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# Machine Learning and Deep Learning for Precision Agriculture

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**ABSTRACT:** Agriculture is of vital importance to the economic development of the country. Almost 58% of the country's main source of income is agriculture. Farmers have so far adopted conventional farming methods. These techniques were imprecise, slowing my productivity and taking a lot of time. Precision farming helps improve productivity by identifying steps that need to be taken at any time of the year. Predicting weather conditions, analyzing soils, recommending suitable crops to grow, and determining the amount of fertilizers and pesticides to use are some of the elements of precision agriculture. Precision agriculture uses advanced technologies such as IOT, data mining, data analytics, and machine learning to collect data, train systems, and predict outcomes.

**KEYWORDS:** machine learning, precise.

## I. INTRODUCTION

### Define Data Mining:

In general, data mining (sometimes called data or knowledge discovery) involves analyzing data from multiple perspectives and turning it into useful information—information that can be used to increase sales, reduce costs, or both. The process of matching. Data mining software is one of several analytical tools used to analyze data. Users can analyze and categorize data from different dimensions or angles to summarize identified relationships. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases.

### Working of Data Mining:

While large-scale information technology has developed transactional and analytical systems separately, data mining serves as a bridge between the two.



Data mining software analyzes stored transactional data for relationships and patterns based on open user queries. There are several types of analytics software available, including statistics, machine learning, and neural networks. In general, one of four types of relationships are searched:

- **Classes:** Stored data are used to arrange data into predetermined groups. For example, a restaurant chain can analyze customer purchase data to determine when customers visit and what they typically order. This information can be used to increase traffic through daily deals.
- **Cluster:** Data items are grouped by logical relationships or consumer preferences. Foreexample, data can be mined to identify market segments and consumer affinities.
- **Associations:** Data can be mined to identify associations. The beer diaper example is an example of associative mining.
- **Sequential Patterns:** Evaluate data to predict behavioral patterns and trends. For example, an outdoor gear retailer can predict a consumer's likelihood of purchasing a backpack based on the sleeping bag and hiking boots she purchased.

Data mining consists of five major elements:

- Extract, transform, and load transactional data into a data warehouse system.
- Storage and management of data in multidimensional database systems.
- Provide data access for business analysts and IT professionals.
- Analyze the data with the application software.

**Different levels of analysis are available:**

- **Artificial neural networks:** Non-linear predictive models that learn through training and are structurally to biological neural networks.
- **Genetic algorithms:** Optimization techniques that use process such as genetic combination, mutation, and natural selection in a design based on the concepts of nature evolution.
- **Decision Tree:** A tree-like structure that represents a series of decisions. These decisions generate rules for classifying records. Specific decision tree techniques include classification and regression trees (CART) and chi-square automatic interaction detection (CHAID). CART and CHAID are decision tree techniques used to classify data sets. They provide a set of rules that can be applied to new (unclassified) records to predict which records will have a particular outcome. CART creates bifolds to segment the data set, and CHAID uses the chi-square test to create segments and create polyfolds. CART generally requires less data preparation than CHAID.
- **Nearest Neighbor Method:** A technique that classifies each record in a dataset based on the class combination of the k most similar records in the previous dataset (k=1). Sometimes called the k-nearest neighbor method.
- **Rule Induction:** Extract useful if-then rules from your data based on statistical significance.
- **Data Visualization:** Visually interpreting complex relationships in multidimensional data. Graphical tools are used to show data relationships.

## II. LITERATURE REVIEW

### 1. Smart Farm Web Application Using Machine Learning Algorithm.

E-Farming is a web application developed for farmers. The app supports village farmers who want to use the facility and find out how it is possible and how to use e-farming. If farmers have computer knowledge, they can



register directly on the site and sell their products. The project was developed to create a website that uses machine learning algorithms to estimate crops and their prices, and this farm information system provides users and research to get online information on crops, statistics and new trends. It was developed by using the auto regressive integrated moving average (ARIMA), the partial least square (PLS), and the artificial neural networks (ANN) algorithms are used for price prediction. Moreover, for PLS we further execute the reaction surface system (RSM), deriving another methodology RSMPLS, by which the non-direct connection between verifiable costs can be explored.

## 2. Smart Farming using Machine Learning and Data Analytics

Smart farming using machine learning and data analytics' is a POC intended for betterment of farmers and agriculture in India. Mentioned in the report are the exact goals to be fulfilled by this project namely, recommendation of the top n crops based on soil properties and environment factors. The Neural Networks Model (NNM) is used to consider the functionality of non-linear data. The model shows the capability to learn as it follows comparable data processing structure. These techniques provide successful results by applying on many problems like classification, control and prediction like a biological brain. The model is dissimilar to both classification model as well as decision tree due to its factor of likely hood prediction. The neural network has many techniques which has merits and demerits. The decision tree is one of the most prominent predictive models in the machine learning that are used for the churn prediction based on classification.

## 3. Smart Farming Using Machine Learning

This paper focuses on predicting the appropriate crop based on the climatic situations and the yield of the crop based on the historic data by using supervised machine learning algorithms. Smart Farming Prediction Using Machine learning, the review is about using machine learning with various environmental factors like soil, pressure, weather, crop type to predict the maximized profitable crop to grow. The paper mainly focuses on the algorithms used to predict crop yield, crop cost predictions. Crop Prediction on the Region Belts of India: A Naïve Bayes MapReduce Precision Agricultural Model The planned work introduces an efficient degree economical crop recommendation system. From the yield graphs, the simplest time of sowing, plant growth, and gathering of plants.

## 4. Weed Identification Using Deep Learning and Image Processing in Vegetable Plantation.

Weed identification in vegetable plantation is more challenging than crop weed identification due to their random plant spacing. So far, little work has been found on identifying weeds in vegetable plantation. Traditional methods of crop weed identification used to be mainly focused on identifying weed directly; however, there is a large variation in weed species. This paper proposes a new method in a contrary way, which combines deep learning and image processing technology. Firstly, a trained Center Net model was used to detect vegetables and draw bounding boxes around them. Afterwards, the remaining green objects falling out of bounding boxes were considered as weeds.

## 5. Precision agriculture using IOT data analytics and machine learning

The emanation of the technologies based on Internet of Things (IOT) has reformed nearly each industry like smart city, smart health, smart grid, smart home, including "smart agriculture or precision agriculture". Applying machine learning using the IOT data analytics in agricultural sector will rise new benefits to increase the quantity and quality of production from the crop fields to meet the increasing food demand. Such world-shattering advancements are rocking the current agrarian approaches and generating novel and best chances besides a number of limitations. This paper climaxes the power and capability of computing techniques including internet of things, wireless sensor networks, data analytics and machine learning in agriculture. The paper proposed the prediction model of Apple disease in the apple orchards of Kashmir valley using data analytics and Machine learning in IOT system. Furthermore, a local survey was conducted to know from the farmers about the trending technologies and their effect in precision agriculture. Finally, the paper discusses the challenges faced when incorporating these technologies in the traditional farming approaches.





S.NO	TITLE	ALGORITHM	ACCURACY
1.	Smart Farm Web Application Using Machine Learning Algorithm.	Artificial neural networks (ANN)	70.272727
2.	Smart Farming using Machine Learning and Data Analytics	Neural Networks Model (NNM)	65.909091
3.	Smart Farming Using Machine Learning	Naïve Bayes	72.181818
4.	Weed Identification Using Deep Learning and Image Processing in Vegetable Plantation.	Center Net	77.545455
5.	Precision agriculture using IOT data analytics and machine learning	K-nearest neighbor	69.454545

The above given table display the accuracy of predictions algorithm .when compared this proposed algorithm given accuracy more than 80%.

### III. SYSTEM ANALYSIS

#### EXISTING SYSTEM

With the help of technology, Precise Farming reduces manual work and increases productivity. In recent years, farmers have been facing various challenges such as poor harvests due to decreased rainfall and soil failures. As the environment is changing, the proposed work will help us discover how to manage our plants and crops in a smart way. Lead people to smart farming. The goal of this work is to enable individuals to grow crops efficiently and achieve high productivity at low cost. It also helps predict the total cost of growth. It helps individuals plan pre-cultivation activities in advance, resulting in an integrated solution in agriculture.

#### DRAWBACKS

- Lack of knowledge.
- Data collection and analysis issue.
- Report generation and prediction is not effective one.

#### PROPOSED SYSTEM

Machine learning makes agricultural applications very efficient and easy. Data acquisition, model building, and generalization are his three phases of the machine learning process. Most of the time, machine learning algorithms are used to solve complex problems when human capabilities are insufficient. Machine learning can be used in agriculture to predict soil diseases and weeds, and identify species. The proposed system uses efficient algorithms to develop crop yield forecasts and suggest the amount of fertilizer that should be used to obtain adequate crop yields. The challenge here is to create an efficient model for predicting the most efficient model for predicting crop yield. So



try different algorithms, compare them all, see which one has less error and less loss, then choose that model and predict the yield for that particular crop. The proposed system was developed by predicting yield using two algorithms. The proposed system uses random forest and back propagation methods to predict harvest outcomes.

#### IV. METHODOLOGY

##### Data Collection

This is the first real step towards actually developing a machine learning model, that collects data. This is an important step that affects how good the model gets as the data gets more data. Our model works fine. There are several techniques for collecting data, including web scraping and manual intervention. The dataset contains agricultural prices and database. The main part is a prediction engine that predicts future prices. There is a web interface showing forecast prices of various selected crops used in daily life such as wheat, rice, paddy.

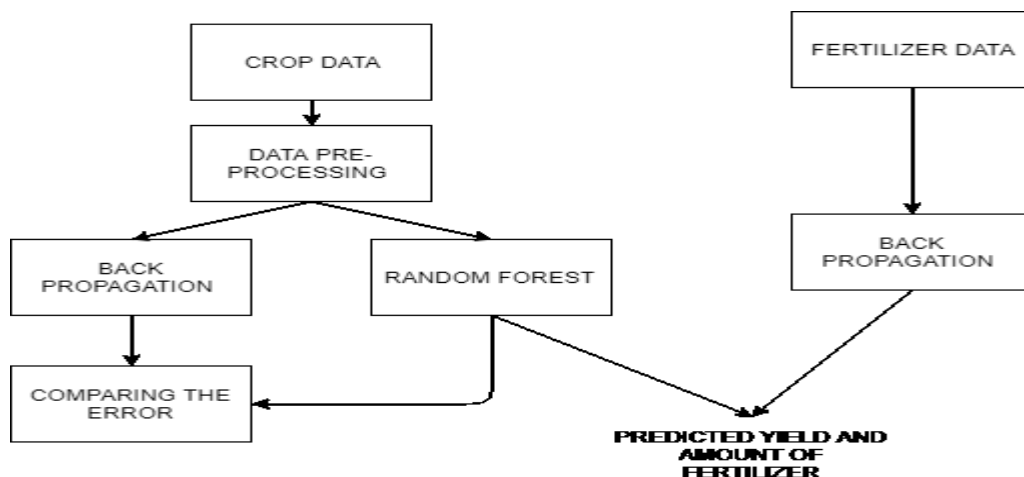
##### Training and Testing Data

Historical crop price data set is from Indian Ministry of Agriculture online site State prices are collected monthly from this page and formulated into datasets according to different states so farmers and agribusiness professional can see crop price projections according to state.

##### Prediction:

Built using the proposed algorithm, it predicts prices after a user-specified months. The previous and predicted price charts are generated by the and are line charts with price and time as axes. Using this chart, farmers and agribusiness workers can easily understand price trends and visually predict whether prices will increase or stay the same. . Using this web interface and his graphics, an agricultural professional can tell a farmer what to sow and get a better ROI for her. This can be achieved by building Farming Centers in each village.

#### V. ARCHITECTURE DIAGRAM



#### V. CONCLUSION

Yield forecasting and efficient use of fertilizer are predicted well and efficient algorithms are also discovered from the algorithms to give the most efficient output of yield. In the future, we will develop a web application based on this idea to make it easier for users to use it and help them understand the yield of crops that are harvested this season.



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