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Original Research Paper

“AGROPREDICT: INTELLIGENT CROP YIELD FORECASTING USING MACHINE LEARNING”

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ABSTRACT

Agriculture is the field which plays an important role in improving our countries economy. Agriculture is the one which gave birth to civilization. India is an agrarian country and its economy largely based upon crop productivity. Hence we can say that agriculture can be backbone of all business in our country. Selecting of every crop is very important in the agriculture planning. The selection of crops will depend upon the different parameters such as market price, production rate and the different government policies. Many changes are required in the agriculture field to improve changes in our Indian economy. We can improve agriculture by using machine learning techniques which are applied easily on farming sector. Along with all advances in the machines and technologies used in farming, useful and accurate information about different matters also plays a significant role in it. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production.

Keywords: Agriculture, Crop Yield Prediction, Machine Learning, Crop Selection, Productivity, Indian Economy, Farming Technology



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I. INTRODUCTION

The main goal of agricultural planning is to achieve maximum yield rate of crops by using limited number of land resources. Many machine learning algorithms can help in improving the production of crop yield rate. Whenever there is loss in unfavourable conditions we can apply crop selecting method and reduce the losses. And it can be used to gain crop yield rate in favourable conditions. This maximising of yield rate helps in improving countries economy. We have some of the factors that influence the crop yield rate. They are seed quality and crop selection. We need test the quality of the seeds before sowing. As we know that good quality of seeds helps in getting more yield rate. And selection of crops depends upon two things that is favourable and unfavourable conditions. This can also be improved by using hybridization methods. Many researches are carried out to improve agricultural planning. The goal is to get the maximum yield of crops. Many classification methods are also applied to get maximum yield of crops. Machine learning techniques can be used to improve the yield rate of crops. The method of crop selection is applied to improve crop production. The production of crops may depend on geographical conditions of the region like river ground, hill areas or the depth areas. Weather conditions like humidity, rainfall, temperature, cloud. Soil type may be clay, sandy, saline or peaty. Soil composition can be copper, potassium, phosphate, nitrogen, manganese, iron, calcium, ph value or carbon and different methods of harvesting. Many parameters are used for different crops to do different predictions. These prediction models can be studied by using researches. These predictions are classified as two types. One is traditional statistic method and other is machine learning techniques. Traditional method helps in predicting single sample spaces. And machine learning methods helps in predicting multiple predictions. We need not to consider the structure of data models in traditional method where as we need to consider the structure of data models in machine learning methods.



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II. LITERATURE SURVEY (WITH EXISTING METHODS)

Many researchers have applied machine learning techniques to improve crop yield prediction. Earlier methods used statistical models like linear regression, which had limited accuracy. Modern approaches use algorithms such as Random Forest, SVM, KNN, and ANN to analyze factors like soil, weather, and crop data. Random Forest is widely preferred due to its high accuracy. Some systems focus only on weather or soil data, while recent models combine multiple parameters. However, many existing methods are costly, complex, or lack real-time adaptability.



III. EXISTING SYSTEM

The existing systems mainly rely on traditional farming knowledge and basic prediction models.

- Farmers depend on experience and past practices
- Statistical models provide limited accuracy
- Weather-based systems ignore soil conditions
- Basic ML models use fewer parameters

Limitations:

- Low accuracy
- No real-time data
- Limited factors considered
- Not user-friendly

IV. PROPOSED METHOD

The proposed system uses machine learning to predict crop yield and recommend suitable crops.

Steps:

1. Data collection (soil, weather, crop data)
2. Data preprocessing (cleaning and normalization)
3. Feature selection
4. Model training using algorithms like Random Forest, SVM, KNN
5. Prediction of crop and yield



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Advantages:

- High accuracy
- Uses multiple parameters
- Easy to use
- Helps farmers make better decisions

V. IMPLEMENTATION

The implementation of the Crop Yield Prediction system is carried out using machine learning techniques to analyze agricultural data and provide accurate predictions. The system is developed using programming languages such as Python along with libraries like Pandas, NumPy, Scikit-learn, and Matplotlib. The first step involves **data collection**, where datasets containing information about soil type, rainfall, temperature, humidity, and crop yield are gathered from reliable agricultural sources. The collected data is then **preprocessed** by handling missing values, removing duplicates, and normalizing the data to improve model performance.

Next, **feature selection** is performed to identify important factors affecting crop yield such as rainfall, temperature, and soil nutrients. These features are then used as input for training machine learning models. The dataset is divided into **training and testing sets**. Various machine learning algorithms such as Random Forest, Support Vector Machine (SVM), Logistic Regression, and K-Nearest Neighbors (KNN) are applied to train the model.

VI. ALGORITHMS



1. Random Forest Algorithm

Random Forest is an ensemble learning technique that uses multiple decision trees to improve prediction accuracy. It handles large datasets efficiently and reduces overfitting. It is widely used for crop prediction due to its high accuracy.

2. Support Vector Machine (SVM)

SVM is used for classification and regression tasks. It works by finding the optimal hyperplane that separates data points into different classes. It is effective in handling high-dimensional data.

3. Logistic Regression

Logistic Regression is used for classification problems. It predicts the probability of a categorical outcome, such as selecting the best crop based on input parameters.

4. K-Nearest Neighbors (KNN)

KNN is a simple algorithm that classifies data based on the nearest neighbors. It is useful for predicting crop types based on similarity with existing data.

5. Decision Tree

Decision Tree is a tree-structured algorithm where decisions are made based on conditions. It is easy to understand and interpret, making it useful for agricultural applications.

VII. SYSTEM DESIGN



1. Input Module

This module collects user inputs such as:

- Soil type
- Temperature
- Rainfall
- Humidity
- pH value

2. Data Processing Module

This module processes the input data by:

- Cleaning and normalization
- Feature extraction
- Data transformation

3. Machine Learning Module

This module applies trained algorithms to:

- Analyze input data
- Predict crop yield
- Suggest suitable crops

4. Output Module

The output module displays:

- Predicted crop yield



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- Recommended crop
- Accuracy of prediction

5. System Architecture (Flow)

1. Data Collection
2. Data Preprocessing
3. Model Training
4. Model Testing
5. Prediction
6. Output Display

SYSTEM DESIGN IMAGES

Above images can be used to train CNN.

SCREEN SHOTS

Home page



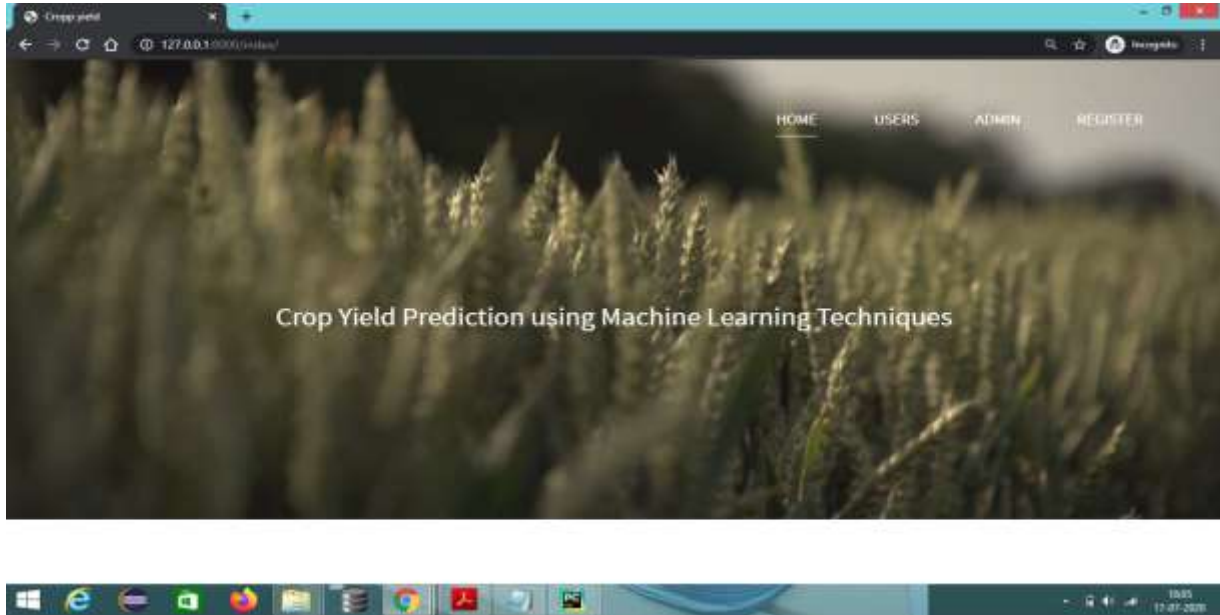
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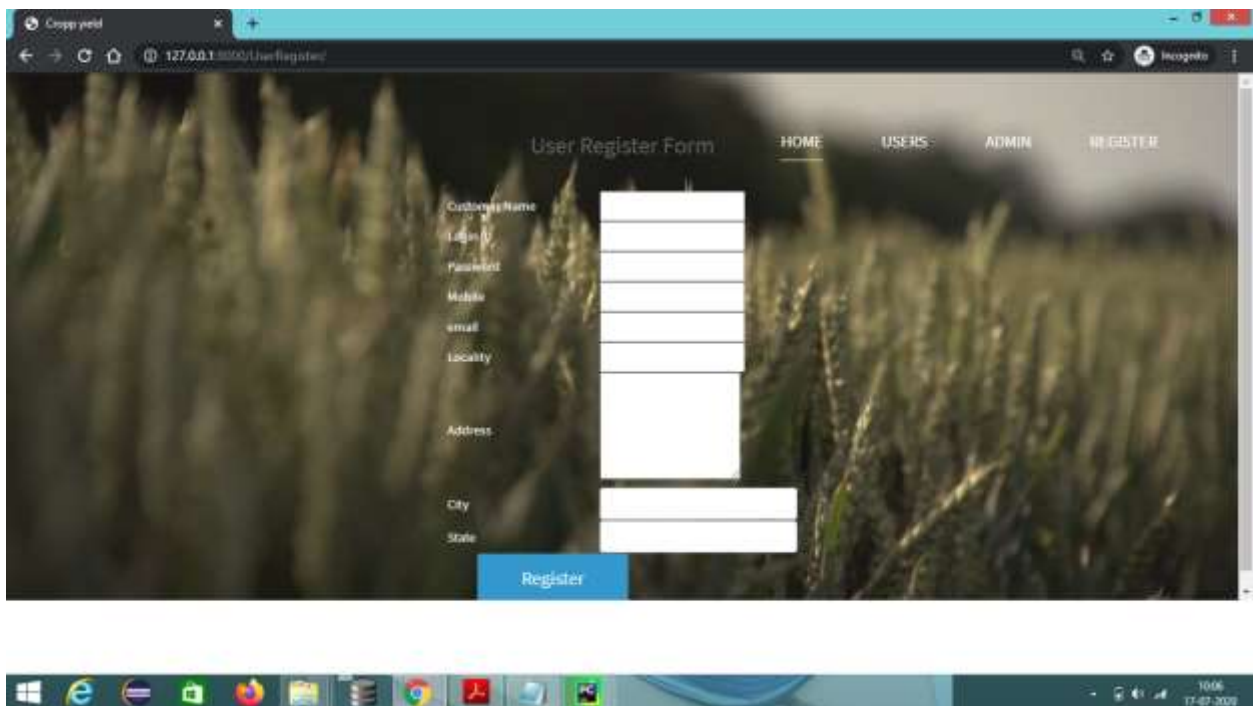
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User Registration:





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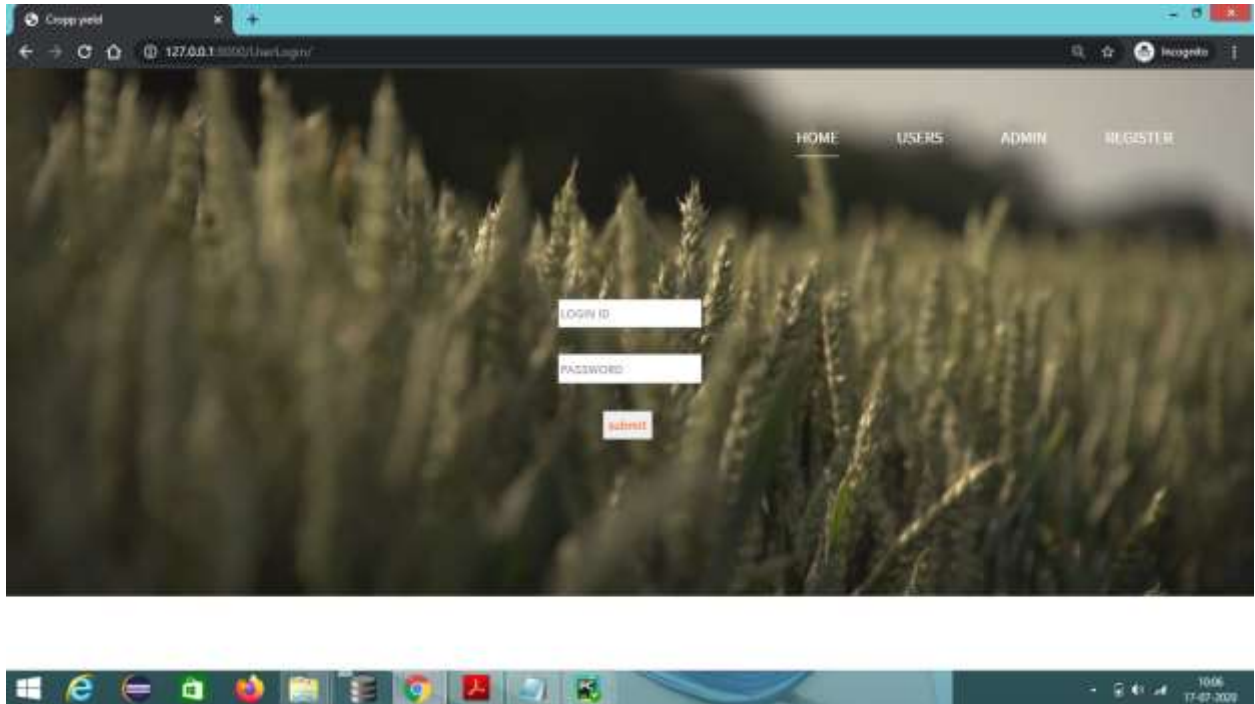
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User login:



User Home



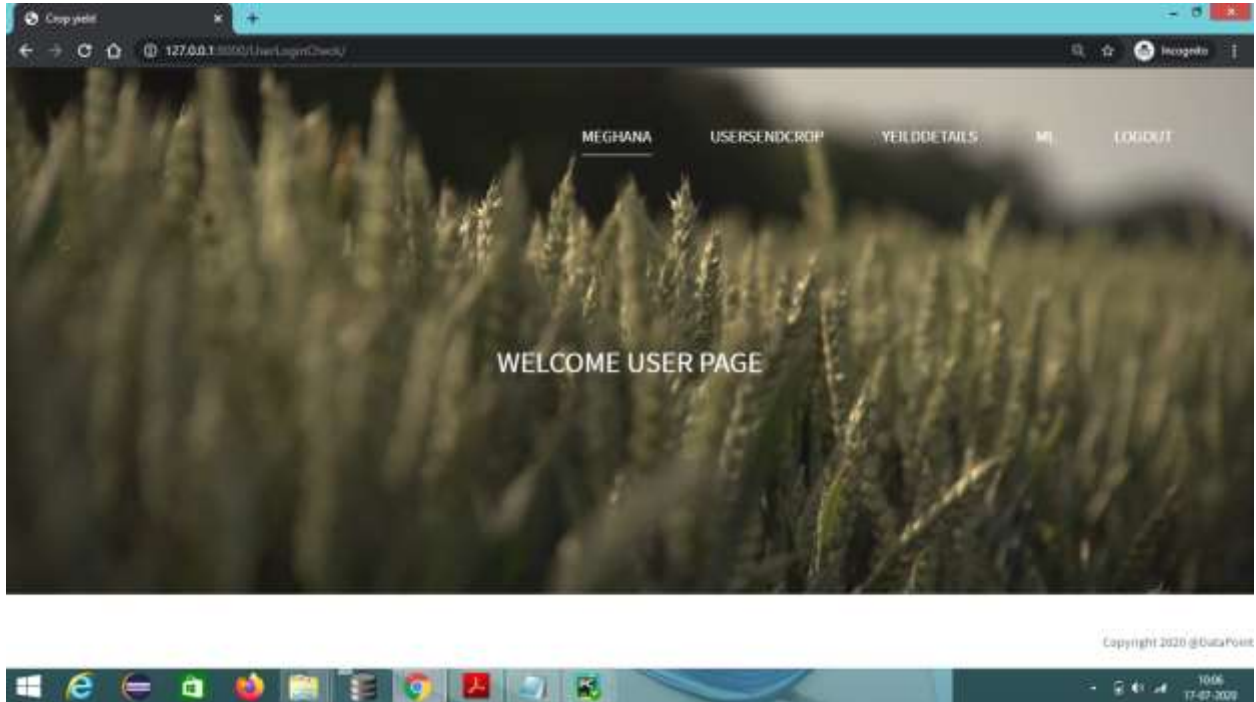
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User SendCrops:



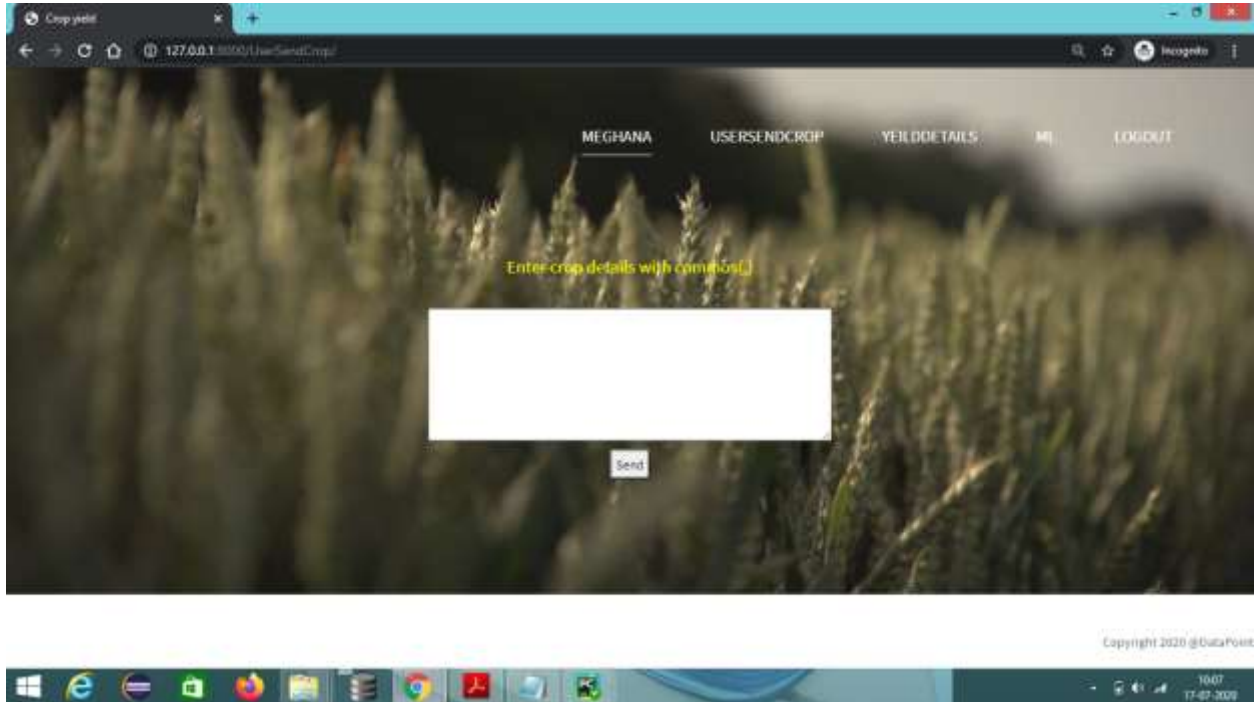
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Yield data:



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S.No	Login ID	Email	cropdetails	yields
1	Meghana	meghana.datapoint@gmail.com	Rice,wetore,kharif	3,789

Copyright 2020 @DataPoint

ML:



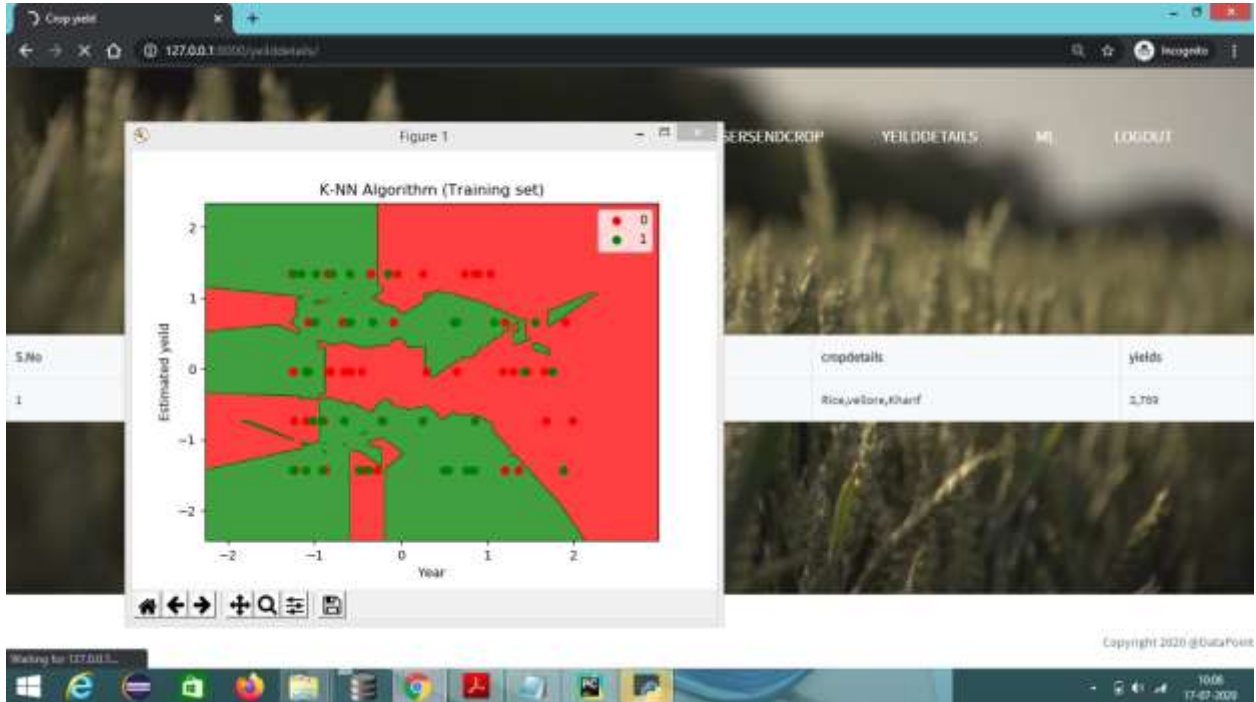
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Admin Login:



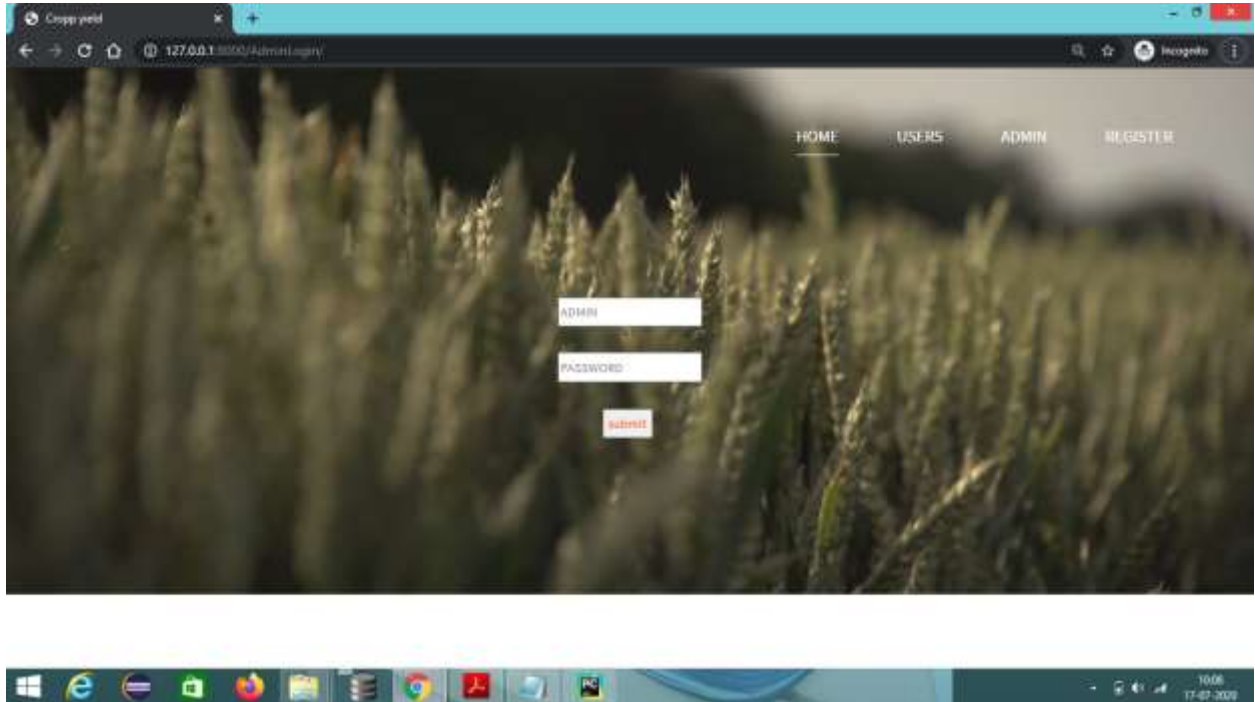
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Admin Home:



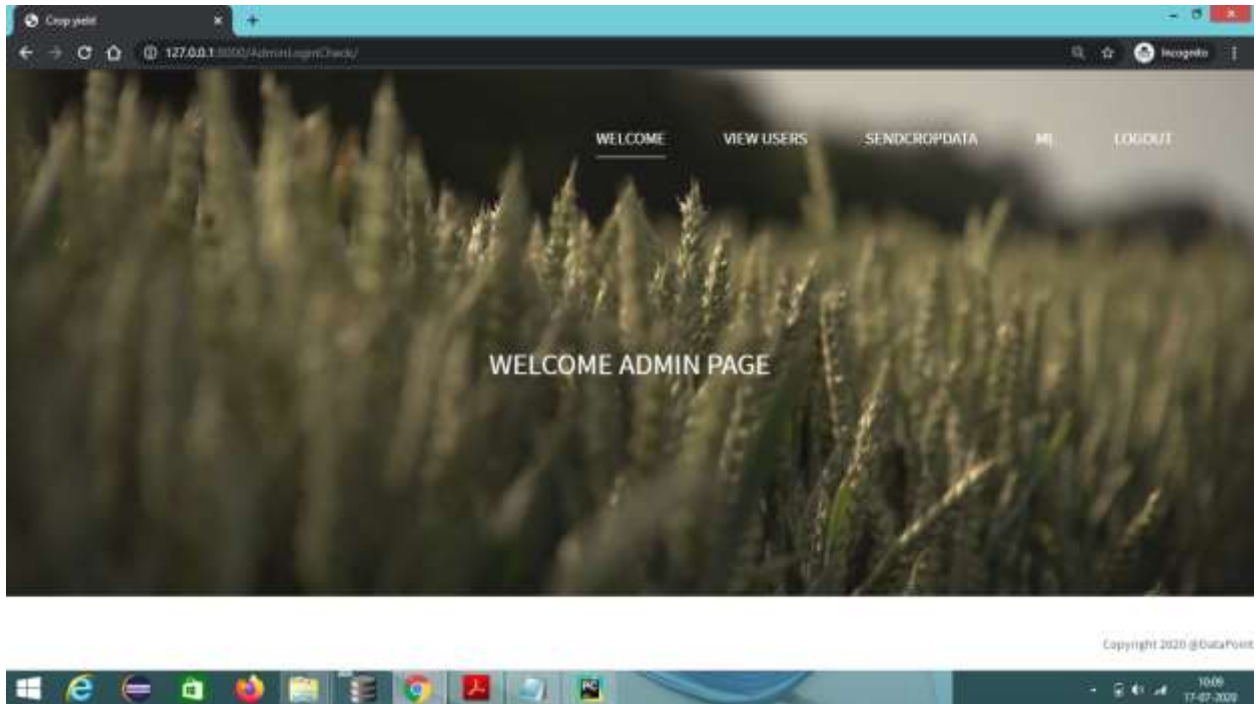
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View Users:



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S.No	Name	Login ID	Mobile	Email	Locality	Status	Activate
1	Meghana	Meghana	9632587412	meghana.datapoint@gmail.com	Vijayuru	activated	Activated
2	Nandana	Nandana	9874563214	nandu@gmail.com	Njayawada	activated	Activated

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Send Cropdata:



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The screenshot shows a web browser window displaying an administrative interface for crop yield management. The page title is "Admin View crop yield details Page". The interface includes a navigation bar with links for "WELCOME", "VIEW USERS", "SEND CROP DATA", "MI", and "LOGOUT". Below the navigation bar is a table with the following columns: S.No, Login ID, Email, cropdetails, yields, status, and Activate. The table contains 8 rows of data. At the bottom right of the page, there is a copyright notice: "Copyright 2020 @DataPoint".

S.No	Login ID	Email	cropdetails	yields	status	Activate
1	Meghana	meghana.datapoint@gmail.com	Rice,tamilnadu,Kharif	76.81	wating	send
2	Meghana	meghana.datapoint@gmail.com	Wheat,uttarpradesh,Rabi	118.20	wating	send
3	Meghana	meghana.datapoint@gmail.com	Wheat,uttarpradesh,Rabi	220.20	wating	send
4	Meghana	meghana.datapoint@gmail.com	Wheat,uttarakhand,Rabi	882	wating	send
5	Nandana	nandu@gmail.com	Wheat,haryana,Rabi	25.88	wating	send
6	Nandana	nandu@gmail.com	Wheat,haryana,Rabi	113.00	wating	send
7	Meghana	meghana.datapoint@gmail.com	Rice,haryana,Kharif	25.88	wating	send
8	Meghana	meghana.datapoint@gmail.com	Rice,vellore,Kharif	1,779	sent	Sent

ML:



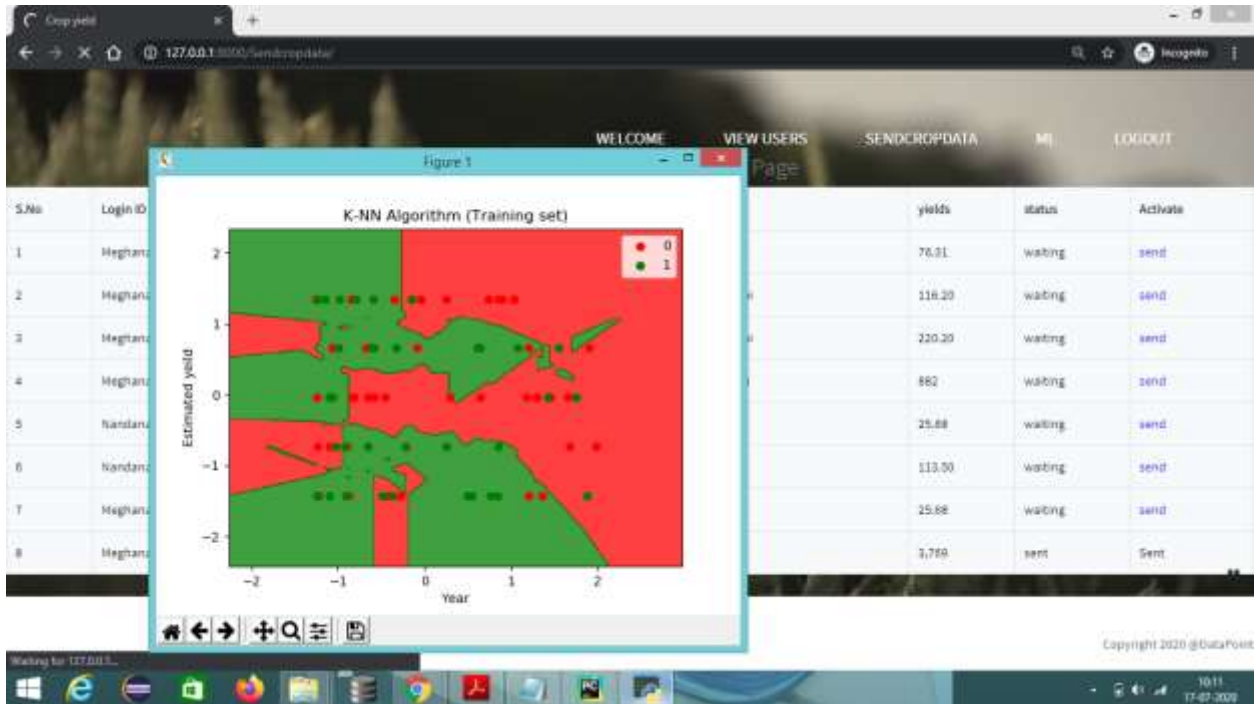
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Accuracy:



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VIII. CONCLUSION

Agriculture is the field which helps in economic growth of our country. But this is lacking behind in using new technologies of machine learning. Hence our farmers should know all the new technologies of machine learning and other new techniques. These techniques help in getting maximum yield of crops. Many techniques of machine learning are applied on agriculture to improve yield rate of crops. These techniques also help in solving problems of agriculture. We can also get the accuracy of yield by checking for different methods. Hence we can improve the performance by checking the accuracy between different crops. Sensor technologies are implemented in many farming sectors. This paper helps in getting maximum yield rate of the crops. Also helps in selecting



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proper crop for their selected land and selected season. These techniques will solve the problems of farmers in agriculture field. This will help in improving the economic growth of our country.

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18. Google Scholar: