Fertilizers Recommendation System For Disease Prediction

Literature Review

[1] Soil Based Fertilizer Recommendation System for Crop Disease Prediction System

Problem Identification

Agriculture is the heart and life of most Indians. But in recent days, the field was going down due to various natural calamities. In order to overcome the problem, various issues in this field need to be addressed. The soil type, fertilizer recommendation, diseases in plants and leaves. All these features need to be considered.

Proposed Solution

The proposed system was organized in such a way, to analyse the soil type, diseases in the leaves and finally to recommend the appropriate fertilizer to the farmers, that may be of great help to them. Plant disease, especially on leaves, is one of the major factors that reduce the yield in both quality and quantity of the food crops. Finding the leaf disease is an important role to preserve agriculture. Smart analysis and Comprehensive prediction model in agriculture helps the farmer to yield right crop at the right time.

Results

In order to carry out the classification process, the data from the soil report was compared with the data stored in the database using Long- or Short-Term Memory algorithm. Finally, the fertilizers are predicted relevant to the soil type.

Merits

The main benefits of the proposed system are as follows: Yield right crop at the right time, Balancing the crop production, control plant disease, Economic growth, and planning to reduce the crop scarcity.

Demerits

The solution was unable to predict the soil nutrient type effectively.

Future Work

The authors proposed a new approach for the soil-based fertilizer prediction system. The proposed system was able to analyse the soil nutrient type efficiently, kind of leaf disease present in the crop and predict the fertilizer in a proficient manner. The approach was flexible, and can be extended to the needs of the users in a better manner. The proposed method was carried out with five different crops. As a future work, the method can be extended to include diverse varieties of crops to be cultivated and to analyse its performance.

[2] Prediction of Crop Yield and Fertilizer Recommendation Using Machine Learning Algorithms

Problem Identification

The works done concentrated on crop prediction using different soil properties and Data Mining Techniques. Fertilizer Recommendation is not taken into consideration. So, it is necessary to develop crop yield prediction and fertilizer recommendation system which predicts crop yield based on soil nutrients crop yield data and recommend fertilizer for selected crop based on different datasets like fertilizer data, location data and crop yield data.

Proposed Solution

The aim of proposed system is to help farmers to cultivate crop for better yield. The crops selected in this work are based on important crops from selected location. The selected crops are Rice, Jowar, Wheat, Soyabean, and Sunflower, Cotton, Sugarcane, Tobacco, Onion, Dry Chili etc. The dataset of crop yield is collected from last 5 years from different sources

Results

The prediction of crop yield based on location and proper implementation of algorithms have proved that the higher crop yield can be achieved. The works implemented that for soil classification Random Forest is good with accuracy 86.35% compared to Support Vector

Machine. For crop yield prediction Support Vector Machine is good with accuracy 99.47% compared to Random Forest algorithm.

Merits

SVM calculation utilizes the portion trap, so you can construct master learning about the issue. Random Forest algorithm is stable if a new data point is introduced in the dataset the overall algorithm is not affected.

Future Work

The work can be extended further to add following functionality. Mobile application can be built to help farmers by uploading image of farms. Crop diseases detection using image processing in which user get pesticides based on disease images. Implement Smart Irrigation System for farms to get higher yield.

[3] Soil Fertilizer Recommendation System using Fuzzy Logic

Problem Identification

Soil nutrients and season have direct impact on the growth and yield of a crop. Deficiency on the nutrient level of the soil may result to plant disease while applying excessive amount of soil fertilizer on the other hand, may also cause negative results to the development of the crop. Nutrients on the soil also changes as the season changes from wet season to dry season.

Proposed Solution

Aims to develop a fuzzy logic-based program that will provide an appropriate amount of fertilizer to soil. The parameters such as season, nitrogen, phosphorus and potassium level are the inputs used on the fuzzy logic system. The researchers proposed four kinds of fertilizer to use in this paper such as Complete, Urea, Solophos and Muriate of Potash. Combination and amount of these fertilizers will be based on the input parameters and fuzzy rules.

Results

The value of the NPK and season is evaluated by the fuzzy system to compute the appropriate amount of fertilizer. The output of the fuzzy logic is used in a simple algorithm to view the results.

Merits

Season, nitrogen, phosphorus and potassium level is used as input parameter of the fuzzy system. Different fertilizer combination is created depending on the range of input parameters used.

Future Work

The researchers would like to make the following recommendations to further improve the research; (1) Used the recommended fertilizer to identify the accuracy of the result and (2) Connect the program to a soil test analyser.

[4] Intelligent insecticide and fertilizer recommendation system based on TPF-CNN for smart farming

Problem Identification

Artificial intelligence and sensor technology play a vital role in the agriculture field. The use of excess insecticides and fertilizers in farming poses a risk to human health. It is necessary to control them to ensure healthy crop production. Many techniques are used to identify the pest, suggest medications, and do soil nutrient analysis techniques separately.

Proposed Solution

This paper applies the dual operator, Transition Probability Function (TPF), and Convolution Neural Network (CNN) to process the pest's image discretely and continuously for applying the recommended insecticide. The proposed system combines two major aspects in farming: pest identification and insecticide recommendation using machine vision

and CNN. Secondly, the soil nutrient analysis uses a soil NPK sensor with the recommendation of fertilizers according to the obtained nutrient values.

Results

The proposed technique uses a 28-layer convolutional neural network. The model was trained for 500 images. While training the model for 5 classes of pests, maximum accuracy was observed as 91%, with epochs at 100, batch size at 32, and learning rate at 0.001. Similarly, for 3 classes of pests 94% accuracy is obtained with a computation time of less than 5 min for both classes. The recommendation of insecticide is made as per the pest detected. The accuracy per epoch generated by the TPF-CNN technique was 91%, and the test loss per epoch was observed at 28.15%. The TPF-CNN network has maximum accuracy (91%) in detecting 5 classes of pests and recommends insecticides accordingly.

Merits

The farmers will be aware of the particular pest and use government-approved insecticides. The time required for soil NPK recommendation is around 60 s which is faster than the laboratory technique, which takes around 24 h for one sample. Also, the cost of testing soil NPK values is reduced.

Demerits

The limitations of this model are it does not save any data on the system or cloud database.

Future Work

In the future, the system can be integrated with more sensors such as pH, temperature, humidity, and moisture sensors for open and indoor farming. Also, this system can be used in online and offline modes. This system can be recommended for farmers, soil testing laboratories, and seed hybridizing companies.

[5] A nutrient recommendation system for soil fertilization based on evolutionary computation

Problem Identification

This paper develops a model that enables efficient exploration of correct usage of nutrients for developing a knowledge-based system for the ICT environment. Develop knowledge is then applied directly to the environment, which recommends balancing soil fertility and crop production. The recommended setting also helps to improve crop yield. The model can optimize nutrient levels with no initial threshold values and extract patterns from the time-series data. The model takes advantage of the genetic algorithm to use the information and recommend optimizing remote environments.

Proposed Solution

Each sensor in the remote area has its set of nutrient levels. The sensor values are stored locally and sent to the database based on intervals (weekly, monthly, yearly). All sensors for each nutrient are collected and merged through the Internet to log the extensive data set of the remote area. The designed algorithm is then applied and optimize for sequence nutrients for decision-making.

Results

The amount of nutrients by the crop and applied to the past ten years has been discussed. The best and maximum values are mentioned. The experiments are carried on Linux mint distro, core i7 processor, and 16 GB RAM. For an improved GA-based model, we set the population size to 100. The maximal generation is set to 100, the neighbourhood exploration is set to 10, and mutation and crossover probability were set to 0.01 and 0.1, respectively. We then used the datasets from 2001 to 2009 and suggested the 2010 nutrient level for cotton, groundnut, maize, and rice.

Merits

After experimentation, the proposed method is found to perform better and produce a higher number of yields. Using the proposed model, crop yield production increased and gave super

ability to decide the right combination of different types of available resources. This will helps farmers and agriculture experts to adopt the method for other crops. The method also improved if a high volume dataset of different crops can be accessible and targets yield values properly indexed with soil type and location.

Demerits

The AI/ML models or multi-objective optimization models can also be considered to solve the limitation of the optimization issue if there is a suitable model to tune the parameters for further implementation efficiently.

Future Work

To optimize the search strategy and individual repair methods to extract valuable parameters. This will help to reduce the computation resources and improve the recommendation to maintain crops for soil fertilization.

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