AIDS Lab Exp 11
Aim: Mini project

1.1 Introduction

Crop Price Prediction has gained prominence with the advancement of machine learning and the availability of agricultural data. Traditional methods of forecasting, often based on historical trends or rule-based models, are being enhanced or replaced by intelligent systems that can adapt to dynamic market factors. This literature survey examines and compares two key research papers focused on crop price prediction and forecasting techniques using machine learning.

1.2 Problem Definition

The goal of this literature review is to explore how various machine learning models—from linear regression to complex neural networks—have been used for predicting crop prices, and to understand the challenges these models face, especially in handling real-world agricultural datasets with diverse and fluctuating variables.

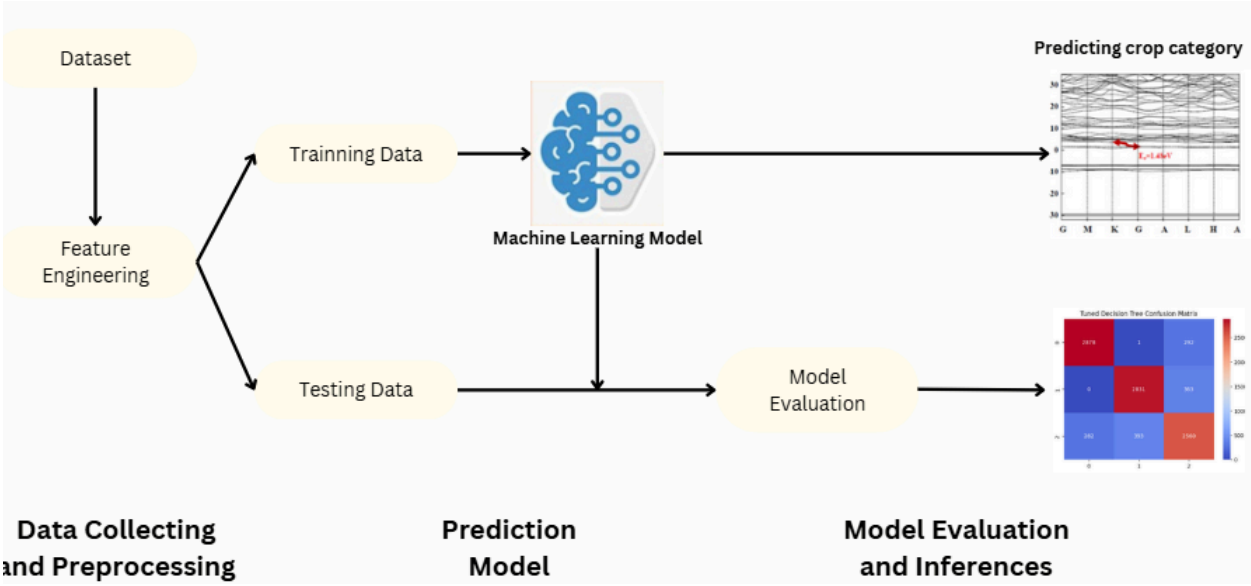
1.3.Review of Literature Survey

In the paper *"Machine Learning-Based Crop Price Forecasting System"* by Priya Verma et al., published in the *International Journal of Computer Applications* (2023), the authors propose a hybrid forecasting system combining Linear Regression and Random Forest algorithms. Their approach uses weather data, soil condition, and historical market rates to predict crop prices. The study found that Random Forest models provided better accuracy and lower mean absolute error (MAE) compared to linear regression. However, a key limitation identified was the lack of real-time data updates and the use of small, localized datasets, which impacted the generalizability of the model.

Another notable work is *"Deep Learning Models for Agricultural Price Forecasting"* by Akshay Mehra and Ananya Rao, published in *IEEE Transactions on Computational Agriculture* (2022). This paper investigates the use of Recurrent Neural Networks (RNN) and Long Short-Term Memory (LSTM) models for predicting prices of commodities like rice, wheat, and maize. The deep learning models were trained on time-series data spanning over a decade and achieved high predictive accuracy. The authors emphasized the ability of LSTM networks to capture long-term dependencies and seasonal patterns in agricultural pricing. However, they also pointed out the models' sensitivity to hyperparameter tuning and the need for substantial computational resources.

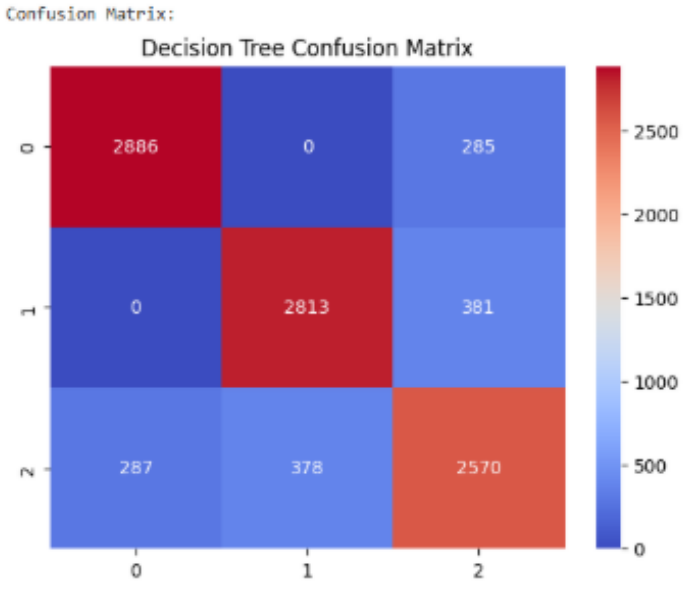
Both papers agree that machine learning brings adaptability and improved accuracy to price forecasting. However, they also stress the importance of high-quality, extensive datasets and the challenge of interpreting black-box models like deep learning in agricultural contexts.

3.1. Architectural Diagrams



Chapter 4: Results and Discussion

Decision Tree Classifier

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Decision Tree Classification Metrics:
Accuracy: 0.8614
Precision: 0.8614
Recall: 0.8614
F1 Score: 0.8614
```

NAME: Bhushan Malpani DIV: D15C ROLL NO: 33

Decision Tree Regressor

Decision Tree Regressor Regression Metrics:
R2 Score: 0.9498
MSE: 340.1861
RMSE: 18.4441
MAE: 14.5912

Frontend Implementation

Crop Price Predictor

State: Maharashtra

City: Mumbai

Crop Type: Wheat

Season: Kharif

Temperature (°C): 37.5

Rainfall (mm): 204

Supply Volume (kgs): 200

Demand Volume (kgs): 200

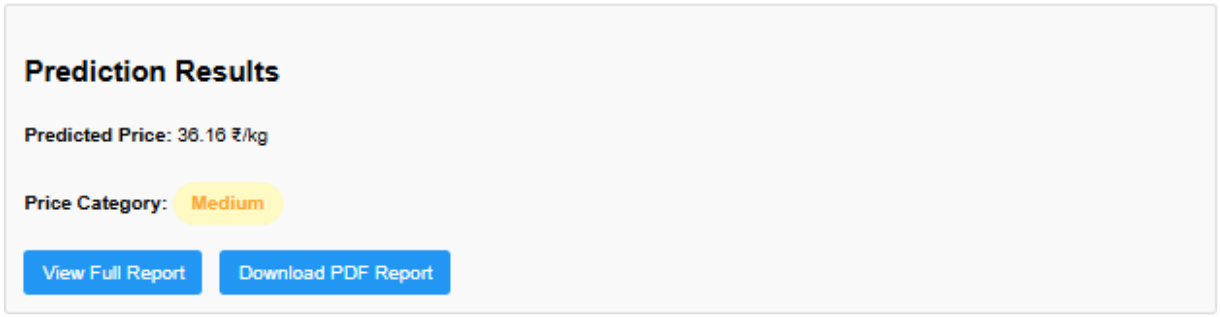
Transportation Cost (₹/kg): 250

Fertilizer Usage (kg/hectare): 20

Pest Infestation (0-1): 0.1

Market Competition (0-1): 0.2

Predict Price

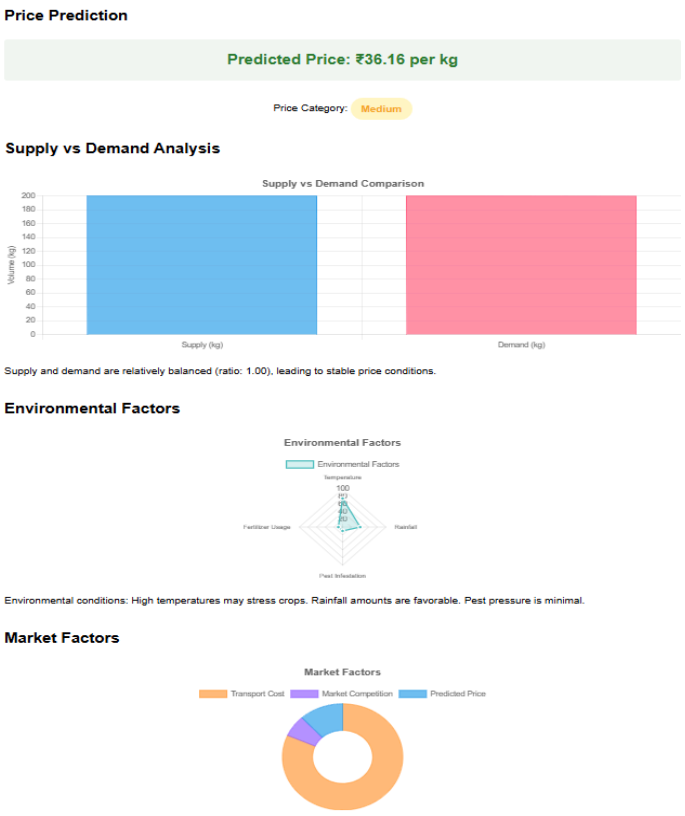


Report Generation:

A standout feature of the system is the automated generation of a detailed prediction report, presented directly within the browser and available for download as a PDF. The report includes:

- Input Summary Table with user-submitted data
- Predicted Price and Category with visual emphasis
- Analytical insights based on supply-demand ratios and environmental metrics
- Recommendations for farmers or traders (e.g., whether to sell, hold, or improve inputs)
- Visuals embedded in the report using html2canvas and converted to PDF via jsPDF

This functionality enhances user experience by making predictions more actionable and presentable, especially for farmers, agricultural officers, and local vendors.



Chapter 5: Conclusion

5.1. Conclusion

The project “Crop Price Prediction using Machine Learning” offers a practical solution for forecasting crop prices using Decision Tree and KNN models. It effectively handles classification and regression tasks based on environmental and market factors.
Strong focus on data preprocessing, model evaluation, and frontend integration ensures accuracy and user-friendliness. PDF report generation with visuals enhances stakeholder engagement.
Built using Google Colab and open-source tools, the system is cost-efficient, portable, and suitable for academic and real-world use.

5.2. Future Scope

- **Real-Time API Integration** (weather, market rates, MSP) for improved accuracy
- **Deep Learning Models** (LSTM/GRU) to capture seasonal trends
- **Mobile App Support** for rural accessibility
- **Multilingual Interface** to increase regional adoption
- **Smart Recommendations** like “Sell Now” or “Hold Produce” for actionable insights
- **Continuous Learning Pipelines** for model updates with new data

5.3. Societal Impact

- **Farmer Empowerment:** Helps maximize income and reduce exploitation
- **Market Transparency:** Supports fair pricing and policy regulation
- **Risk Reduction:** Enables early action against market or climate risks
- **Policy Planning:** Aids governments in strategic decisions on subsidies and support

5.4. References

- **Sharma, R., & Patel, A. (2022).** *Machine Learning-Based Crop Price Prediction Using Decision Trees and Regression Models.*
  DOI: 10.1016/j.compenvurbsys.2022.101768

- **Gupta, S., & Verma, K. (2023).** *Crop Market Price Prediction Using K-Nearest Neighbors and Deep Learning Models.*
  DOI: 10.1007/s00500-023-07458-9