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Artificial Intelligence in Agriculture

[1]Dr. Bhaskar S, [2]Balakrishna A

[1, 2] Dept. of ECE, SJCIT, Chikkaballapur, India

ABSTRACT—

The population is increasing tremendously and with this increase the demand of food and employment is also increasing. Artificial intelligence (AI)technology has strengthened agro-based businesses to run more efficiently. AI solutions have the potential to solve the challenges farmers face such as climate variation, an infestation of pests and weeds that reduces yields. AI is being used in applications such as automated machine adjustments for weather forecasting and disease or pest identification. AI implementation emphasis on checking defective crops and improving the potential for healthy crop production.

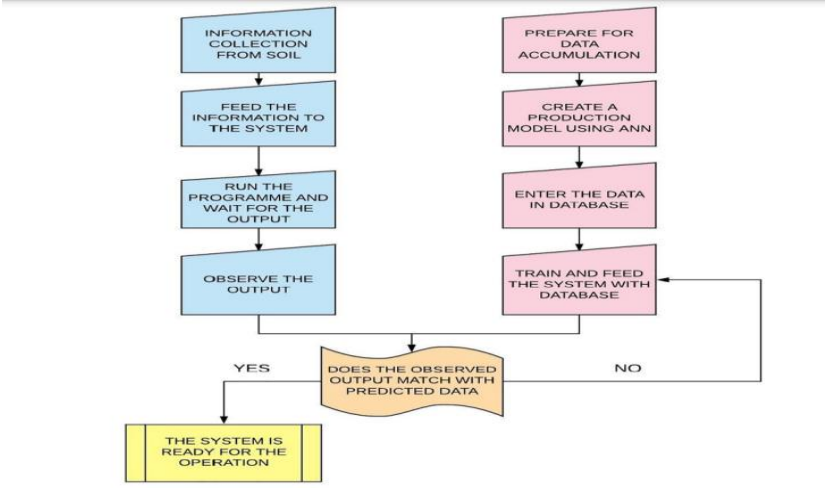
Keywords- Automated Waste Segregation, GSM, Organic and Inorganic, Footpath, Arduino Uno, Treatment, Transmitter (Tx), Receiver (Rx), Arduino C programming.

I. Introduction

With the advent of technology in this digital world, we humans have pushed our limit of the thinking process and are trying to coalesce normal brain with an artificial one. Agriculture is that the business that attended the evolution of humanity from pre-historic times to current eras and consummated dependably one in all its most simple needs: food provides. These days this remains its core mission, however, it's integrated with a much exceptional than ever mechanism motivated by varied social sciences, economic and environmental teams. Data generated by sensors or agricultural drones collected at farms, on the field, or during transportation offer a wealth of information about soil, seeds, livestock, crops, costs, farm equipment, or the use of water and fertilizer. Artificial intelligence and advanced analytics help farmers analyze real-time data like weather, temperature, moisture, prices, or GPS signals and provide insights on how to optimize and increase yield, improve farm planning, make smarter decisions about the level of resources needed, when and where to distribute them to prevent waste. Growing implementation of advanced technologies (such as laptop vision, machine learning, and prognostic analysis) & applications in the agricultural field that permits the farmers to research period information of temperature, climatic conditions plant health, and soil wet.

II. Methodology

Prediction and analyzing model using Artificial Neural Network is divided into the following steps.



Fg 1. Flowchart of ANN-based crop predictor using smartphone

Step 1: It is necessary to combine many different Artificial Neural Network (ANN) Prototypes, to find out the optimal configuration. Hence certain algorithms were used for training this particular model such as Silva and Almeida's algorithm, Delta-bar-delta, Rprop, The Dynamic Adaption algorithm, Quickprop. Step 2: Trial and error method is used to decide the number of hidden layers. Also certain value of training parameters are obtained through the same method. A very careful observation is needed to select the number of hidden layers. Hence different networks with different number of neurons at middle layer is used and comparison is made between the results. Here the comparison is made and best result is selected using Root Mean Square Error (RMSE) and hence the number of hidden layers is selected. Step 3: By adjusting the momentum to the appropriate value, the network weights and parameters are initialized.Step 4: The Prediction system is developed by using the MATLAB platform, ANN Toolbox. Step 5: Since the system is to be developed as the Android application, the Matlab code of the system is extracted.Step 6: The front panel of the Application is developed using Eclipse IDE, and the Java program written at the backend. Step 7: Finally extract the application in the APK(Android Package Kit) format, so that it can be installed in a smart phone and utilized.

III. Block Diagram

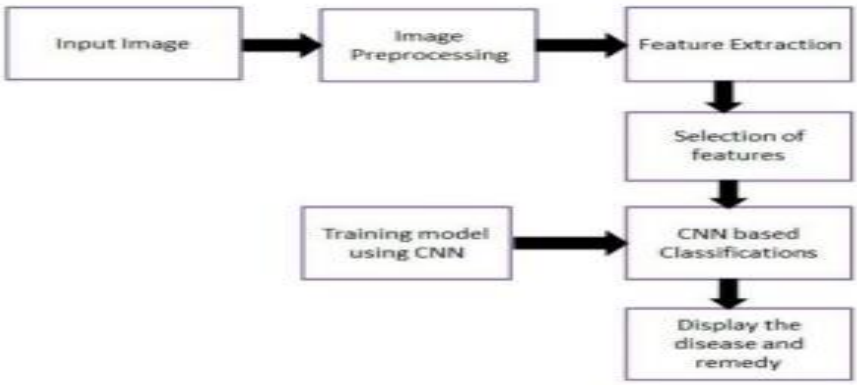


Fig.2 Block Diagram of Proposed System

Fig 2 shows block diagram of CNN to perform plant disease detection and diagnosis using simple leaves images of healthy and diseased plants Convolutional Neural Network (CNN) models were created, through deep learning methodologies. First user has to capture the plant leaf image from app. The application will send this image to our AI system. The image goes through number of processing steps like preprocessing, feature extraction, selection of feature etc.A novel method of creating a visual database that has been successfully used to train CNN which is a deep residue with 97.8% accuracy in detecting four species of insects .Convolutional neural networks can receive any form of data as input, such as audio, video, images, speech and natural language. CNN constitutes a class of deep, feed forward ANN that has been applied successfully to computer vision applications [19].CNN reached high precision in the large majority of the problems where they have been used, scoring higher precision than other popular image-processing techniques

IV. Advantages

1. **Agriculture robotics:** Companies are developing and programming autonomous robots to handle agriculture tasks at higher volume and faster pace than humans.
2. **Crop and soil monitoring:** To monitor crops and soil health drones or software-based technology is used to collect/capture data and uses computer vision and deep-learning algorithms to process that data.
3. **Predictive analytics:** AI used models are used to track and predict various factors which affect the crop yield such as weather change.

V. Applications

1. Error Reduction
2. Difficult Exploration
3. Daily Application
4. Digital Assistants
5. Repetitive Jobs
6. No Breaks for Machines, unlike humans, do not require frequent breaks and refreshments.

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