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A BRIEF SURVEY ON APPLYING NEW INNOVATIVE TECHNIQUES TO IDENTIFYING CROP YIELD IMPROVEMENT USING INSECT IMAGES

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ABSTRACT

Insects are serious risk to food security in India not over in India, including other Asian nations; Insects pose a serious danger to food security in over all nation. One-fifth of the world's total crop production is annually destroyed by herbivorous insects. Natural fibbers that feed on insects and damage wooden construction materials They also have a significant impact on the health of people and domestic animals by creating annoyance, inflicting bites and stings, and spreading illness. Examples include rain stored grain and accurate the process of decoy. There is a negative impact of insects on crop productivity. While some insects drain the cell sap to prevent bees from aiding in pollination, others clip the plant components, restricting their growth. Some insects are even referred to as "borers" since they reduce agricultural yields overall. In this research, we discussed various papers, conducted a brief survey to classify and describe the results, and made recommendations for the best approach to apply to classifying insects, using augmentation techniques, and how to increase crop yield in recent years. Being able to identify insects to see around the farm helps to identify and categorise of the insect is very dangerous an urban agricultural pest.

Keywords: Insects, Crops, Classification, Augmentation Techniques.

1. Introduction

Farmers today find it increasingly difficult to identify pests in crops early. For the vast majority of individuals, agriculture is their main source of income. The current priority is to increase crop productivity. However, plant pest infection is a problem. Many approaches have been taken to deal with this problem. A variety of crops are grown in the field. In The majority of this research focuses on paddy crops. The two pest diseases that affect rice crops most frequently are green leafhopper and paddy stem borer. Farmers can use image processing techniques to identify pest morphology, impacted leaf areas, and colour changes caused by pest-infected areas, these issues can be resolved by individually identifying changes in each leaf's shape and size. The most reliable way for identifying pests in crops is automatic detection, and classification algorithms are used to categorise them based on image properties. The main goal of this research is to create an automated or semi automated agricultural image-based plant insect recognition system that can classify insects as bad or good insects and determine the percentage of affected leaves and plant diseases. We compared our technique to the latest approaches for insects, leaf, and plant disease classification using the same dataset. While sending another computerized or semi-mechanized framework created utilizing for execution examination, we will think about the normal most noteworthy discoveries of our system with

the typical results of our review work involving profound learning calculations for highlight extraction and grouping of bugs continuously bug picture information.

2. RELATED WORK

The multicolour weighty metal picture recognizable proof can be utilized to plan the multicolour weighty metal picture ID by the ghostly recognition in the dirt contamination part location strategy, and it can play the contamination cautioning job, according to the author's discussion in the paper [1] etl...September 2020 Arabian Journal of Geosciences. Described the writers of study [2] etl, Saleh Albahli, Momina Masood, Ali Javed, Waleed Albattah, and Marriam Nawaz, discussed it. The flow approach offers a particular structure for the programmed determination and order of plant infections. It is a pristine profound learning procedure for recognizing and sorting plant illnesses. To remove the agent gathering of highlights from the information test, we uniquely present the DenseNet-77.CenterNet classifier is then prepared utilizing the registered central issues to recognize and order different plant sicknesses. The 38 unmistakable yield sicknesses detailed in the Plant Village dataset might be quickly found and classified utilizing the recommended framework. Besides, our technique is as yet exact for characterizing plant sicknesses regardless of the presence of various curios, like varieties in the light's power, variety, size, direction, and type of plant leaves. There ought to be conversation on the creators of the review [3] that follows. Agribusiness Information Processing 8, 2021, 446-457, Using present day AI procedures, Thenmozhi Kasinathan, Dakshayani Singaraju, and Srinivasulu Reddy Uyyala characterize and distinguish bugs in field crops. Utilizing the bug bother recognizable proof procedure, the location execution for Wang, Xie, Deng, and IP102 datasets was accomplished with less calculation time. The near discoveries with the cutting edge order calculations uncovered extraordinary improvement in arrangement exactness, calculation time execution while apply all the more effectively in field yields to recognize the bugs. In horticulture, the arrangement exactness discoveries are used to recognize crop bugs right off the bat and abbreviate the time expected to further develop crop result and yield quality. In their review [4] named "Bug Detection and Classification Based on an Improved Convolution Neural Network," producers Denan Xia, Peng Chen, Bing Wang, Jun Zhang, and Chengjun Xie, For fast and precisely perceiving bugs in photos, an objective ID system considering refreshed VGG19 was presented. The current creators worked on the pre-prepared model given by the Caffe library, whose plan has effectively adjusted highlight extraction, to construct the ideal model for this examination. The consequences of the tests on the current dataset "MPest" exhibited that this strategy is faster and more precise than the ones at present being used. Barbedo, Jayme Garcia[5] Simulated intelligence 2020, 1, 312-328; doi:10.3390/ai1020021. Deep progressing unequivocally has shown a significant removed concerning precisely perceiving and mentioning aggravations in both fake and conventional photographs. The absence of vigor of programmed bother observing frameworks to the enormous scope of situations that can be found practically speaking is ostensibly the best boundary restraining their more extensive organization. Restrictions on the datasets used to prepare the arrangement models are the reason for this thus. To close this hole, more careful irritation picture information bases should be made. In any case, it is very suspicious that any headway in this space will be made utilizing regular systems given the level of vulnerability related with genuine application. Jun Liu and Xuewei Wang [6] present this paper.

Distinguishing Pests and Diseases of Tomatoes In light of the Improved Yolo V3 Convolution Neural Network, a technique to analyze tomato sicknesses and bug irritations is given. The Yolo V3 network was further developed utilizing multi-scale highlight recognition in view of picture pyramids, object bouncing box aspect gathering, and multi-scale preparing. The trial results show that the calculation has a recognition exactness of 92.39 percent and a location season of under 20.39 ms. Subsequently, the better Yolo V3 procedure proposed in this study can keep a high discovery rate as well as fulfill the ongoing recognition necessities and rapidly and precisely pinpoint the area and sort of tomato illnesses and bug bothers. In contrast with SSD, Faster R-CNN, and the first Yolo V3, the improved Yolo V3 CNN can identify dangers to tomatoes all the more precisely and rapidly, and it can satisfy the needs of continuous identification exactness and speed. The overhauled Yolo V3 organization's phenomenal heartiness for perceiving assorted object sizes and picture goals in convoluted circumstances is additionally delineated by evaluation of easily overlooked detail circumstances and changed picture objectives. The organization's superb recognition and situation exactness is additionally demonstrated to have the option to address the issues of nuisance and sickness location for tomatoes in such settings. The previously mentioned creators ought to introduce solid exploration and discoveries. The information from our survey ought to be applied to the prior ends.

3. Proposed Methodology

3.1 Systematic Literature Review

In the systematic survey approach, individual units from a population are sampled in-depth, and data gathering methods are applied to that sample. It consists of tools or procedures that, in order to collect data and boost survey response rates, ask various question patterns typically asked of a chosen sample.

In this research study method should defined several research questions and categorised method in (ssms) systematic survey methodology studies.

Research Questions	Subject
RQ-1	Properties of Data set
RQ-2	Classification of Insects
RQ-3	Limitations
RQ-4	Performances
RQ-5	Future Directions

RQ-1-Dataset Properties

1. Which insect affect the crop yield?
2. Which Index used for making pest management decisions?
3. What are the methods used to protect crops?
4. What insect causes the most damage?
5. How many crops do insects destroy?

RQ-2 Insect Classification

Since insects are considered to be animals, they belong to the Animalia kingdom. They belong to the phylum Arthropoda together with crustaceans since they have segmented bodies and an exoskeleton. The class Insect is where insects are classified. among insects Knowing the kind

of insects you encounter near your house or garden will help you determine if they are harmful, an agricultural or urban pest, or useful.

RQ-3 Limitations

The tracheal system is present in both insects and decapods, and it's possible that the oxygenated circulatory system is what prevents insects from growing to their maximum size. The use of other creatures to control pests like insects and mites is known as biological pest control. Predation, parasitism, herbivory, parasitody, or other natural mechanisms are used, although often active human management is also present.

RQ-4 Performances

Performances of Insects are the main decomposers of organic matter, offer crucial pollination services for the growth of crops and the maintenance of natural landscapes, and add environmental balance to intricate food webs.

RQ-5 Future Directions

The feature direction they have survived many environmental changes and are adapted in different ways. They reproduce frequently and have an exoskeleton. They have access to a wide variety of meals. They have adapted specialized mouth parts to suit the feeding habits.

In the table -1 in the table below, numerous study classification headings concerning various insect types, photographs of affected crops, and affected areas and percentages of affected areas have been gathered. Table 1 & Table 2 fully show the results status.

Table-1 Insects Classification

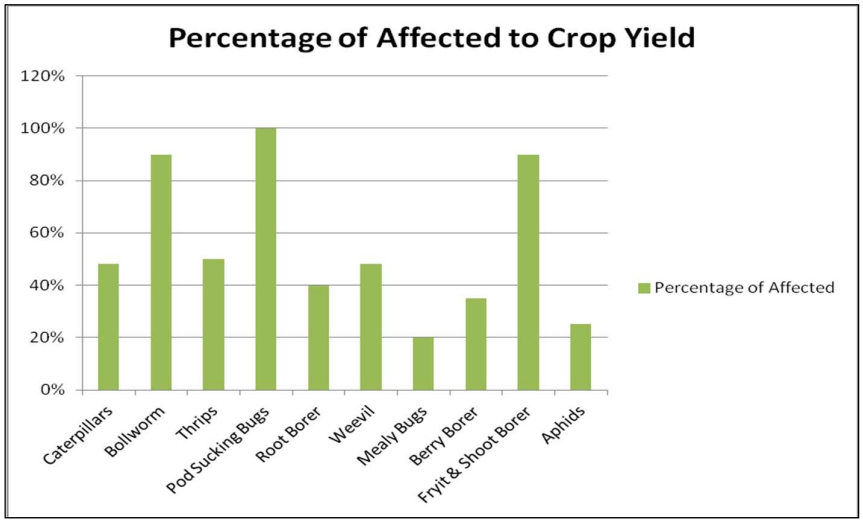
S.No	Different Types Of Insects	IMAGES	Crops Allocated Area	Percentages of Affected
1	Caterpillars		Stemboress	10 To 48%
2	Bollworm		Later buds lowers and Bolls	20 To 90%
3	Thrips		Eggs are laid on or just under the leaf issues	25 To 50%
4	Pod Sucking Bugs		Female Lays 15 eggs into spongy stem larvace feed on leaves and bore into pods	14 To 100%

5	Root Borer		Young shoots are entered by Borer Lavra, who then tunnels downward. As a result, the upper portion or the central leaf entire is severed, and the plant dies, leaving behind dead hearts and shoots.	20 To 40%
6	Weevil		Grubs that chew roots and feed on leaves or tree trunks cause plants to wither and die.	10 To 48%
7	Mealy Bugs		Nyissuemphs suck the sap from plant tissues	5 To 20%
8	Berry Borer		Gruns wilt limbs and occasionally kill shrubs as they tunnel into the steam over 8 to 9 months.	30 To 35%
9	Fryit & Shoot Borer		Early on, the larva bores into the fragile branches, causing "dead hearts."	15 To 90%
10	Aphids		Likewise called plant lice They are soft-bodied, pear-shaped liminutine insects that mostly feed on sap in the spring and summer.	5 To 25%

Table-2 Affected Percentages of Insect

Different Types Of Insects	Percentage of Affected
Caterpillars	48%
Bollworm	90%
Thrips	50%
Pod Sucking Bugs	100%
Root Borer	40%
Weevil	48%

Mealy Bugs	20%
Berry Borer	35%
Fryit & Shoot Borer	90%
Aphids	25%



PICTURE-1PERCENTAGE OF AFFECTED TO CROP YIELD

4. PROPOSED SURVEY RESULTS AND DISCUSSION

In the research survey classification performed using different types of insect classification images with crops allocated area and numbers of percentages should be affected. We classified previous various Insect classification papers. In the Authors discussed various things and most of the author Discussed. A method for processing images using Deep learning algorithms. In order to compare the classification accuracy for insects, CNN models are also utilised, along with ANN, SVM, KNN, and Naive bayes. However, we use a deep learning algorithm in our proposed research survey to focus on suggesting new algorithms. GANs (Generative Adversarial networks) Deep learning generative algorithms called GANs produce new data instances that mimic the training data. The two halves of GANs are a generator that learns to create false data and a discriminator that learns from that false data. GANs aid in producing realistic visuals. Render 3D objects and take pictures of insects. Because GANS are unsupervised and don't need labelled data to be trained, data labelling is a costly operation. Right now, GANs provide the sharpest images. This is made possible by adversarial training. Only back propagation can be used to train both GAN networks.

5. RESULTS AND DISCUSSION

In the above Research survey to suggest to using Features research to implement Deep learning Algorithm GANS (Generative Adversarial networks) We contrasted several algorithms, however the GANs model is used to increase the classification accuracy using extracting features. With various convolution layers, better classification accuracy is possible, as shown by the GANs model's exploration of high level characteristics in insect photos.

Table-3 OVERALL TABLE PERFORMANCE

ALGORITHM	TABLE PERFORMANC ACCURACY LEVEL IN PERCENTAGE
ANN	88.5%
SUM	91.2%
KVVN	93.4%
NAÏVE BAYES	95.3%
CNN	96.7%
GANs	98.3%

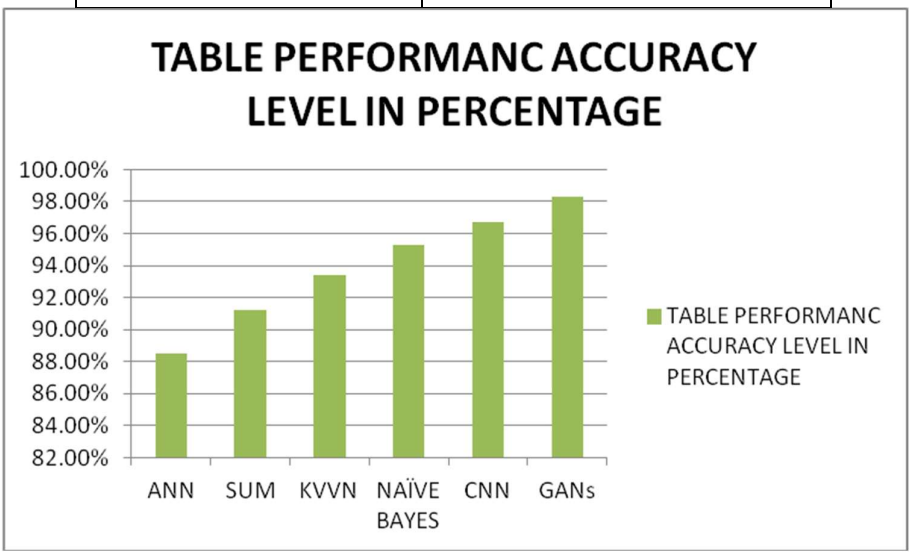


Figure-2 Overall Performance of Algorithms

In the above Table-3 various authors' performances were discussed, and in the meantime, study survey results were explored, with the best bug picture categorization using GANs algorithm being made evident. It takes a long time to manually get tagged data. Labelled data are not necessary for GANs. The internal representations of the data in this algorithm were performed using an algorithm for detecting insect pests, and it thinks Deep learning algorithms and techniques with a wide range of insects and insect images in agricultural field crops at various developmental stages. As they understand the internal representations of the data, they can be trained using unlabeled data.

6. CONCULSION

In this review, different datasets and photographs of bugs were arranged and recognized involving the profound learning and bug's recognition procedure in GANs. We discussed several algorithms, including ANN, SVM, KNN, Naive Bayes, and CNN. Our research's suggested technique, GANs in deep learning, produced extremely good results when used to detect several insects and insects in photographs taken at various stages of development in agricultural field crops. The performance of this method was enhanced by the use of insect photos and a faster algorithm for detecting pest insects. Crop photos of insects during various stages of development in agricultural.

7. REFERENCES

1. T. Han, "Design and application of multicolour image identification in soil pollution component detection," Arabian Journal of Geosciences, vol. 13, no. 18, 2020.
2. Waleed Albattah, Marriam Nawaz, Ali Javed, Momina Masood, Saleh Albahli "A clever profound learning technique for identification and order of plant sicknesses "Complex and Intelligent Systems (2022) 8:507-524 https://doi.org/10.1007/s40747-021-00536-1
3. Thenmozhi Kasinathan, Dakshayani Singaraju, Srinivasulu Reddy Uyyala, Insect grouping and identification in field crops utilizing current AI procedures, Information Processing in Agriculture 8 (2021) 446 - 457.
4. Denan Xia , Peng Chen , Bing Wang , Jun Zhang , and Chengjun XieInsect Detection and Classification Based on an Improved Convolutional Neural, Network,www.mdpi.com/journal/ Sensors 2018, 18, 4169; doi:10.3390/s18124169.
5. Jayme Garcia Arnal Barbedo Detecting and Classifying Pests in Crops Using Proximal Images and Machine Learning: A Review AI 2020, 1, 312–328; doi: 10.3390/ai1020021 www.mdpi.com/journal /ai.
6. Denan Xia , Peng Chen , Bing Wang , Jun Zhang , and Chengjun XieInsect Detection and Classification Based on an Improved Convolutional Neural Network, Frontiers in Plant Science | www.frontiersin.org 1 June 2020 | Volume 11 | Article 898.
7. J. Akosa, Predictive accuracy: A misleading performance measure for highly imbal- anced data, in: Proceedings of the SAS Global Forum, volume 12, 2017.
8. A. Antoniou, A. Storkey, H. Edwards, Data augmentation generative adversarial net-works, arXiv preprint arXiv:1711.04340 (2017).
9. K.S. Banga, N. Kotwaliwale, D. Mohapatra, S.K. Giri, Techniques for insect detection in stored food grains: an overview, Food Control 94 (2018) 167–176.
10. G. Bebis, M. Georgiopoulos, Feed-forward neural networks, IEEE Potential. 13 (4) (1994) 27–31.