



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 4, April 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.165



9940 572 462



6381 907 438



ijircce@gmail.com



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Crop Prediction and Disease Detection Using Machine Learning

Priyanka Bhosale¹, Arati Zanjad², Kiran Munde³, Pradnya Londhe⁴, Prof. Ketaki Katre⁵

Department of Information Technology, Genba Sopanrao Moze College of Engineering, Balewadi, Pune, India

ABSTRACT: Soils are complex mixtures of minerals, water, air, organic matter, and countless organisms that are the decaying remains of once-living things. Soil serves as the media for the extension of all the kinds of the plants. We can say that the soils are essential ingredients of the agricultures. There are several types of soils and each type of soils can have different kinds of features and different kinds of crops grow on different types of soils. We must know which type of soil is better in our soil. We can apply machine learning techniques to compartment soil and to predict the crop suitable but there are lots of leaf diseases. Our system predicts the Leaf disease by using image processing. The automatic detection of plant leaf diseases is highly preferred in the field of agricultural information. Deep Learning is a hot research topic in pattern recognitions and machine learning at present, it can successfully solve these problems in vegetable pathology. In this study, we propose a new leaf diseases detection method based on the convolutional neural networks (CNNs) techniques. Using a dataset of the 260 native image of disease and healthy leaves captured from an experimental field. To improve the detection accuracy of leaf diseases and decrease the numbers of network parameters, a CNN model based on deep learning is proposed for leaf disease detection.

KEYWORDS : Soil series, Land type, Chemical feature, Geographical attribute, machine learning, CNN.

I. INTRODUCTION

There are so many soil series and leaf diseases available in India. Every soil series has different features and every soil is suitable for different crops. Sometimes or we can say every time it happens that farmer soil is best for some specific crop but as he doesn't know. The main purpose of the proposed work is to create suitable models for classifying various kinds of the soil series data along with suitable crop suggestions and predict the diseases of leaf also. Series are recognized by the machine learning methods using various chemical features and the possible crops for that a soil series are suggested using geographical attributes. Soil is one of the keys component of agricultural fields for a yield of the crops. Soil classification philosophy follows the existence of knowledge and practical circumstances. On the land surfaces of earth, classification of soil creates a link between soil samples and various kinds of natural entities.

This project presents deep convolutional networks models to achieve fast and accurate automated detection by using different plant leaf disease images. Plant leaf diseases have various symptoms. It may be more difficult for inexperienced farmers to detect diseases than for professional plant pathologists. As a verification system in the diseases detections, an automatic system that is designed to identify crop diseases by the crop's appearance and visual symptoms could be of great help to farmers. Many efforts have been applied to the quick and accurate detections of the leaf disease. By using digital image processing techniques and native networks, we can detect plant leaf disease. Deep learning has made tremendous advances in the past few years. It is now able to extract useful feature representations from a large number of input images. Deep learning provides an opportunity for detectors to identify crop diseases in a timely and accurate manner, which will not only improve the accuracy of plant protection but also expand the scope of computer vision in the field of precision agriculture.

II. MOTIVATION

The key motivation for developing this project is as we say every part of the world is developing but we can see that there is no such big achievement or a development in soil, crop or disease related to issues. So we can give preferences to the soil field and if we suggest suitable crops to farmers then it is beneficial for them.

III. LITERATURE SURVEY

“Soil Classification using a Machine Learning Methods and the Crop proposal Based on Soil Series” [1] In this paper, we have proposed a model that can predict soil series with land types and according to prediction it can suggest suitable crops. Several machine learning algorithms such as weighted k-Nearest Neighbour (k-NN), Bagged Trees, and Gaussian kernel based Support Vector Machines (SVM) are used for soil classification. Experimental results show that the proposed SVM based method performs better than many existing methods.

“Gradient descent with the momentum based on a neural networks by patterns classification for the prediction of soil moisture content in precision agriculture” [2] In this paper we have proposed one expansion technique like Gradient Descent with Momentum is used to train neural network pattern classification Algorithm. The algorithm is tested for the prediction of soil moisture contents in each one hour advancing by considering eleven different soils and the environmental parameters collected during a field test. The prediction error is analysed using MSE, RMSE, and R-squared error.

“Performances of the SVM Classified For a Images Based on the Soil Classification” [3] This paper explains support vector machine based classification of the soil type. Soil classifications include steps like image acquisition, image preprocessing, feature extraction and classifications. The texture features of soil images are extracted using the low pass filter, Gabor filter and using colour quantization technique.

“The Soil Classification Characterization Using a Image Processing” [4] In Rajasthan there are various types of soil available sandy, saline, alkaline, calcareous soil are also present, we can classify the soil by image processing method in which we can see the colour, energy, HSV.

“The Automated Soil Classifications and Identifications Using a Machine Vision” [5] By using an automated system by implementing machine vision,

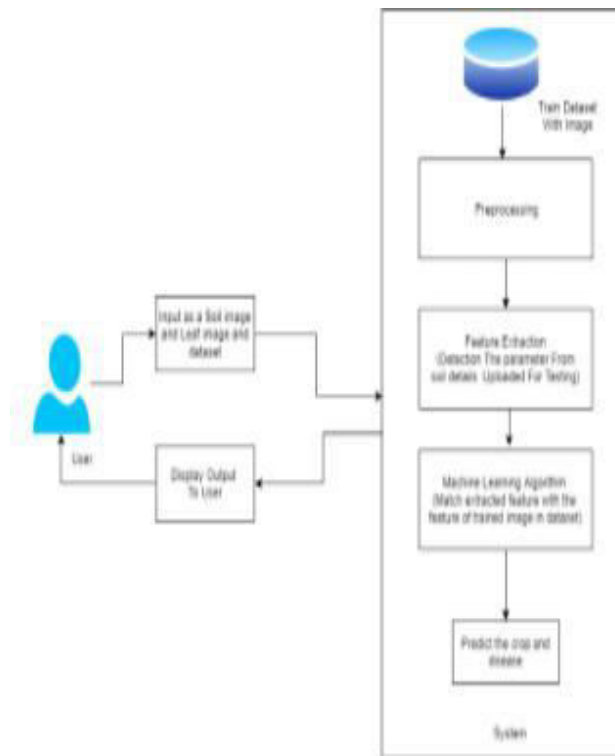
more accurate results can be achieved and test durations can be decreased dramatically.

IV. ALGORITHM

CNN (Convolution Neural Network) :

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assigns importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. CNN are used for image classifications and recognitions because of its high accuracy. The CNN follow the hierarchical models which work on building a network, like a funnel, and finally give out a fully-connected layers where all the neurons are connected to each other and the output is running. CNN is a type of neural networks models which allow us to extract high representation for the image content. Unlike the classical image recognition where you define the image features yourself, CNN takes the image's raw pixel data, trains the model, then extracts the features automatically for better grouping.

V. SYSTEM ARCHITECTURE



VI. CONCLUSION

A model is proposed for predicting soil and diseases series and providing suitable crop yield suggestions for that specific soil. The model has to been tested for applying different kind of machine learning algorithm. Bagged trees and K-NN show good accuracy but among all the classifiers, CNN has given the highest accuracy in soil classification with less time. It gives us more accuracy as compared to existing systems and gives more benefit to farmers. This paper provides the very accurate deep learning solution for detecting plant leaf disease which makes use of convolutional neural networks for classification motive. The presented model is used to the dataset that is consists of a number of images for training the model. As we increase the number of images the Accuracy of the model is also increased. After training the model it will be able to detect plant leaf disease from new input images.

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Impact Factor: 8.165

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