6.35% ▲

Fig-4.4: Current Trends of Crop

5. CONCLUSIONS

The Crop Survival project represents a pioneering endeavor at the intersection of agriculture and technology, aiming to revolutionize crop management and decision-making processes. Through the extraction and alignment of comprehensive crop data from sources like Kaggle and Google, coupled with rigorous model training and optimization phases, the project has culminated in the development of a robust machine learning model with the capacity to predict crop viability with notable accuracy.

Leveraging the Flask framework for implementation, the model is seamlessly integrated into a user-friendly application, ready for execution across diverse platforms. The main conclusion drawn from this project is the tangible impact it can have on agricultural practices, empowering farmers, policymakers, and stakeholders with valuable insights into crop selection, market trends, and risk management. By harnessing the power of data-driven decision-making, the Crop Survival project heralds a new era of precision agriculture, promising to enhance productivity, sustainability, and food security in an ever-evolving global landscape.

6. FUTURE SCOPE

1. **Advancements in Predictive Modeling** – Incorporating deep learning and reinforcement learning for improved accuracy.

2. Adaptation to Climate Change – Continuous updates based on climate models to mitigate the impact of changing weather patterns.

3. Geographic Expansion – Expanding to different regions with localized datasets and multilingual support.

4.Integration with Smart Farming Technologies – Incorporating IoT devices, drones, and automated farming machinery.

5.Mobile and IoT Applications – Developing mobile applications for real-time monitoring and user-friendly access.

6.Collaborative Partnerships – Partnering with governmental agencies, research institutions, and agritech startups for continuous innovation.

By embracing these advancements, the Crop Survival Project is poised to drive agricultural innovation and ensure global food security for future generations.

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