Fertilizer Recommendation System and Disease Prediction

Abstract:

The major problems that the farmers of our country are currently facing includes Crop Failure, Lack of adequate knowledge, Crop damage due to ignorance/carelessness, Lack of professional assistance, Inaccessibility to agro-tech solutions. CROFED will help the farmers to deal with these problems by providing following aids: Crop Recommendation system, Fertiliser suggestion system, Crop Disease Detection System. We will develop an IOT device that will examine the quality of soil and can also detect crop diseases on scanning the leaves of the crops. Soil testing is significant since it allows for the determination of soil fertility and hence crop prediction. Soil pH is a measure of the acidity and alkalinity in soils. pH levels range from 0 to 14, with 7 being neutral, below 7 acidic and above 7 alkaline. We have proposed a system which will have a device which gives pH value and we will estimate Nitrogen (N), Phosphorus (P) and Potassium (K) from the pH of that soil. We are using Machine Learning classification algorithm to predict suitable crops based on the values we get from our device and we will also provide suitable fertilisers required for that land. We believe this will help the farmers in producing greater yield of crops and crop damage can also be prevented to a larger extent.

Literature Survey:

1. shows a case study related to wireless sensor networks for crop monitoring, growth and measurement of meteorological factors. The paper suggests farmers for application of specific pesticides and insecticides in stressful conditions. There was no focus on soil nutrients, the level of soil fertility and monitoring the crop growth or suggest the crop for the next season in the above proposed paper. The solution to the issues in agriculture trends is proposed in this paper. The study suggests that farmers need to increase the fertility of soil and measure all parameters which are required to grow a crop in healthy condition.
2. data mining algorithms are used on agriculture data. The main criterion for this categorization is that if the pH value is greater than 8.5, the soil is unsuitable for crop cultivation; otherwise, it is. To overcome this problem the proposed system will give necessary suggestion to increase or decrease the pH value of soil
3. the proposed system is related to increase net yield rate of the crop, based on the parameter related to the soil and atmosphere. The model gives the Crop prediction which can be carried out by using the "Bayesian algorithm". Data mining is used to extract the large amount of data from the data set and analyses those data to predict the crop yield and suggest the crop. The limitation of this includes atmospheric prediction is not accurate.
4. In his article, the author proposes a method which helps us predict crop yield by suggesting the best crops. It also focuses on soil types in order to identify which crop should be planted in the field to increase productivity. In terms of crop yield, soil types are vital. By incorporating the weather details of the previous year into the equation, soil information can be obtained. It allows us to predict which crops would be appropriate for a given climate. Using the weather and disease related data sets, the crop quality can also be improved. Prediction algorithms help us to classify the data based on the disease, and data extracted from the classifier is used to predict soil and crop. Due to the changing climatic conditions, accurate results cannot be predicted by this system.
5. Based on fuzzy logic and neural networks & interval-based partition, the author proposed a model which is used currently in rice to predict crop production using a fuzzy time series model. Using this model and comparing it to an existing algorithm, the result was compared to the reduction in AFER and MSE in the prediction.
6. Using previous years' data, the author provides a model to forecast rice production based on information that is correct and robust. To improve prediction accuracy, it uses a fuzzy time series approach based on percentage change, effective length and emphatic computations on time series data
7. Measuring ph using a glass electrode. principles of the glass-electrode method
8. Inherently low soil fertility continues to be a barrier to potato production in kenya, threatening food security. the soil fertility status of smallholder potato farms in nyandarua and meru counties was investigated. 198 farms provided soil and plant tissue samples for analysis of selected nutrients (ph, oc, n, p, k, s, ca, mg, zn, b, and cu). the sufficiency of nutrients for potato growth was determined using critical nutrient levels. soils in the sampled farms were acidic (ph-cacl2 3.9–6.6) with low to high soil organic matter concentration (1.5–97.5 g kg1).
9. The current work examines and describes image processing strategies for identifying plant diseases in numerous plant species. BPNN, SVM, K-means clustering, and SGDM are the most common approaches used to identify plant diseases. Some of the issues in these approaches include the impact of background data on the final picture, optimization of the methodology for a specific plant leaf disease, and automation of the technique for continuous automated monitoring of plant leaf diseases in real-world field circumstances. According to the review, this disease detection technology has a lot of promise and certain drawbacks, including the capacity to identify plant leaf illnesses. As a result, existing research has room for improvement.
10. Deep learning algorithms were used in this study to develop a novel way for automatically categorizing and detecting plant illnesses using leaf pictures. The developed computer could detect the presence of leaves and distinguish between healthy leaves and 13 abnormalities that could be seen visually. In the end, the trained model's overall accuracy was 96.3 percent. Because the suggested approach had not been applied in the field of plant disease detection, there was no comparison with similar findings obtained using the exact process. This study will be expanded to include the development of a whole system composed of server-side components including a trained model and an application for smart mobile devices capable of identifying diseases captured by a smart phone camera. The authors anticipate that by expanding this research, they will have a substantial impact on sustainable development, influencing crop quality for future generations.
11. Plant Leaf Disease Detection and Classification Based on CNN with LVQ Algorithm - Melike Sardogan, Adem Tuncer, Yunus Ozen. Early disease detection is critical in agriculture for efficient crop yield. The diseases bacterial spot, late blight, septoria leaf spot, and yellow curved leaf have an impact on tomato crop quality. Automatic plant disease classification methods also aid in taking action after detecting symptoms of leaf diseases. This paper describes a Convolutional Neural Network (CNN) model and Learning Vector Quantization (LVQ) algorithm-based method for detecting and classifying tomato leaf disease. The dataset contains 500 images of tomato leaves with four disease symptoms. We created a CNN model for automated feature extraction and classification. Colour information is being extensively employed in plant leaf disease research .The filters in our model are applied to three channels depending on RGB components. For training the network, the LVQ was fed the output feature vector of the convolution component. The experimental findings show that the proposed approach accurately detects four forms of tomato leaf diseases.
12. Deep learning models for plant disease detection and diagnosis Konstantinos P.Ferentinos Hellenic Agricultural Organization “Demeter”, Institute of Soil & Water Resources, Dept. of Agricultural Engineering, 61 Dimokratias Av., 13561 Athens, Greece Through deep learning approaches, convolutional neural network models were constructed in this paper to detect and diagnose plant diseases using simple leaf photos of healthy and ill plants. The models were trained using an open collection of 87,848 photos, which contained 25 different plants in 58 separate classes of [plant, illness] pairs, including healthy plants. Several model architectures were trained, with the top performing model achieving a success rate of 99.53 percent in detecting the corresponding [plant, illness] pair (or healthy plant). The model's very high success rate makes it a very useful advising or early warning tool, and it might be expanded to enable an integrated plant disease identification system that operates in real-world production circumstances
13. Plant Disease Detection and Classification using CNN Model with Optimized Activation Function S. Yegneshwar Yadhav; T. Senthilkumar; S. Jayanthy; J. Judeson Antony Kovilpillai This research discusses the application of Convolutional Neural Networks (CNN) algorithms for the optimum real-time detection of diseases that impact the plant and the afflicted area, so that proper fertilisers can be employed to prevent additional harm to plants from pathogenic viruses. The activation function is at the heart of the CNN model since it combines non-linearity to create a true artificial intelligence system for classification. ReLu is one of the best activation functions, however it has the problem that its derivative is 0 for negative values, resulting in neuronal necrosis.To increase the accuracy and performance of the system using a TensorFlow two fully connected dense layers and the sigmoid function. The model was trained using a 3663 picture dataset of apple and tomato leaves, resulting in an accuracy of 87 percent. With the dropout value adjusted to 0.2, the overfitting problem is discovered and removed. The model is also run on GPU Tesla to evaluate its speed and accuracy because it permits parallel processing. As a result, the report inspires researchers to design an integrated plant disease identification system that delivers accurate results in real time
14. Transfer Learning Based Plant Diseases Detection Using ResNet50 Plant diseases are a principal threat to the safety of food. In agriculture sectors, it is the greatest challenge to identify plant diseases. The state-of-the-art Convolutional Neural Network (CNN) gives excellent results to solve image classification tasks in computer vision. Transfer Learning enables us to develop a deep CNN network in a most cost effective way. In this work, a Transfer Learning based CNN model was developed for the identification of plant diseases precisely. The dataset, we have used is consists of 70295 training images and 17572 validation images holding 38 different classes of plant leaves images. We have focused mainly on ResNet50 network, a popular CNN architecture as our pre-trained model in Transfer Learning. Additionally, several Transfer Learning architectures were experimented with few other popular pre-trained models (VGG16, VGG19, AlexNet) and compared with the proposed model. The proposed model has given the best performance of 99.80 % training accuracy
15. Disease Detection and Classification in Agricultural Plants Using Convolutional Neural Networks — A Visual Understanding Mercelin Francis Dept. of Computer Science & Engineering, Thiagarajar College of Engineering, Madurai, India; C. Deisy All deep learning models start with a convolutional neural network. As a result, a Convolutional Neural Network model was designed and developed to identify and classify plant diseases using photos of healthy and diseased apple and tomato leaves. Each convolutional layer is followed by a pooling layer in the model. The presence of disease is determined using two fully connected dense layers and the sigmoid function. The model was trained using a 3663 picture dataset of apple and tomato leaves, resulting in an accuracy of 87 percent. With the dropout value adjusted to 0.2, the overfitting problem is discovered and removed. The model is also run on GPU Tesla to evaluate its speed and accuracy because it permits parallel processing. As a result, the report inspires researchers to design an integrated plant disease identification system that delivers accurate results in real time.