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Research Article

Artificial Intelligence Based SmartFarm Agriculture System for Farmers

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Abstract

In 2050, the global population is estimated to be about 9.7 billion, as a result of which there will be great food demand. In order to meet these needs, it is necessary to increase the existing system of agriculture. It's fine, according to the traditional way of agriculture, but still it won't meet the world's entire requirements. Here applications of data mining techniques in estimation of yields and climate change are called to help the farmer make decisions for farming and gain the required economic return. A major problem that can be overcome based on past experience is the problem of yield estimation. Therefore, a brief study of crop yield prediction is proposed using CNN methodology. Using Google API to access crop production patterns in response to climatic conditions such as rainfall, temperature, relative humidity, evaporation and sunshine etc. Crop prediction is a pre-condition, and prediction of disease is a post-condition for the collection of data from a field or area from a weather parameter sample. It lets farmers improve quality in decision making. And using the software means farmers have crops with high yields.

Keywords: *Smart Agriculture, Google API , CNN algorithm , IoT in agriculture*

Introduction

India is an agricultural country and depends on agriculture for about 70 per cent of the population. Different elements have influenced the soundness of farming in India. Farming is depends on weather condition like temperature , rainfall, humidity , soil type with respect to farming land. It consider to be cultivation of plants their needed fertilizers, harvesting etc. Among in the all procedure, in mean time its go throw plant disease problem. Plant disease contributes to a significant reduction in both agricultural product quality and quantity. To enhance on this problem Smart Agriculture system is to be design. The smart farm is a kind of farm automation system based on IoT technology. In this proposed system CNN algorithm to be used for disease control. Detection of plant disease using CNN will be evaluate as well as its recommend to farmers fertilizers/pesticides.

Problem Statement

To design a system which will suggest farmer suitable crop according to environment and recommend fertilizers for probable disease control.

Literature Survey

The soil moisture is the most important factor for plant growth. Therefore, using agricultural IoT systems, the soil humidity sensor is an important part of the smart farm program. Because wet underground soil moisture sensors are mounted, and the sensor consists of copper, rust eats away the sensor copper coating. Based on agricultural IoT Environments, soil humidity details can be obtained from rusting of sensors on a smart farm system. Makes for a successful smart crop. Find in this paper a new type of soil moisture sensor to increase the lifetime [1].

The use of Internet of Things (IoT) and Data Analytics (DA) is used as a smart agriculture to improve operating efficiency and productivity in the agricultural sector. The IoT incorporates many existing technologies, such as applications for WSN, radio frequency recognition, cloud computing, and end users. Use of wireless sensor network (WSN) to use IoT and DA as a major driver of smart agriculture. IoT has identified many opportunities and threats. Using the IoT ecosystem and combining IoT and DA makes smart farming possible. It provides future business trends and opportunities, and marketability of products [2].

To meet the demand for food, problems such as extreme weather conditions and rising climate change will be resolved. Smart IoT- based farming would allow farmers to reduce waste and increase productivity from the amount of fertilizer used to the number of journeys that farm vehicles have made. So, smart

farming is a capitalintensive, high-tech system for masses to grow food cleanly and sustainably. It is the use of modern ICT (Information and Communication Technologies) in farming. Here the IoT hardware and software for smart farming is introduced, in addition to sharing the successful results [3].
IoT computer is a built-in network with sensors which needs wireless connectivity [4]. The embedded system consists of field programmable gate arrays or microprocessor, interfaces for connectivity, memory and input / output. The downside is that Standard wireless communication definition is used. Within 100 m, the short range standards will span distances. The long-range levels of contact will reach distances of up to 10 s / km [4].
Traditional crop yield prediction approaches based on remote sensing consist of classical Machine Learning methods such as Support Vector Machines and Decision Trees. Convolutional Neural Network (CNN] and LongShort Term Memory Network (LSTM] are deep neural network models that are proposed for crop yield prediction recently. This study focused on soybean yield prediction of Lauderdale County, Alabama, USA using 3D CNN model that leverages the spatiotemporal features
[5].

Proposed Methodology

The proposed system developed as per the recommendation of crop as per area, suggestion crop with cultivation process prediction of crop disease and its process as well as fertilizers and prediction and this system also recommends the nearby fertilizer shop.
The proposed technique involves the following steps:

CASE 1: Pre-condition
Step 1 : Registration/login of farmer.
Step 2 : Crop yield and disease prediction as per area and crop.
Step 3 : Predict THR.
Step 4 : Recommend precision/fertilizer.
Step 5 : Shop recommendation as per area.
Step 6 : Notification given by farmer.

In this designed system first it capture the leaf images using image processing and identifies the disease. Depend on disease system will recommend pesticides. Depend on soil type system will also provide appropriate crop cultivation. Following steps are used to identify the disease of plant in which segmentation feature extraction classifiers plays an important role.

CASE 2 : Post-condition *Step1:* Input the image.
Step2: Preprocessing of the image which reduces the noisy data from it.
Step3: Image segmentation is performed which divides the image into the small segments.
Step4: Extract the features from the segments of the image.
Step5: Selects the optimized features by optimization process using Deep learning method.
Step6: Features learned by the classifier
Step7: Detect the affected leaf
Step8: Analysis of Accuracy, Precision, and recall.

Advantages

1. It will capture the image and identify the disease.
2. Recommend the pesticide for the disease.
3. Real time working model.

Enhancement in Existing System
The existing system only detect the affected leaf to enhance the existing system the proposed system design CNN algorithm for prediction of diseases and recommend the pesticides for that disease to avoid the diseases .

A. System Architecture:

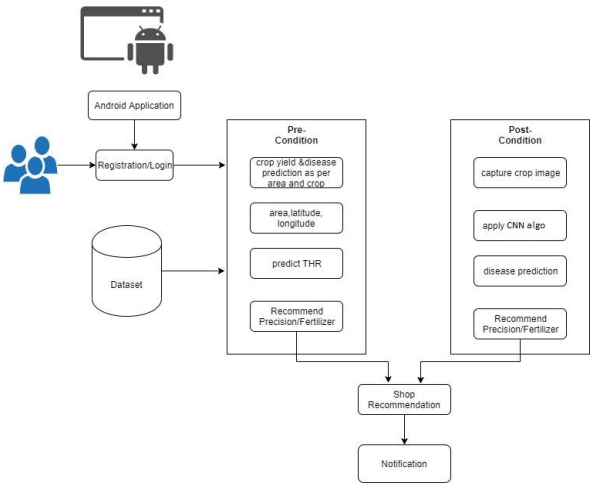


Fig.1: Proposed System Architecture

A. Algorithms

Following are the algorithms that are used in the proposed work. The Grey wolf optimizations are used to optimize the features which are given by CNN.

CNN Algorithm

The convolutional neural networks (CNNs) has achieved an impressive results in the field of image classification. CNN algorithm approach to be used in the development of plant disease recognition model. It consist different plant leaves from their surroundings. For CNN other structures are included as follows:
1. Convolution Layer: Convolution is the first layer where features are derived from an input image. Convolution maintains the relation between pixels by using small squares of input data to learn image features.

Strides: Stride is the number of pixels transferred over the vector of the data. When the stage is 1 we transfer the filters at a time to 1 pixel. If the step is 2 move the filters at the same time to 2 pixels and so on.

2. Padding: Sometimes filter doesn't fit the input image perfectly. It have two options: Patch the picture with zeros (zeropadding) to blend in. Fall the image section where the filter failed to match.

3. Pooling: Layer Part of pooling layers will lower the number of parameters when the images are too large.

Result and Discussions

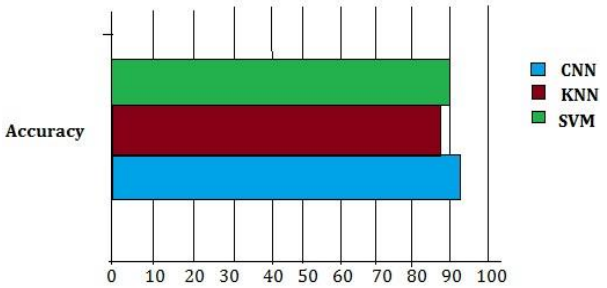
Accurate forecasts of these climatic parameters would result in accurate production forecasts in the future. Hence this model will be strong supportive tool for the farmers in making best decisions for cultivation well in advance in order to achieve maximum crop. The goals of system are:

- Simplified and reduced the manual work.
- Large volumes of data can be stored.
- It provides Smooth workflow.

Proposed Result

Comparison of algorithms are shown in table 1

Sr. No.	Algorithm	Accuracy
1	CNN	92
2	KNN	89
3	SNM	90



Conclusions

The soil sort and the storm assume an important job of predicting the yields are to be planted in the cultivable land to bring knowledge to the new farmers. The right use of pesticides and fungicides to be known for executing ailments and bugs. It is hypothesized that using CNN algorithm strategies would produce acceptable disease results, and suggest accuracy / fertilizer.

The farmer will be made aware of the agricultural circumstances. In this task, another strategy was proposed here for the expectation of harvest ailment and yield from momentum climate using Google API with the help of calculating CNN and estimating yield diseases from yield

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