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Solar Based Multi Agricultural Robot for Detecting Diseases with the help of Image Processing and Automatic Spraying Pesticides

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ABSTRACT

Agriculture, allied with various sectors has been the largest livelihood provider for India. It also contributes to about 15-17% of the total Gross Domestic Product (GDP) of India. There is a need to decipher the issues like controlled use of pesticides, proper leaf disease detection. The automation of agriculture has emerged as a futuristic technology. The automation concept helps the farmers in increasing the gain from the soil and saving time. Improvement in the quality of life of the farmers and reducing heavy labor and tedious tasks is the main aim of this work. A prototype of the precision agriculture robot is presented which is designed for performing the functions like leaf disease and pesticide spraying function. The robot is a four wheeled module controlled by Raspberry pi Microcontroller. The robot also inhabits a leaf disease detection module based on CNN algorithm, image processing and machine learning which will be used to detect the type of disease affected. Further, suitable pesticide is sprayed to the affected part of the plant depending on the type of disease.

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I. INTRODUCTION

Machine Learning behaves like self-learning concept which will work without any interruption of a human. Now a day's self-driving cars, hand-writing recognition, Stock market are some of the examples of Machine Learning concepts. Machine learning will be able to predict the future based on the past or historical data. A computer program is said to be learned from experience E with respect to some clause of task T and performance measure P, if its performance on T as measured by P improves with experience E. Machine learning broadly uses three major learning algorithms Supervised learning, Unsupervised learning, Reinforcement learning. Machine learning can be used in each and every routine task performed by human being. The research work deals with plant disease prediction with the help of machine learning. A plant disease is a physiological abnormality. Once a plant suffers from any diseases it shows up certain symptoms.

Crop diseases are a major threat to food security, but their rapid identification remains difficult in many parts of the world due to the lack of the necessary infrastructure. The combination of increasing global smartphone penetration and recent advances in computer vision made possible by deep learning has paved the way for smartphone-assisted disease diagnosis.

Symptoms are the outward changes in the physical appearance that are gradually developed and can be witnessed by naked eyes. Wilting, it is loss of turgor pressure in a plant leading to temporary or permanent drooping of leaves, shoots, or entire plants from lack of water or infection by different pathogens. Spot, is a definite, localized, round to regular lesion, often with a border of a different color, characterized as to location (leaf spot, fruit spot) and color (brown spot, black spot); Powdery mildew, is a fungal disease that affects a wide range of plants. Infected plants display white powdery spots on the leaves and stems. As the disease progresses, the spots get larger and denser. Galls, these are abnormal growths that occur on leaves, twigs, or branches. They may be simple lumps or complicated structures, plain brown or brightly colored.

Dryness, after normal aging process generally leaf's get dry and fall down from the tree, but at other times drying of leaves may be a symptom of fungal attacks. In plant disease diagnosis, data provided is small and some of the values are

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missing that will require imputation of values we will replace all the null values with -1. The proposed research work applies the concept of ensemble learning that is implemented through machine learning algorithms. After implementation the result is compare to get the model has the highest accuracy.

A. Objectives

1. To find various diseases which affects Glycine Max (soyabean) farming
2. To collect data set for various diseases.
3. To detect diseases using image processing techniques.
4. Classify diseases using machine learning techniques.
5. To Spray Pesticides by finding disease type and required proportion of pesticides.

B. Motivation

Basic motivation behind this project is farmers and current issues in India about farming. Farmers mostly doesn't know about specific disease occurred on plants and they believe pesticides which ever suggested by dealers, in such cases loss of farmers can occur as dealers suggest costlier solutions and sometimes those pesticides can harm plants also.

II. LITERATURE REVIEW

"Autobot for Precision farming" today's scenario farmers are striving hard to cultivate the land and yield the production. In this paper Robot runs with many components as a multifunctioning robot. The several components used are camera, spraying mechanism, sensors. There are using login module and selection and display module.

- Relevance in project: To identify diseases we are using image processing technique. Then spraying mechanism are used for spray pesticides in the affected area. Information of all the crops are stored in database used by the farmer.

"Smart Leaf Infection Identification and Fertilizer Spray", in this paper an automated system has been developed to determine whether the plant is normal or diseased. This paper attempts to develop an automated system that detects the presence of disease in the plants. An automated disease detection system is developed using sensors like temperature, humidity and colour based on variation in plant leaf health condition.

- Relevance in project: First capture the picture using camera and then through image processing detect the disease after detecting the disease compare the image with database and if disease is the same with the both picture then fertilizer process is done.

"AgRobots (A combination of image processing and data analytics for precision pesticide use)", India is mainly an agricultural country. This paper mainly deals with mechanism that uses image processing technique to analyze the ill part of the plant and provide pesticide to that part of the plant. In this proposed system openCV can be interfaced with the python for image processing .pesticide spraying mechinsum is carried out by autonomous robot

- Relevance in project: To identification or detecting disease with the help of image processing techinque and analysis of particular pesticides is used for the particular disease.

"Design and Development of Agrobot for Pesticide Spraying Using Grading System", India is a country where greater than 70% of people depends on agriculture. Agriculture is the column of Indian economic wealth. Our farmers work 24 hours to count over 1.20 billion. in India agriculture contributes about 16.1 % of full GDP and 10% of total transport. more than 60% land zone is cultivative building. hence farmers need a well-founded system which can detect the infected crops. It's easy to use Agrobot to observe farms detect the diseases and automatically sprinkling.

- Relevance in project: Detecting diseases using image processing technique and pesticide spraying using grading system.

III. BLOCK DESCRIPTION

In this system plant disease detection is made through image processing technique. Here python programming language is used, Detection of the plant disease involves steps image acquisition, image processing, image segmentation, feature extraction and classification. After detection of particular plant disease pesticide will be sprayed. Image of the plant is taken via pi camera of 5MP, focal length of 3.29 and resolution of 2592×1944. These images will be sent to the server. Here we make use of Raspberry pi it will collect image and store in database Digital image processing is performed, under Image Processing. Pre-processing is heavily dependent on feature extraction method and input image type. The aim of Pre-processing is an improvement of the image data that remove the unwanted distortions. There are 3 steps of image processing such as image cropping, resizing the image 640×480, image covering is formed RGB to gray scale and image enhancement.

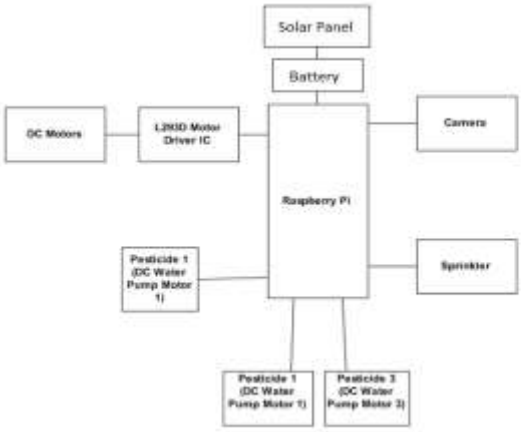

Fig 1. Block Diagram

IV. LEAF DISEASES

Blight is a rapid and complete chlorosis, browning, and then death of plant tissues such as leaves, branches, twigs, or floral organs. Accordingly, many diseases that primarily exhibit this symptom are called blights. Early blight of potato and tomato, caused by species of the ubiquitous

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fungal genus Alternaria.

Cercos, Infectious plant diseases are caused by living (biotic) agents, or pathogens. These pathogens can be spread from an infected plant or plant debris to a healthy plant. Microorganisms that cause plant diseases include nematodes, fungi, bacteria, and mycoplasmas.

Common rust (Phragmidium spp.) is a fungal disease that attacks roses, hollyhocks, snapdragons, daylilies, beans, tomatoes and lawns. It is most often found on mature plants where symptoms appear primarily on the surfaces of lower leaves. Severe infestations will deform and yellow leaves and cause leaf drop.

Fungal diseases are often caused by fungi that are common in the environment. Fungal diseases in the lungs are often similar to other illnesses such as the flu or tuberculosis. Some fungal diseases like fungal meningitis and bloodstream infections are less common than skin and lung infections but can be deadly.

V. CONCLUSION

Identification of the disease and spraying pesticides is done automatically, Hence saving the loss and help in agricultural field efficiently.

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