A Novel Approch For Pests Detection Using ANN

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***Abstract*—** The Food and Agriculture Organization reports that in agricultural 20 to 40 per cent losses in global cultivation each year (FAO). Therefore, intelligent agriculture provides farmers with the best choice of using artificial intelligence approaches incorporated with current ICT to eliminate these dangerous insect pests. As a result, their agricultural productivity can be enhanced. This paper provides a novel scheme to classify pesticides automatically using artificial neural network technique, to benefit farmers and specialists. In addition to a classification that is significantly harder than general object detection due to the variation in appearance of pest species, the multi-class pest detection is one of the essential components of the pest management with localization. It is general knowledge that the production process and, ultimately, the quality of a product of many businesses is negatively affected by poisonous pests. In these production operations it is therefore appropriate to see pests identification as a critical duty in order to take relevant decisions on pest control. This research deals with a new technique to developing a model for the identification of pests by using an artificial neural network based on leaf image. In practise, a new approach of training and methodology makes it easy.

Keywords— Pests Recognition, Pests Classification, ANN

I. INTRODUCTION

The fourth industrial revolution has begun as ICT technology and traditional manufacturing, manufacturing, distribution, and service industries intersect and integrate. In particular, artificial intelligence has sophisticatedly processed the huge amount of information gathered through the Internet of Things, opening up new avenues of research. The results of intelligent farm research, combining IT and agriculture, were reported in various ways before the fourth industrial period. Smart farm research focuses on the analysis of the current situation of agricultural products. Different imaging and extraction approaches were employed for the picture analysis of the product, in particular in pest analysis study. The image analysis and results of the disease have, nevertheless, a limitation that should be examined on the basis of the image database. The old pest data analysis system was only capable of studying the image after a pest, rather than forecasting and preventing pest data, based on analysis of formal data. The analysis of pest information results. The detection and removal of pests is crucial in manufacturing industries such as agriculture, food and beverages and candy in order to increase food security, improve products' quality and reduce costs of production. A lot of manual effort must be used to get a successful pest identification without the use of computer views, especially artificial intelligence.

Computer vision has become an increasingly and extensively employed strategy to categories pests through the development of current computer science, as vast time consumption and intensive work are severe constraints in conventional manually classified approaches. In recent years, however, progress in agricultural pesticide detection has slowed dramatically, and the contemporary technologies used as ready-to-use methods of computer vision have not been able to deliver satisfactory pesticide detection performance.

1.1 Problem Statement:

Crop diseases and pests represent a major danger to food security, yet quick detection is challenging because of the lack of resources in many parts of the world so we need to resolve this issue by using ANN Technique.

II. LITERATURE REVIEW

Mohamed Esmail Karar et. all (2021) The study introduced a novel mobile app using the Faster R-CNN and Cloud computing systems to detect and classify crop pests. The development of the image recognition system, as shown in this research, classes five of the most well-known crop plagues. In comparisons to state-of-the-art methodologies, such as neural network and SSD mobilnet, the assessment findings of insect pest classifications employing the proposed Faster R-CNN have proven superior. The basic outlook of this research is to add new classes of agricultural pesticides for specific crops with suggested pesticides. In addition, in the future work of our created mobile identification systems, the construction of a wireless motion sensor network for the real-time detection of insect pests will be considered. [1]

Kyung-Jong Kim et. all (2017) A CNN-based system for analysing mushroom and pest diseases was proposed and a learning and analysis module for mushroom conditions and pests was developed through the construction of a management interface, user interface and C NN model, with convolutionary layers, pooling layers, activation features or fully connected layers. A qualitative evaluation was done to compare the results of the implementation with previous research, and the results were assessed by units in order to evaluate the performance of learning. The learning model had no issue detecting identical mushroom items by measuring based on low-performance equipment and a short learning period, but had far to go until it had an accurate assessment of the symptoms of pumpkin species or illnesses and pests. After

the hardware upgrade, optimizing the analytics system and boosting the learning level of the learning model, a follow up research will analyze the performance of the proposed system. [2]

R. K. Samanta et. all (2012) This paper presents an automated classification approach to detect tea insect pests based on CFS and a progressive back propagation neural network. The decreased feature set offers several clear advantages provided intelligent system performance is not impaired. For the function reduction, authors apply CFS. Next, an original feature set and a reduced feature set were utilised to classify the neural network with incremental back propagation (IBPLN). Both outcomes are compared between writers. This work shows that CFS can be used to reduce the vector and that CFS+ IBPLN can be utilised for various classification tasks. [3]

R.Jeya Bharathi (2020) This work has been done with classification techniques of the Convolutional Neural Network(CNN). Inactiveness, sensitivity and specificity are improved by the CNN. The CNN. This paper explores a new approach to thorough study in the classification of paddy pests, illnesses, and weeds. The designed models can categorise with precision 96.50 percent 16 categories of paddy pests, illnesses and weeds. It is obvious that this precision is proof that a paddy, disease and weed automatic categorization system is achievable. The study will be expanded to include the development of mobile apps to help farmers spot pests, diseases and weed with their mobile phones and to provide remedial treatments. [4]

N.Abirami et. all (2021) Rice farming is one of the Indian economy's most important economic sectors. The demand for rice is likewise growing with the expansion in the world's population. To enhance rice development, the plagues must be detected in an earlier period to minimize the expansion of the plague. But, especially in agricultural zones, our farmers are struggling to preserve crops from external attacks. Authors are offering a method to overcome this difficulty to protect cultivations in farmland through deep networks. Therefore, farmers' lives are saved from their fight. In this paper, we suggested a system for helping farmers to detect rice crop pests by use of a deep-convolutionary VGG16 neural network. The proposed model is then compared to GoogleNet and AlexNet's current models. [5]

Eusebio L. Mique et. all (2021) In this paper, authors use a convolutionary neural network to construct rice pests and disease detection applications. A model was developed through transfer learning to accurately predict pests and illnesses in rice. Instead of developing a model from scratch, researchers can train the model at great speed. With minimum cross-entroPy or an inaccuracy in the prediction of results, the trained model has attained excellent accuracy. The model can therefore be utilized for the prediction or detection of high precision rice pests and illnesses. It can be advised for farmers using smartphones to help them manage rice pest infestations. [6]

Aitor Gutierrez et. all (2019) Computer vision for pest detection chooses on each picture too many areas with possible diseases. Pictures with few insects or eggs, for example, also produce a large number of areas for the analysis of pest classification by machine. The classification of several regions by machine learning model is very difficult because it is not possible to examine green house plants in real time by combining computer vision with machine learning technique. For real-time inspection, the balance between inspection speed and precision is crucial. Pictures will be analyzed both in real time and subsequently on the server side, but information is needed in real time to adjust the path autonomously inspected by the robot. In order to segment background plants or for select regions of likely insect or egg, computer vision algorithms will be affected by changes in illumination. [7]

Nikhil Patil et. all (2019) In this paper, authors proposed detection of crop diseases using the deep learning CNN system. The technique proposed can be used efficiently by farmers since it provides immediate information on the crop illness. It also decreases the outbreaks, booms that cause enormous losses to plant and pasture and threaten disadvantaged farmers with livelihoods. As The given method has an exactness rate of 89 percent, which signifies the correct detection of 9 photos from a set of 10. Compared to typical crop disease detection system. [8]

Muammer et. all (2019) This article compared the results of deep extraction and transfer education for the detection of plant and insect illnesses. This study utilized nine powerful deep neural network designs for both deep-function removal and transfer learning. First, writers have extracted deep characteristics from these profound models for fully connected layers. The deep characteristics acquired were determined using classification SVM, ELM and KNN. Then the profound models are perfected on the basis of pest and plant diseases. Finally, we used standard approaches to compare performance findings with deep learning models. Evaluation results indicated that in comparison with standard methods the profound study models offered better results. The outcomes of deep functional extraction were superior than the successes of transfer learning. The fc6 layers of the models AlexNet, VGG16 and VGG19 produced improved accuracy scores compared to the other layers in the studies based on deeper function extraction and classification. [9]

Liu Liu et. all (2017) This study proposes the new end-to-end automatic PestNet pesticide detection network, a large-scale multi-class pesticide detection system. Our new CSA module is a new feature enhancement module that might automatically extract higher-quality features from our PestNet. We have also chosen PSSM instead of FC in order to reduce computing costs in pest classification and the process of box regression in comparison with numerous typical object detection methods. In order for PestNet to further improve its detection efficiency, contextual rois were also taken into consideration as contextual information. [10]

Jun Liu et. all (2020) During its growing process, tomatoes are afflicted by several illnesses and pests. If the inspection is not prompt, the return or even crop failure will be reduced. It is extremely vital to successfully control the diseases and pests and help vegetable growers increase their own tomato yields

and to diagnose illnesses and insect pests with accuracy. The diseases and pest recognition approach based on deep knowledge may directly input the original picture compared with the classic pattern recognition method. The end-to-end structure is used to simplify the recognition process instead of tedious steps such as image pre-processing, feature extraction and classification in the traditional method, and solve the problem that it is hard for the manually developed extractor to obtain an expression closest to the natural attribut of the object. [11]

Adeline Sneha J et. all (2019) Every year, demand for food grows. To feed the rising population, it is vital to increase production. In order to meet the demands of food in the year 2050. 70% further of food production is required. In many locations, chemical agriculture has been utilized to limit crop losses due to pesticides, weeds and diseases. But all living species on the earth are affected by chemicals in the diet. Therefore, few intelligent technologies are being employed to limit and abolish chemicals used in agriculture. The identification of neurological pests using pest sounds is one of the intelligent technologies. It produces 98.9% efficiency in eradicating the plant's harmless pest. [12]

Pruthvi P. Patel et. all (2019) Agricultural challenges are crop disease and pest deterrence. Since farmers are unaware of all the diseases and pesticides that impact their crops, how the sickness is verified and what actions should be performed, the automated system helps them to better farming duties. The objective of this endeavour is to help farmers improve farm output by detecting illnesses and pests that affect crops. [13]

III. METHODOLOGY

3.1 Proposed System Flow Chart

In the present work we proposed an approach based on image processing algorithms and techniques, used to detect the pest insects from the crops in the agricultural fields. The process includes the following steps: pre-processing, k-mean clustering, and other steps to remove noise content in the image and to find the boundaries of the objects. Finally the given image was classified as low and high based on the number of counts. By giving an input image we can able to segment the objects (insects) from the original one. Plant pest can recognize using MATLAB code. Here it detects the pests of plants through image processing where we will give images of the leaves of their disease affected crops. The image will go through several levels of processing to detect and identify the pests.

Advantages of our Proposed System:

- Simple approach and computational complexity is low.
- High image quality.
- Low Response Time
- Low Computational Power Required
- It consumes less time for operation.
- User Friendly for Run Program
- Easy for performing operation
- Good Results

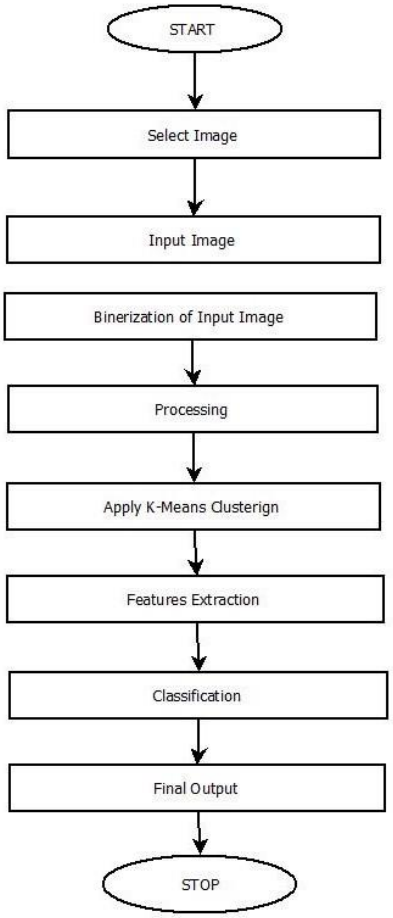

Figure: 1 Main Proposed Work Flow Chart

In this flow chart we can, 1st our main algorithm is start then we select a image to perform operation and this selected image is used as input image then algorithm perform per-processing task then this image converts in to segmented image after this image converts in to clustered image then final output will be show. And algorithm will be stop.

Classification using artificial neural network for pests

Neural networks (NN) are a sophisticated data mining technology for the classification and clustering of data. It's a computer experiment to compose and copy the functions of the brain. Most of the time, NN learns by comparison. If sufficient examples are supplied to NN, classifying and even identifying new trends or patterns of results should be possible. There are three levels of input, output and hidden layers in a basic NN. The input layer nodes are attached to the nodes of the hidden layer and a high number of nodes are available for each layer. The nodes of the output layer are linked to the secret layer nodes. Classification is considered one of the most complicated disciplines of research and implementation in artificial neural networks (ANR). These links reflect weights among nodes. The biggest problem to utilizing ANN to classify data sets with an increasing number of features and sets is the classification of instruction, learning and transition. The impact of different function combinations

employing ANN as a classifier and the accuracy of these functions for diverse datasets are examined.

IV. RESULT

Trained Artificial Neural Network

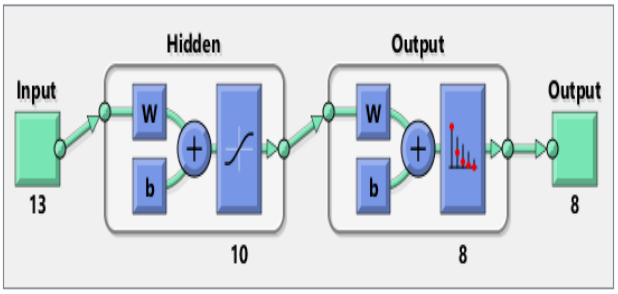

Figure: 2 Trained Artificial Neural Network

Figure: 3 Pests image

In this above screenshot we can see input pests infected image.

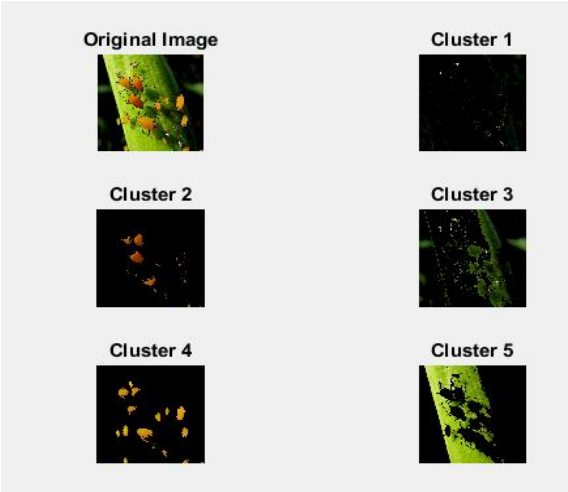

Figure: 4 Original Image with clusters Images

In the above screenshot we can see the predicted cluster This will be divided into five different clusters for identify which cluster predicted the presence of pest correctly and if the provided prediction is wrong than user can manually enter the value for all cluster. This is basically a color segmentation.

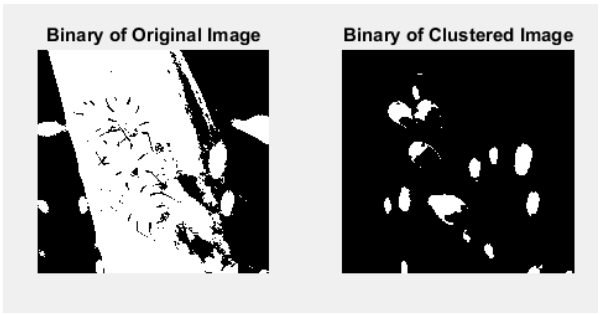

Figure: 5 Compute white pixel area

Here, we can clearly see the difference between the infected area by pests.

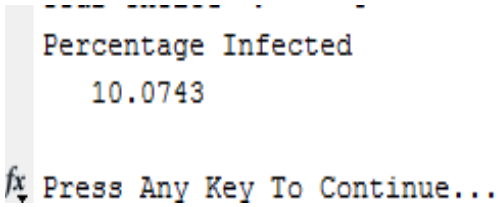

Figure: 6 Percentage of Infected area of our input image

In this image we can see percentage of infected area of our input image that is 10.0743%.

V. CONCLUSION

Every year demand for food is growing. To feed the expanding population it is vital to increase productivity. In order to meet food demand in 2050, additional 70 percent of food production is required. In many locations, chemical cultivation was utilized to prevent crop loss due to pesticides, weeds and diseases. Agriculture challenges are crop disease and pests detection. Since not every farmer is aware of all the diseases and pests which harm their crops, how the disease is verified and what actions are to be performed, the ANN technique helps them enhance the duties for agriculture. This work has been done with algorithms from the artificial neural network. The artificial neural network improves the accuracy, sensitivity and specificity of the results. A new ANN approach for the detection of pests is examined in this study. We trained an artificial neural network in this proposed approach to find the best outcomes. All images were redimensioned, pre-processed and other procedures. The image processing technique has proven to be useful as an efficient machine vision system for agriculture. In this Image Processing process the classification of pests that impact the output can be correctly categorized.

VI. FUTURE SCOPE

We plan to use regional pictures and enhanced ANN models to increase classification performance for future project. We also collect pictures of other ailments to expand the database. The main objective of future study will be the development of

a smart mobile device application for the detection of different plant diseases. For the future, we are planning to develop this system very precisely and plan to use the camera and the raspberry pi, single board computer for this algorithm. We want to make this IoT device compatible for remote detection monitoring.

VII. REFERENCES

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[14.]

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