Crop Yield Prediction using Machine Learning

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ABSTRACT

In today's world the most important thing for living in the Indian economy is Agriculture. Above 70% of the world's population is likely to be dependent on agriculture. Many crops are cultivated in India, with wheat being one of the most important food grains cultivated and exported by this country. It can thus be seen that wheat is a big part of the Indian agricultural system and the economy of India. Therefore, it is very important to maintain the steady production of the above-stated crop. To handle the segmentation of the system we use the crop predictive model.

Planning for agriculture plays a major role in agro-based countries' economic development and food security. In agricultural planning, the selection of crops is a significant question.

KEYWORDS – Crop recommendation, pre-processing, classifier algorithm, feature extraction, Machine Learning, NLP (Natural Language Processing)

INTRODUCTION

For Predictive Analysis In order to increase productivity and crop production efficiency, agricultural systems are very efficient. Population, however, increases slowly, while the crop production resource declines day by day. Traditionally, farming includes planting the crop or harvesting it according to a predetermined timetable. Precision agriculture requires the collection of real-time weather data, air quality, soil, crop maturity, machinery, labour costs and current data availability. In this digital world we use smarter decision process for solving our problem. Therefore we use a predictive model in the sector of agriculture.

Farmers, through their experience, predict the crop production or yield; however this is also not the correct approach. Oculus observation by consultants is the most adopted method for the prediction and identification of plant or crop yield.

OBJECTIVE:

- The reason for this decline in the agriculture sector is due to the fact that farmers are not empowered and due to lack of application of IT in the farming sector.

- Farmers have inappropriate knowledge about different types of crops and the climatic change.

- We tend to overcome this obstacle by applying machine learning techniques to predict the crop yield and name by considering various factors such as temperature, rainfall, Season and area.

RELATED WORK OR LITERATURE SURVEY

[1] "Machine learning approach for forecasting crop yield based on climatic parameters "

Author: S.Veenadhari, Dr. Bharat Misra, Dr. CD Singh

Climate plays an important role in the field of agriculture. Over this year due to increase in global warming climate has been affected badly and it had a great impact on crops. Predicting the crop yield will tell the farmers what to harvest depending upon the the predictive analysis.

[2] Crop Selection Method to Maximize Crop Yield Rate using Machine Learning Technique

Author: Rakesh Kumar1, M.P. Singh2, Prabhat Kumar 3 and J.P. Singh

Food Security and Economic Growth are one of the important factors in the field of Agriculture across the agro-based countries. Crop Selection is a difficult task for agriculture planning depending on the climate. It depends on various aspects such as climatic conditions, Market price, production rate and Government policy.

[3] Prediction of crop yield and fertilizer recommendation using machine learning algorithms

Author: Devdatta A. Bondre,

 Mr. Santosh Mahagaonkar

Machine learning is an emerging research field in crop yield analysis. Yield prediction is a very important issue in agriculture. Any farmer is interested in knowing how much yield he is about to expect. Over the decades Farmers were predicting the crop based on their experience and overall estimation of a particular crop.

[4] Agro consultant: intelligent crop recommendation system using machine learning algorithms

Author: Zeel Doshi,Subhash Nadkarni

Agriculture is the main backbone of the Indian economy. The Indian population depends either internally or externally on agriculture for their livelihood. Thus, agriculture plays a key role in the country. Many of the farmers believe in harvesting crops by considering some major factors like guessing, seasonal factors and their previous experience.

I. MATHEMATICAL MODELING
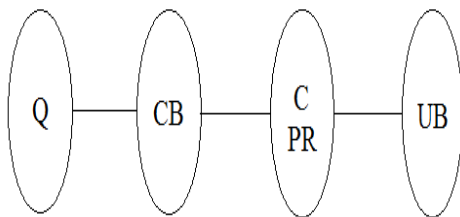
Where,

Q = User entered input

CB = Pre-process

C = Feature selection

PR = Pre-process request evaluation

UB = Predict outcome

Set Theory

1) Let S be as system which input image

S = {In, P, Op, Φ}

2) Identify Input In as

In = {Q}

Where,

Q = User entered input (dataset)

3) Identify Process P as

P = {CB, C, PR}

Where,

CB = Pre-process

C = Feature selection

PR = Pre-process request evaluation

4) Identify Output Op as

Op = {UB}

Where,

UB = Predict outcome

Φ=Failures and Success conditions.

Failures:

1. Huge databases can lead to more time consumption to get the information.

2. Hardware failure.

3. Software failure.

Success:

1. Search the required information available in Datasets.

2. Users get the result very fast by giving their appropriate inputs.

Space Complexity:

The space complexity depends on Presentation and visualization of discovered patterns. More the storage of data, the more the space complexity.

Time Complexity:

Check No. of patterns available in the datasets= n

If the given dataset is greater than one then fetching information can be time consuming. Time complexity of the given algorithm = $O(n^n)$

Above mathematical model is NP-Complete.
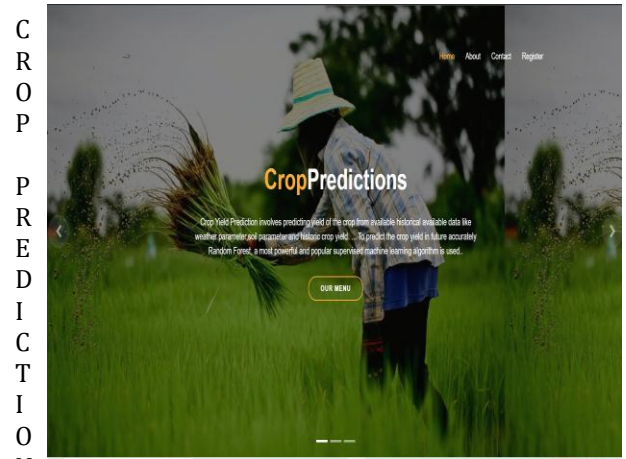
EXISTING SYSTEM AND DISADVANTAGES

In the existing system there is no computerised system to identify the crop recommendation and behaviour analysis. Firstly, it is only suitable for the instance-level approaches that require an instance classifier, As we mentioned before, existing popular approaches with neural networks treat separated instances as inputs, then use a deep neural network to transform them into embedding space.
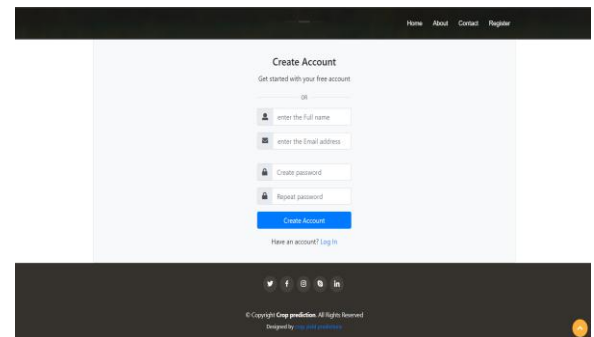
ADVANCED SYSTEM AND ADVANTAGES

The proposed system because environmental variables fluctuate by region, a machine learning model is employed to estimate the optimal crop type for the chosen plot of land. Machine learning techniques are used to pick the best crop to cultivate with the highest likelihood of growing using data from the standard dataset to train the crop suggesting model. The optimal crop type is chosen using XGBoot, Naive Bayes, and Support vector machine methods. It was chosen what type of crops the farmer should cultivate based on this model. Humidity, temperature, soil moisture, pH level, and sunlight are all aspects to consider.
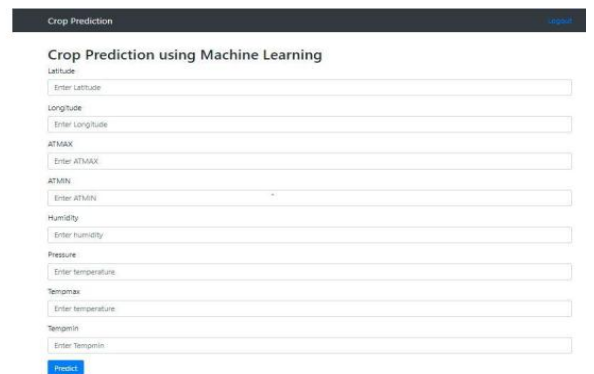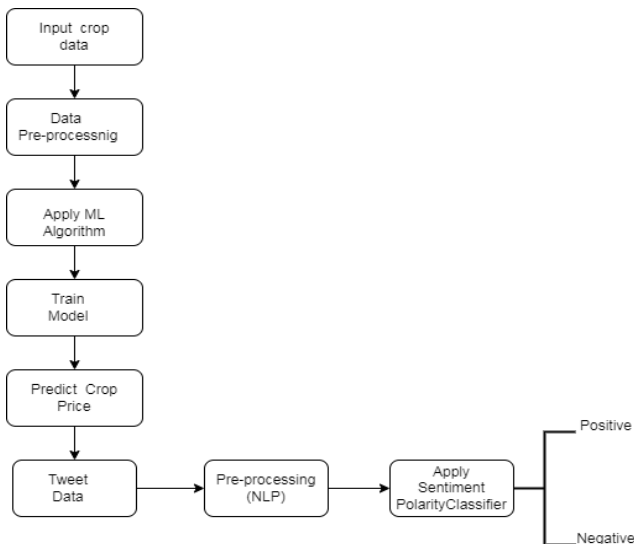

Figure: Advance System Architecture

Advantages:

- Secure and efficient system.
- The advantage of this system in the field of agriculture is that we can select proper crops according to climate, temperature etc.

- As Machine Learning helps us to make predictions using the given data it avoids assumptions and difficulties of using larger sample spaces and complex problems

FRONT-END

CROP PREDICTION (LOGIN)

INPUT

CONCLUSION

According to our report, the scope is still open for the Outcome enhancement. During the research that we carried out, It is noted that the algorithm used for most of the A unified approach is not used by writers where all the variables are involved. It is possible to use the effect on crop yield simultaneously to estimate crop yield. As the dataset is considered to be limited in certain situations, there is also more space for development. The outcome can also be strengthened by using a large dataset

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