



Atharva Karale  
Presenter

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# Crop Prediction Using Machine Learning

An Insight into Utilizing Machine Learning for Effective Crop Forecasting





# Team Members

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# Introduction to Crop Prediction

Exploring Machine Learning Solutions for Modern Agriculture

## 1 Significance of Crop Prediction

Understand why crop prediction is crucial in today's agriculture.

## 2 Challenges in Agriculture

Explore the various challenges farmers face due to climate change.

## 3 Role of Machine Learning

Learn how machine learning can transform crop prediction processes.

## 4 Optimizing Yields

Examine strategies for optimizing crop yields with predictive analytics.

## 5 Reducing Losses

Investigate how predictions can help in minimizing crop losses.

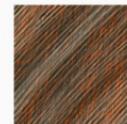
# Machine Learning Techniques

Exploring Methods for Crop Prediction



## Random Forest

A versatile technique that builds multiple decision trees to improve prediction accuracy and reduce overfitting.



## Support Vector Machine (SVM)

An effective method for classification tasks that finds the optimal hyperplane to separate data points distinctly.



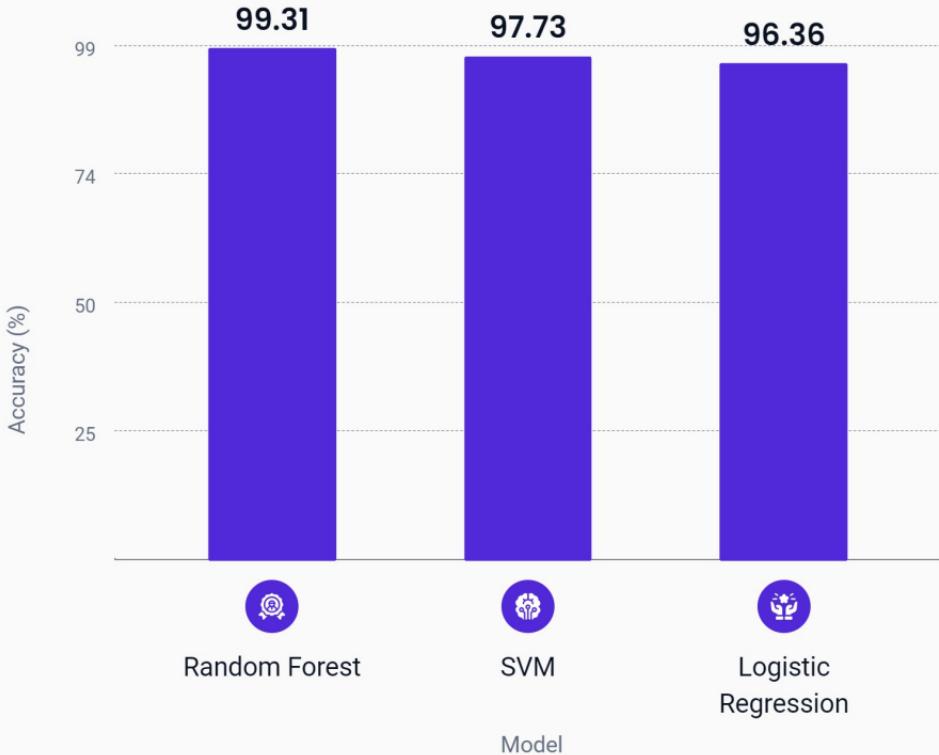
## Logistic Regression

A statistical method used for binary classification that predicts the probability of a target variable based on input features.

# Dataset and Variables

Key variables crucial for predicting suitable crops using machine learning

Variable	Description
Nitrogen	Essential nutrient that affects plant growth and yield.
Phosphorus	Important for root development and energy transfer.
Potassium	Regulates water and nutrient movement in plants.
Temperature	Influences plant metabolic processes and growth.
Humidity	Affects transpiration rates and plant health.
pH	Soil acidity impacting nutrient availability.
Precipitation	Water supply critical for crop development.



Source: Companies Market Cap

## Performance Comparison of Models

Evaluating accuracy of Random Forest, SVM, and Logistic Regression in crop prediction

## Hyperparameter Tuning

Enhancing Model Performance with Optimal Settings



## Minimum Samples Split

Use a minimum samples split of 2 to allow more data points for splits.



## GridSearchCV Utilization

Employ GridSearchCV to efficiently search for optimal hyperparameters.



## Estimators Count

Choose 300 estimators to increase model robustness and accuracy.

## Max Depth Configuration

Set max depth to 20 to prevent overfitting and enhance decision-making.

## Model Accuracy Improvement

These settings result in significant enhancement of model accuracy for crop prediction.

# Significance of Attributes

Key Factors Influencing Crop Suitability in Machine Learning Models

## Precipitation

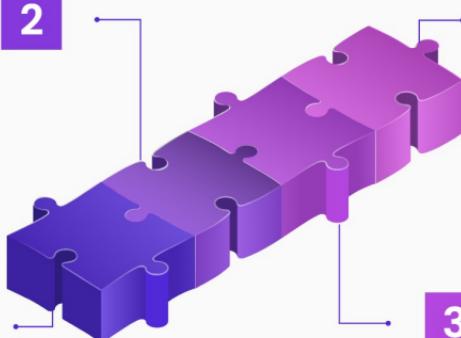
Adequate rainfall is essential for crop irrigation and development, influencing overall suitability.

2

## Nitrogen

Nitrogen levels significantly impact plant growth and yield, making it crucial for crop suitability.

1



## pH Level

Soil pH affects nutrient availability, playing a significant role in determining crop health.

4

## Temperature

Optimal temperature ranges are necessary for crop growth, affecting their viability and yield.

3



100%



# Case Study: Successful Implementations

Exploring Real-World Machine Learning Impact on Crop Yield  
Predictions



# Future Directions

Integrating IoT and Deep Learning for Enhanced Crop Prediction

## Integration of IoT

Leveraging IoT devices for real-time agricultural data collection to enhance predictions.

## Enhanced Prediction Accuracy

Combining multiple data sources to achieve higher accuracy in yield forecasts.



## Real-time Data Analysis

Incorporating real-time weather data to make timely and accurate crop predictions.

## Deep Learning Applications

Applying deep learning algorithms to analyze complex patterns in crop data for better forecasting.

## Satellite Imagery Usage

Utilizing satellite images to gather comprehensive data on soil conditions and crop health.

# Conclusion and Call to Action

Embrace Machine Learning for Enhanced Crop Prediction and Sustainability

