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Smart Farm Web Application Using Machine Learning Algorithm

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Abstract: ***In India and other countries, the situation of small landowners is getting worse. Providing confidential support helps them to better utilize their field and get better creativity and benefits. Its primary motivation is to reach out to farmers and disseminate relevant and timely information to them. "The idea of reducing arbitration costs". The platform aims to see the accuracy and temptation of intermediaries by launching the deal, where e-commerce activity in recent decades has seen consumers switch their purchases from the virtual market to the Internet market. Agriculture is a manual process. The integration of any kind of robotization through machine learning methods is in the adoption stage. A comparison study between machine learning algorithms is done to see if this is the most accurate algorithm for estimating the best yields of a particular land, and in addition this website guides farmers to find new agricultural paths, compare the current market rate for various materials, and sell wholesale and net profit.***

1. Introduction

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. In recent years, agriculture and the agribusiness have become more complex and challenging, as large amounts of agricultural data are coming up with modern technologies. Therefore, developing good services for retrieving and analyzing this data becomes an important issue in data science. The information system includes information retrieval facilities for consumers from anywhere in the form of fertilizers, research institutes and research, diseases, related soil crops for relevant crops, statistical information about exports and so on.

2. Literature Survey

There are a few projects going on around the world. The different innovations just engage the requirements of huge homestead holders however little land holders are overlooked who are in reality the genuine makers of nourishment that we eat. In the event that we talk about India, a few projects are going on in the field of harvesting the executives, pesticide use, land the executives and so forth.

Mansi Shinde [1] et al. proposes a framework for foreseeing reasonable crops dependent on NPK values of soil4. The framework gives the warning utilizing SMS administration which incorporates the suggested crop.

Moet al. [2] proposed a procedure-based crop growth model for some reasons. Their model is utilized to foresee water use proficiency, water utilization and crop yield. They utilized remotely detected information relating to North China Plain.

Kastens et al. [3] utilized remote sensing images for crop yield prediction. For crop yield prediction soil types play an important role. The soil data can be gotten by obtaining the weather detail of earlier years into the record.

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) [4], deriving another methodology RSMPLS, by which the non-direct connection between verifiable costs can be explored.

3. Proposed System

In India and other countries, the situation of small landowners is getting worse. Providing confidential support helps them to better utilize their field and get better creativity and benefits. Its primary motivation is to reach out to farmers and disseminate relevant and timely information to them. "The idea of reducing arbitration costs". The platform aims to see the accuracy and temptation of intermediaries by launching the deal, where e-commerce activity in recent decades has seen consumers switch their purchases from the virtual market to the Internet market. Agriculture is a manual process. The integration of any kind of robotization through machine learning methods is in the adoption stage. A comparison study between machine learning algorithms is done to see if this is the most accurate algorithm for estimating the best yields of a particular land, and in addition this website guides farmers to find new agricultural paths, compare the current market rate for various materials, and sell wholesale and net profit.

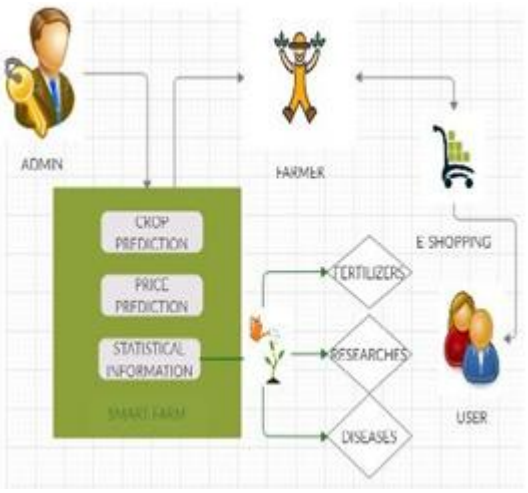

Figure 1: Proposed Architecture

4. Methodology

The primary point of this module is to provide all the detailed functionalities related to Farming Product. This Farming Product Module is a significant module right now in the E-Farming Management System which has been developed on PHP and MySQL.

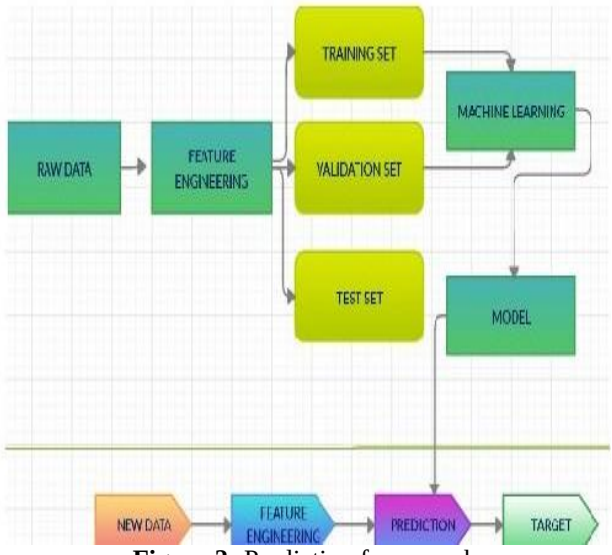

Figure 2: Prediction framework

a) Regression Analysis

Regression analysis is used to analyze and determine the connection between the response variable and the explanatory variable. The variables considered for the present analysis are Annual Rainfall (AR), Area Under Cultivation (AUC), Food Price Index (FPI). Crop yield is a dependent variable that depends on these e-environmental factors.

b) Linear regression

Linear regression algorithms show the relationship between 2 variables and how a change in the effect of one variable is another. The algorithm has the effect of changing the dependent variable on the dependent variable. Independent variables are referred to as explanatory variables because they describe factors that influence the dependent variable. The dependent variable is often referred to as the interest or ict attendance factor.

```
    # number of observations/points
    n = np.size(x)
    # mean of x and y vector
    m_x, m_y = np.mean(x), np.mean(y)
    # calculating cross-deviation and deviation about x
    SS_xy = np.sum(y*x) - n*m_y*m_x
    SS_xx = np.sum(x*x) - n*m_x*m_x
    # calculating regression coefficients
    b_1 = SS_xy / SS_xx
    b_0 = m_y - b_1*m_x
    return(b_0, b_1)
def plot_regression_line(x, y, b):
    # plotting the actual points as scatter plot
    plt.scatter(x, y, color = "m",marker = "o", s = 30)
    # predicted response vector
    y_pred = b[0] + b[1]*x
    # plotting the regression line
    plt.plot(x, y_pred, color = "g")
    # putting labels
    plt.xlabel('x')
    plt.ylabel('y')
```

Advantages of Linear Regression Algorithm

- This is one of the most understandable machine learning algorithms, making it easy to explain to others.
- Minimum it requires minimal tuning so it is easy to use.
- It is the most used machine learning technique and it runs fast.

c) Classification Analysis

Classification is a kind of supervised training. It refers to the category of information blocks and is best used when the crop has limited and varied characteristics. This is the class for the input variable.

d) Naive Bayes

We are often interested in selecting the data (d) provided by the best theory (H) in machine learning .In a classification problem, our theory (H) may be the class that assigns the new data example (D). One of the easiest ways to choose the hypothesis for the most part is to provide us with data that can be used as our prior knowledge of the problem. Bayes theory provides a way to estimate the probability of a given inference.

The Bayes theory states:
P (h | d) = (P (d | h) * P (h)) / P (d)
Where
P (h | d) is the probability of being given the data. This is called the posterior probability.

The theory of d is correct because P (d | h) is the probability of data d.

P (h) is true of the concept of h (regardless of the data). This is called the predictability of h.

P (d) is the probability of the data (regardless of the hypothesis).

```
from sklearn.datasets import price.csv
price=price.csv()

# store the feature matrix (X) and response vector (y)
X = price.data
y = price.target

# splitting X and y into training and testing sets
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4, random_state=1)

# training the model on training set
from sklearn.naive_bayes import GaussianNB
gnb = GaussianNB()
gnb.fit(X_train, y_train)

# making predictions on the testing set
y_pred = gnb.predict(X_test)

# comparing actual response values (y_test) with predicted response values (y_pred)
from sklearn import metrics
print("Gaussian Naive Bayes model accuracy(in %):", metrics.accuracy_score(y_test, y_pred)*100)
```

You can see that we want to calculate the posterior probability of P (H | D) from P (H) to P (D) and P (D | H). After calculating the posterior probabilities for the different theories, you can choose the hypothesis of high probability. This is called the maximum likelihood theory, which is theoretically known as the maximal posterior (MAP) hypothesis.

e) Statistical information

The Statistics module contains records with computed statistical values. Each record contains some value, a floating point number that represents the result of statistical criteria. Output will bring UI graphical details. The major informations are the fertilizers, diseases and the researches of the crop and also provides

- *The new tendencies*: It is a technique for farming or new fertilizer developed etc… will be sent to the registered members inside the website as an email.
- *Research Institutes*: In the field of Agriculture Research, Institutions are playing one of the important roles. If the former doesn't get any idea of some diseases or fertilizers they have to get help from research institutes. Research institutes are located in the main area of the city it will not be known to interior area formers. In this module each registered user can know about the location of their area search institutions.
- *Suitable Soil Concentration*: There are many types of soil available in the earth, but when we come to agriculture there are only 4 types of soil that is suitable for agriculture. Any crops can grow in any soil but some crops are suitable for only some specific soil. Every crop has some of their favourite soils which will grow well, that suitable soils will be shown in this module using naïve Bayes algorithm.

5. A Better Solution

An interface designed in such a manner which can help the farmer visualize things and understand properly with simple handling techniques and with full features which can provide accurate data which is required and instructions that are to be kept in mind while growing or managing his land.

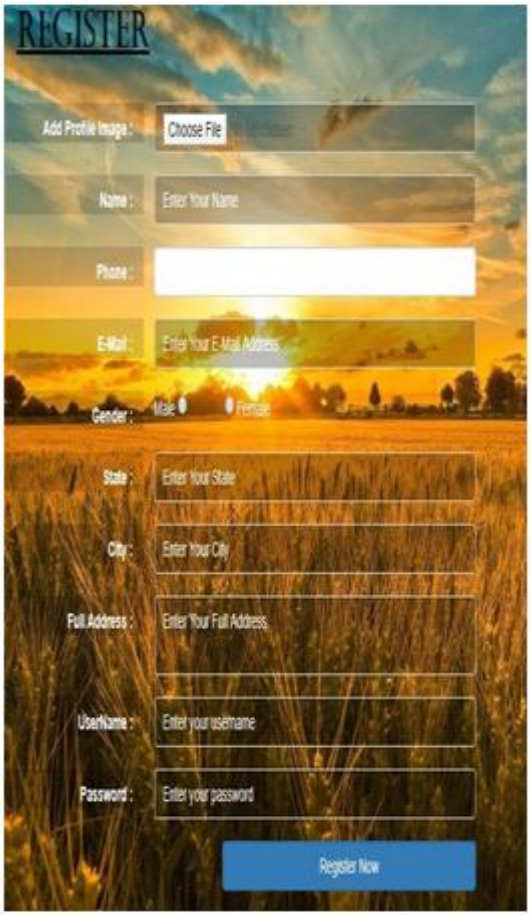

Figure 3: Registration page

6. Result

The goal of the research is to build a user-friendly web application that helps farmers and other policy makers to assess crop yield, price and other statistical information on the crop. A web application called 'smart farm' was developed in this way.

Figure 4: Home page

Figure 5: Result page

7. Conclusion

Using technology to facilitate and improve agriculture: Simplified e-farming support (SEFs) provides farmers with better understanding and knowledge about their property and the variety of crops that can be developed. On this side, farmers have access to global forecasts such as weather forecasting, market rates . This system reduces the gap between illiterate farmers and the current technologies that are being implemented for productive agriculture. As the farmer has a better understanding of his property and acreage and the potential threats to his land and productivity, the farmer can certainly develop more, earn more and live the world longer. Although unknown to farmers, the country will experience great emergencies for years and years to come. The government should focus on small landowners, educate them and save the plant's genetic resources for a better future. The consolidation of the resources and databases that FAO provides can certainly help to better educate the public.

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