IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

State Level Conference – AITCON 2K24

Adarsh Institute of Technology & Research Centre, Vita, Maharashtra

Vol. 11, Special Issue 1, March 2024

AI Using Crop Disease Detection and Monitoring Plants

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Abstract: By limiting environmental deterioration, AI was able to solve a variety of issues while also protecting a valuable resource. In terms of agricultural output, India ranks second. Each crop is susceptible to certain diseases, which have an impact on yield quantity and quality. Crop diseases account for roughly 42% of crop failure for most of the major food crops. Crop diseases tend to wipe out an entire crop's productivity. Early illness detection will allow for more efficient monitoring and good crop product. We share our research on crop disease detection and crop health using image processing, sensors, and other techniques in this publication. When it comes to assessing crops, the suggested method saves time and yields more precise results. In addition, we mentioned the destiny of AI-Powered agriculture and the realistic and technical demanding situations ahead.

Keywords*:* Agriculture, Artificial intelligence, Disease Detection, Image processing, Sensors.

I. INTRODUCTION

Approximately 37.7% of the overall land floor is used for crop manufacturing, from the employment era to contribute to National Income, agriculture is crucial. With its rapid clinical growth and high-quality application location, Artificial Intelligence (AI) is one of the most popular subjects in software program engineering. The essential concept of AI in agriculture is its adaptability, rapid performance, precision, and cost-viability. AI enhances performance in crop harvesting, irrigation, soil content material sensitivity, crop monitoring, weed, harvest, and establishment. AI era allows diagnosis of plant diseases, pests, and malnutrition on farms, and AI sensors can hit upon and become aware of weeds. Here in this paper, we present an AI-based technique for detecting pest-infected crops and leaves in this paper. When it comes to assessing crops, the proposed method saves time and yields more exact results. Crop photographs are used to categorize them.

II. AI TECHNIQUES USED FOR DETECTION OF DISEASES IN AGRICULTURE

2.1. IMAGE PROCESSING

A picture is turned into a numerical matrix that can be easily read by a computer to be processed. Picture enhancement, image restoration, image compression, and image analysis are just a few of the various forms of processing available. The latter is particularly intriguing since it allows precise information to be extracted straight from a picture. The analysis can be done by looking at the edges of images (image extraction), the colors of the images (texture analysis).

a) Image Acquisition: - Images of the inflamed leaves are obtained. This database has specific varieties of plant sicknesses, and the picture are saved in JPEG format. These picture are then studied in MATLAB with the use of the study command.

b) Image Pre-processing: Image pre-processing is used to erase noise from the photo or different item exclusion, specific pre-processing techniques. Image scaling is used to transform the authentic photo into thumbnails due to the fact the pixel length of the authentic photo is huge and it calls for greater time for the general system for this reason after changing the photo into thumbnails the pixel length gets lower and it's going to require much less time.

c) Image segmentation: - Image segmentation is one of the maximum broadly used techniques to differentiate pixels of picture properly in a focused app. It distributes a photo into several discrete states such that the pixels have wonderful similarities in every region and excessive dissimilarity among areas.

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d) Feature Extraction: - Feature Extraction is a critical part of illness detection. It plays a critical characteristic with inside the identification of an item. Feature extraction is applied in numerous programs in photo processing. Color, texture edges, and morphology are the features, that are applied in sickness detection.

e) Detection and classification of plant illnesses: -The final phases are the detection of diseases and the classification of plants with disease matches in the given dataset using disease classifiers.

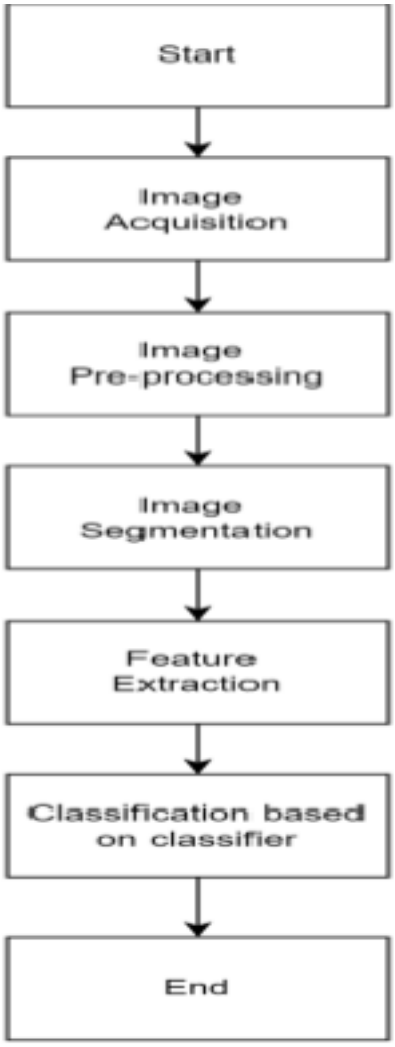

Fig.1: Detection Method

2.2 Convolutional Neural Network (CNN)

Using basic leaf pictures of healthy and unwell plants, CNN models were built using deep learning methodologies to recognize and diagnose plant illnesses. The first user must take a screenshot of the plant leaf from the app. This image will be sent to our AI system via the application. Preprocessing, feature extraction, feature selection, and other processing stages are performed on the picture.

CNN, a deep residue with 97.8% accuracy in recognizing four kinds of insects, was successfully trained using an innovative approach to constructing a visual database. Convolutional neural networks may accept data in any format, including audio, video, pictures, speech, and natural language. CNN is a type of deep, feed-forward artificial neural network (ANN) that has been effectively used in computer vision applications. CNN achieved great precision in the vast majority of the cases in which it was utilized, outperforming other prominent image-processing approaches**.**

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III. BLOCK DIAGRAM

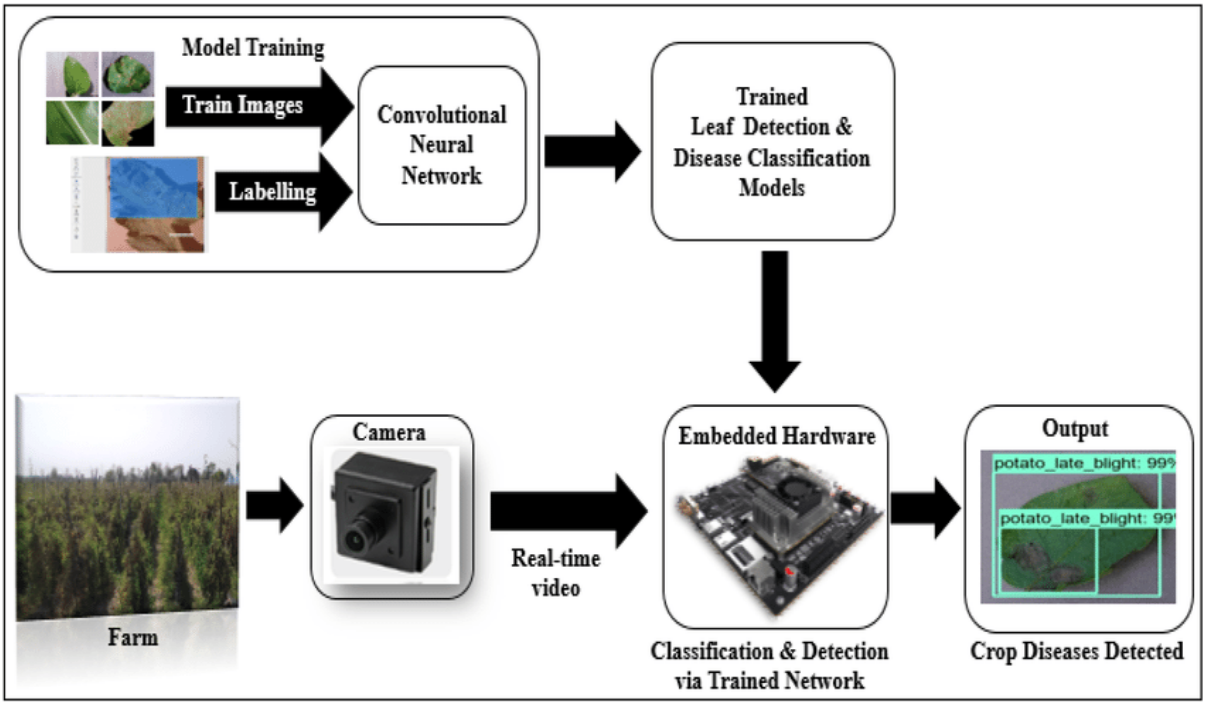

Fig.2: Convolutional Neural Network (CNN)

2.3 Sensors

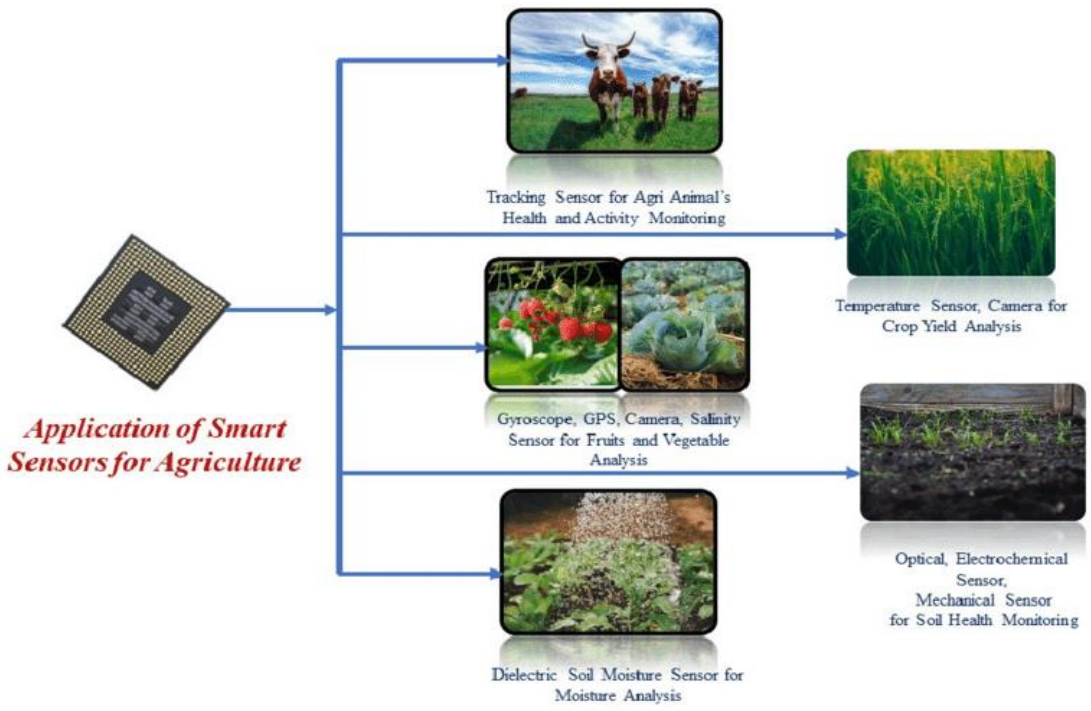

Fig.3: Sensors used in system

Agricultural sensors are sensors that are utilized in smart farming. These sensors give information that helps farmers monitor and optimize crops by allowing them to adjust to changes in the environment. Weather stations, drones, and agricultural robots all have these sensors attached. They can be controlled using dedicated smartphone applications. They may be controlled directly through Wi- Fi or via cellular towers and operated using mobile phones and also used in weather stations. Sensors in this system provide information on soil temperature at numerous depths, air temperature, rainfall, etc. They are employed in a variety of agro-based companies' equipment (e.g., dendrometers) for agricultural or farming purposes such as measuring trunk diameter, leaf wetness, and so on. In agriculture drones, they're utilized to spray insecticides and pesticides. Because of the lower cost of electricity, solar-powered mobile pumps have become increasingly popular.

IV. CONCLUSION

The current review study covers the various applications of artificial intelligence in agriculture. The primary goal of this research was to provide an overview of the uses and existing techniques of artificial intelligence to help farmers achieve the desired output. The report also covers numerous pieces of literature that reflect various approaches to detecting agricultural diseases. In line with the literature, artificial intelligence is an extraordinary device for a country's agronomics. As a result, future researchers should compile a comprehensive dataset spanning all aspects of agriculture and improve present technology to boost primary sector production.

V. FUTURE SCOPE

India's population is expected to acquire more than 1.6 billion through manner of approach of 2030. With this big hike in the populace, you'll be able to anticipate a large call for agricultural intake as well. With the development with inside the carrier zone, there may be a massive migration of a team of workers from the number one zone to the tertiary zone. In addition, the lack of awareness of growing illnesses in plants is lowering the yield of cultivation as well. Food being the primary necessity of human life, future researchers needs to take the course for reviving the agriculture arena. Artificial Intelligence must be the foremost gear for the researchers to cope with the above-stated issues. With the exceptional variety in agronomy species, an in-depth database desires to be acquired for numerous quantities of agriculture.

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