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Weed Detection

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Abstract: The process of weed removal is critical in agricultural fields. The traditional method of weed removal is time consuming and needs more physical labor. The goal is to automatically remove weeds from agricultural fields. Using a deep learning method, the suggested study detects weeds growing between crops and removes them using an automatic cutter. The important characteristics from the agricultural images are analyzed using deep learning. The dataset has been trained to identify weeds and crops. When it comes to deep learning, Convolutional Neural Network (CNN) employs a max-pooling and fully connected layer with ReLU to identify the weed from the crop and uses a convolutional layer with a ReLU function to extract the features of a picture. The CNN network receives the pre-processed picture. From the resultant image, Region Of Interest (ROI) is extracted and also extract some features for training. The categorization is completed after the training. As a result, a deep learning network is used to detect the weed. A total of 100 photos are trained in order to increase accuracy.
Keywords: Weed Classification, Shape Features, Convolutional Neural Network.

I. INTRODUCTION

The need for food rises in tandem with the global population. Given the scarcity of land, water, and labor, it is predicted that agricultural output would improve. To properly administer herbicides when chemically treating weeds, it is reared to first determine the makeup of the weed species. When performing mechanical weed management, it's important to know where the crop plants and weeds are so that you can protect the crop plants while successfully removing the weeds with the least amount of energy. Agriculture is India's backbone, and rural people rely on it. The profit of plants and vegetables will be determined by the yield produced. One way to get more profit, to remove the weed from the crop. The conventional way of weed removal is a time-consuming process and also requires more labor for removing weed from the crop. The use of herbicides affects the plant, soil. So, it is proposed to use an automated method to remove the weed in the crop. In automated method, the image is captured by the camera. Once the images are captured, preprocessing of images are done and the features are extracted. Based on the features, the network is trained for classification. Once the weed is identified, the controller operates the motor to cut the weed. The rest of this paper describes the existing work, methodology, classification and experimental results. We utilize the CNN algorithm in our system to detect weeds in the crop. The important characteristics from the agricultural photos are analyzed using deep learning. The dataset has been trained to identify weeds and crops. Convolutional Neural Networks (CNNs) in deep learning employ a convolutional layer with a ReLU function to extract picture features and a max-pooling and fully connected layer with ReLU to identify weed from crop.

II. LITERATURE SURVEY

Jialin Yu1 et.al [1] Precision herbicide application can significantl

grass the board frameworks. Wise spot-showering framework overwhelmingly depends on machine vision-based identifiers for independent weed control. In this work, few profound a convolutional brain organizations (DCNN) were built for location of dandelion (Taraxacumofficinale Web.), ground ivy (Glechomahederacea L.), and spotted spurge (Euphorbia maculata L.) filling in lasting ryegrass. Kavir Osorio et.al [2] Weed administration is one of the main parts of harvest usefulness; knowing the sum and the areas of weeds has been an issue that specialists have looked for a long time. This creator's paper presents three techniques for weed assessment in light of profound learning picture handling in lettuce harvests, and they contrasted them with visual assessments by specialists

Umamaheswari S et al [4] Human people group is taught about the ecological issues of pesticides and manures utilized in farming. There is a consistently developing interest for food to be met by agribusiness makers. To lessen the ecological issues and address food security, loT based accuracy farming has developed. Accuracy agribusiness diminishes cost and waste, yet additionally further develops usefulness and quality. Creator proposes a framework to recognize and find the weed plants among the developed homestead crops in view of the caught pictures of the ranch.

Siddhesh Badhan et.al [5] The creators paper proposes a Real-time weed discovery framework that utilizes AI to distinguish weeds in yields and sound system vision for 3D harvest recreation. Structure from movement method is used on a video of a homestead to create a 3D point cloud. The AI model is prepared on two physically made datasets of cucumber and Onion crop.

Convolutional Neural Networks (CNN) and ResNet-50 calculations are utilized to prepare the Al models. It is seen that the ResNet-50 model outflanks the Convolution Neural Networks model. ResNet-50 model gives a general exactness of 84.6% for the cucumber dataset while it gives a precision of 90% for the Onion crop dataset.

Sarvini T et.al [6] Weed control is fundamental in agrarian efficiency as weeds go about as a bug to crops. The regular techniques for weed evacuation are tedious and require more difficult work. Subsequently there is a need to robotize this interaction. The goal of the proposed framework is to identify weed from crop utilizing Al calculations. The thorough dataset is gathered for four distinct business harvests and two sorts of weeds, for example, Para grass and Nut sedge. Overabundance green strategy and Otsu's thresholding is utilized for veiling the dirt and concentrate the locale Of interest.

XIAOJUN JIN et.al [7] This creators paper proposes another technique in an opposite manner, which joins profound learning and picture handling innovation. Right off the bat, a prepared CenterNet model was utilized to distinguish vegetables and draw bouncing boxes around them. Thereafter, the leftover green articles dropping out of jumping boxes were considered as weeds. Along these lines, the model spotlights on recognizing just the vegetables and consequently tries not to deal with different weed species. Besides, this system can generally diminish the size of preparing picture dataset as well as the intricacy of weed recognition, consequently upgrading the weed recognizable proof presentation and exactness. To extricate weeds from the foundation, a shading record based division was performed using picture handling.

Muhammad HamzaAsad,& Abdul Bais [8] Herbicide use is rising around the world to upgrade food creation, actually hurting climate and the environment. Accuracy horticulture proposes variable-rate herbicide application in light of weed densities to alleviate unfavorable impacts of herbicides. Exact weed thickness assessment utilizing progressed PC vision methods like profound learning requires huge marked agribusiness information. Marking huge agribusiness information at pixel level is a tedious and drawn-out work. In creator's paper, an approach is created to speed up manual naming of pixels utilizing a two venture methodology. In the initial step, the foundation and forefront are fragmented utilizing greatest probability grouping, and in the subsequent advance, the weed pixels are physically marked. Such marked information is utilized to prepare semantic division models, which arrange harvest and foundation pixels as one class, and any remaining vegetation as the second class.

Bo Liu1 and Ryan Bruch1 [9] Weed location frameworks are significant answers for one of the current rural issues unmechanized weed control. Weed location additionally gives a method for decreasing or taking out herbicide use, alleviating agrarian ecological and wellbeing sway, and further developing maintainability.

Vi Nguyen Thanh Le etal [10] In creators paper, a FT BRC picture dataset (distributed online with 3380 pictures) was gathered by a camera introduced on a compact streetcar under commonsense field conditions from a business ranch in Cunderdin, Western Australia. In light of their destructive consequences for the harvest yield, Wild radish (Raphanus raphanistrum) and Capeweed (Arctotheca calendula) weed identification in Barley crops (Hordeum vulgare) is examined. With regards to finding designated weeds and assessing weed thickness, a piece of the FT_BRC dataset was completely clarified and applied Faster RCNN models with various component extractors for weed location in the field.

III. PROBLEM STATEMENT

Weeds cause damage on the primary crop, reducing its nutritional value. Visual identification of the plant is the classic method of manual weed detection. The manual process is labor intensive and time consuming. The usage of herbicides reduces crop output. To solve these issues, a method that combines image processing and deep learning to identify weeds in farm crops has been developed. This method will assist in the classification and identification of weeds for crop purposes.
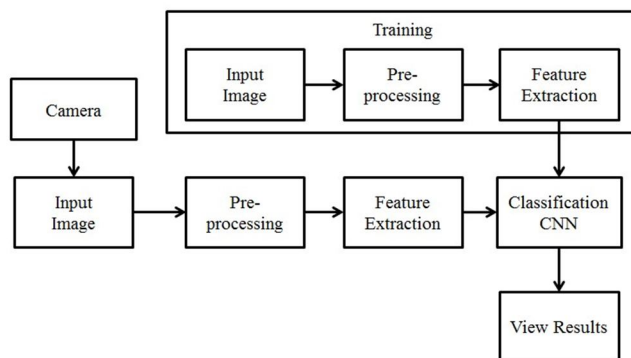
IV. PROPOSED SYSTEM

In this system we use CNN algorithm for weed detection. By using CNN we detect the weeds from crops.

A. Image Acquisition

The recommended approaches have been implemented using the weed image dataset. This approach is used to develop for accurate weed extraction and consists of a number of phases, including picture capture, edge detection, and tumour categorization.

B. Image Pre-Processing

In this module, we conduct some fundamental image operations in order to obtain a suitable picture for processing. To obtain a correct and clean image, we will conduct operations such as gray-scale conversion, filtering, sharpening, smoothing, edging, and image segmentation in this module. The preprocessing stage improves the image quality by removing noise. Gray scale photos, often known as black-and-white or grey monochrome images, are made up entirely of different shades of grey. The intensity of light at each pixel may be measured using grey scale photographs. The Filtering process is used to improve the image's smoothness, sharpness, and edge enhancement. Sharpening filters are used to enhance photos in sharpening and to bring out detail that has been lost in the process. To minimize noise, a smoothing filter is utilized. It has utilized a variety of algorithms. Edging is a method of locating and recognizing sharpness in a photograph.

C. Image Segmentation

Image segmentation is a crucial step in the field of computer vision, with applications as diverse as weed imaging, video surveillance, and many others. The image segmentation is a processing phase in which the weeds image grey level is segmented into binary images using the threshold approach. Segmentation is the process of dividing digital pictures into several segments or objects. Segmentation is the process of grouping pixels with similar characteristics. It is used in photos to locate objects and boundaries. In essence, the segmentation technique is used to extract key elements from a picture for further analysis.

D. Feature Extraction

We'll do some more operations on the segmented

picture in this module. We will do a feature extraction operation in this module to obtain all comprehensive information about the weed picture. In the field of computer vision and machine learning, feature extraction and reduction has played a critical role in classifying weed regions into their appropriate categories. The main problem with feature extraction is determining the most active characteristics for classification, which results in an efficient result. When it comes to dimensionality reduction, feature extraction is utilized.

E. Classification

In this session, we use deep learning algorithms to apply classification approaches to identify weed status. The suggested approach's final stage is weed categorization, which is utilized to determine the kind of weed. Following the extraction and selection of features, the obtained feature vector is subjected to a classification phase using CNN. The training and testing phases of the CNN structure are used to conduct classification.

F. Convolutional Neural Network

The mathematical action known as convolution is performed by the "Convolutional Neural Network." Convolution is a type of linear operation that is specialized. A convolutional neural network (CNN, or Convent) is a type of deep neural network used in deep learning. Convolutional networks are simple neural networks with convolution in at least one of its layers. Weed detection has been successfully identified by convents. An input layer, an output layer, and numerous hidden layers make up a convolutional neural network. CNN, or feed forward neural network, is a popular image identification and classification algorithm. The input is convolved by the Convolutional neural layers, which then send the result output to the next layer. CNNs are multilayer perceptron variants that have been regularized. Multilayer perceptron networks are completely linked networks in which each neuron is connected to all other neurons in the next layer. The term "completely connected" refers to a network that can accommodate a large amount of data.

V. ALGORITHM

A. CNN Algorithm

The CNN algorithm is used to detect weeds in the crop. An input layer, an output layer, and numerous hidden layers make up a convolutional neural network. CNN, or feed forward neural network, is a popular image identification and classification algorithm. Artificial Intelligence has made significant progress in closing the gap between human and computer capabilities. Researchers and hobbyists alike work on a variety of facets in the field to achieve incredible results. The field of computer vision is one of several such disciplines.

The goal of this field is to enable machines to see and perceive the world in the same way that humans do, and to use that knowledge for a variety of tasks such as image and video recognition, image analysis and classification, media recreation, recommendation systems, natural language processing, and so on. Advancements in Computer Vision using Deep Learning have been built and developed through time, mostly through the use of a single algorithm - the Convolutional Neural Network.

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning system that can take an input picture, assign relevance (learnable weights and biases) to various aspects/objects in the image, and distinguish between them.

VI. CONCLUSION

To improve the crop's production, the categorization of weed and crop is utilized to detect the weed and remove it with an automatic cutter. CNN is used to extract the image's most important elements. For our system to identify weed via image processing, the CNN method is very important. The goal for the future is to create an automated procedure.

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