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A Survey on Pest Detection and Pesticide Recommendation using CNN Algorithm

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Abstract: ***When we think of crops, we automatically tend to think about the insects because they are the ones which reduces the crop yield rate and has been a nightmare for farmers. With the technology improvement, we still couldn't find an efficient way to sort these issues and the farmers are struggling with the harmful impacts caused to the crops by the variety of insects. The Present method that the farmers are following for separating the insects from the crops is with the help of man power. But this requires a lot of man power and it also requires a lot of time when there is a huge crop field. This work makes use of convolutional neural network model to identify and classify the insects.***
Compared with previous classifiers such as k-nearest neighbors and linear discriminate analysis (LDA), support vector machine (SVM) was proposed with Haar-like features to classify insects and obtained a poor performance than the Convolutional Neural Network .The proposed model is an Android app and thus it helps effectively for farmers.
Keywords: Convolution neural networks, android app.

I. INTRODUCTION

Convolutional Neural Networks (ConvNets or CNNs) are a category of Neural Networks that have proven very effective in areas such as image recognition and classification. CNN have been successful in identifying faces and it is done by taking the image, pass it through a series of convolutional, nonlinear, pooling (downsampling), and fully connected layers, and get an output. The output can be a single class or a probability of classes that best describes the image. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/ characteristics. The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex.
A ConvNet is able to successfully capture the Spatial and Temporal dependencies in an image through the application of relevant filters. The architecture performs a better fitting to the image dataset due to the reduction in the number of parameters involved and reusability of weights. In other words, the network can be trained to understand the sophistication of the image better. Here inorder to help farmers from pests , we use CNN to capture the insects in the field . From the image captured it processes the data with the samples and gives an output. With that output we suggest the right pesticide for the farmer.

II. LITERATURE SURVEY

In paper[1],the authors Lingqiao Liu, Chunhua Shen, Anton Van Hengel discussed about cross convolutional pooling and 2 types of methods to create image representation. The first method is ,the image is directly feeded into DCNN. The second method is, applying the DCNN to the input image to subregions . DCNNs is very much helpful in extracting local features of the input image. The issue is While using k value for pooling method and when k becomes too large, retrieval performance will start to drop.
In paper[2],the authors Rahul Chauhan, Kamal Kumar, R.S.Joshi discussed the as Relu non linearity activation function that has been used for training neural network models . Relu activation function has been widely used to train larger neural networks and it is also relatively easier activation function when compared to sigmoid, tanh, and leaky activation functions. The issue is, In case of high bias which results in underfitting ,the network needs to be trained longer Variance error will occur and it affects the resultant value. In paper[3],the authors Ann-Katrin Fattal, , Michelle Karg, Christian Scharfenberger, and Jürgen Adamy discussed about the region proposal networks . The RPN is used as slider over the feature maps of a convolutional layer, then it computes each anchor scores by using bounding box regression at each different level. Small ZF-Net is used that consists of five convolutional layers, two pooling and two fully connected layers. The two pooling layers makes sure the input image is not down-sampled, so small objects is detected. The issue is prior maps which are relying on Visual Attention might produce inconsistent results.
In paper [4] Ke Gu discussed about smoke detection. They used a new deep dual-channel neural network (DCNN) which is made by selective-based batch normalization network(SBNN) and skip connection-based neural network(SCNN) for feature fusion and feature extraction for classification of smokes.

So the DCNN consist of two layers the first is multiple convolutional layer and max pooling layer which is used to extract the detail information of smoke and the second layer is the batch normalization layer which is used to improve the feature propagation. These two layers can be used in our project for feature identification.

In paper [5] Yang Ji discussed about automatic classification of spider image in natural background based on Convolutional Neural Network and transfer learning. So here they used inspection v-3 and feature vector for transfer learning model which is used to solve domain problems with existing knowledge. The image pro processing is done with contour detection and data expansion. And CNN is used to extract effective feature of spiders from complex images with natural background.

In paper [6], Shaoqing discussed about real time object detection using faster R-CNN. The R-CNN is a classifier that identify the regions on image. It mainly consit of two modules the deep fully convolutional network which is used to propose regions and the second model which is faster r-cnn that detects the proposed regions. Here the rcnn uses a shared convolutional layer to get rectangular object proposal. It is an unified, deep learning based object detection that runs at 6-17 frame per seconds.

In paper [7], Sangdi Lin and George C.Runger discussed about a new end to end deep neural network model for time-series classification (TSC) with emphasis on both the accuracy and the interpretation. This model consists of a convolutional network component to extract high level features and a recurrent network component to enhance modeling of the temporal Characteristics of TS data . It also uses sparse group lasso (SGL) to generate final classification. This model gives good interpretability through the SGL.It outperforms traditional CNN.

In paper [8] , Fok Hing Chi Tivive and Abdesselam Bouzerdoum discussed about some efficient training algorithms based on first order , second order and conjugate gradient optimization methods. This is a hybrid method derived from the principles of quickprop, rprop and LS . Alll these methods are combined to give a better recognition pattern of the image .

In paper [9], R Amog Shetty Rishab F TatedSunku Rohan Triveni S Pujar use CNN and train a neural network model that predicts whether the crop is going to get any pest and disease attacks. The model developed by these authors gave up to 99% classification ability which satisfies the required efficiency as Neural Network is used. It highly depends on the colour and shape features that are extracted from the input image the prediction occurs

In paper [10] ,Hoo- Chang Shin , Holger R Roth, Mingchen Gao , Le Lu , Ziyue Xu , Isabella Nogues , Jianhua Yao , Daniel Mollura , Ronald M summers discussed about factors of employing deep convolutional neural networks to computer aided detection problems Here the different CNN architectures are explored and evaluated .It contains 5 thousand to 160 million parameters and finally the examination of transfer learning is done .This is more efficient than normal CNN methods.

Table1.1 CNN in different fields

S.NO	PAPER	TECHNIQUE	RESULT	ISSUES
1.	Convolutional layer Pooling for Image Recognition	Cross-layer pooling	In Comparison Cross- layer pooling counterpart achieves 74.4% on MIT67 which is much better than the traditional pooling	While using k value for pooling method and when k becomes too large,retrieval performance will start to drop.
2.	Convolutional Neural Network(CNN) for Image Detection and Recognition	Relu non linearity activation function	The calculated accuracy on MNIST is 99.6% .	In case of high bias, which is on training batch the network needs to be trained longer . Variance error will occur
3.	Saliency-Guided Region Proposal Network for CNN Based Object Detection	RegionProposed Network,Small ZF-Net	The region proposal network increases the overall execution time of up to 3ms .	The issue is prior maps which are relying on Visual Attention might produce inconsistent results
4.	Deep Dual-Channel Neural Network for Image-Based Smoke Detection	DCNN and SBNN SCNN	The DCN has achieved high performance on average as compare to HLTMPC.	the DCNN fails with the smoke that has fewer textures.
5.	Automatic Classification of Spider Images in Natural Background	Convolutional Neural Network, Transfer Learning, Contour detection and data expansion for preprocessing of image.	the accuracy of training set and testing set can reach more then 90% recognition speed can be controlled with 1 second.	The accuracy and loss of training set changed with time and CNN is too simple and it was not able to extract accurate feature of spiders.

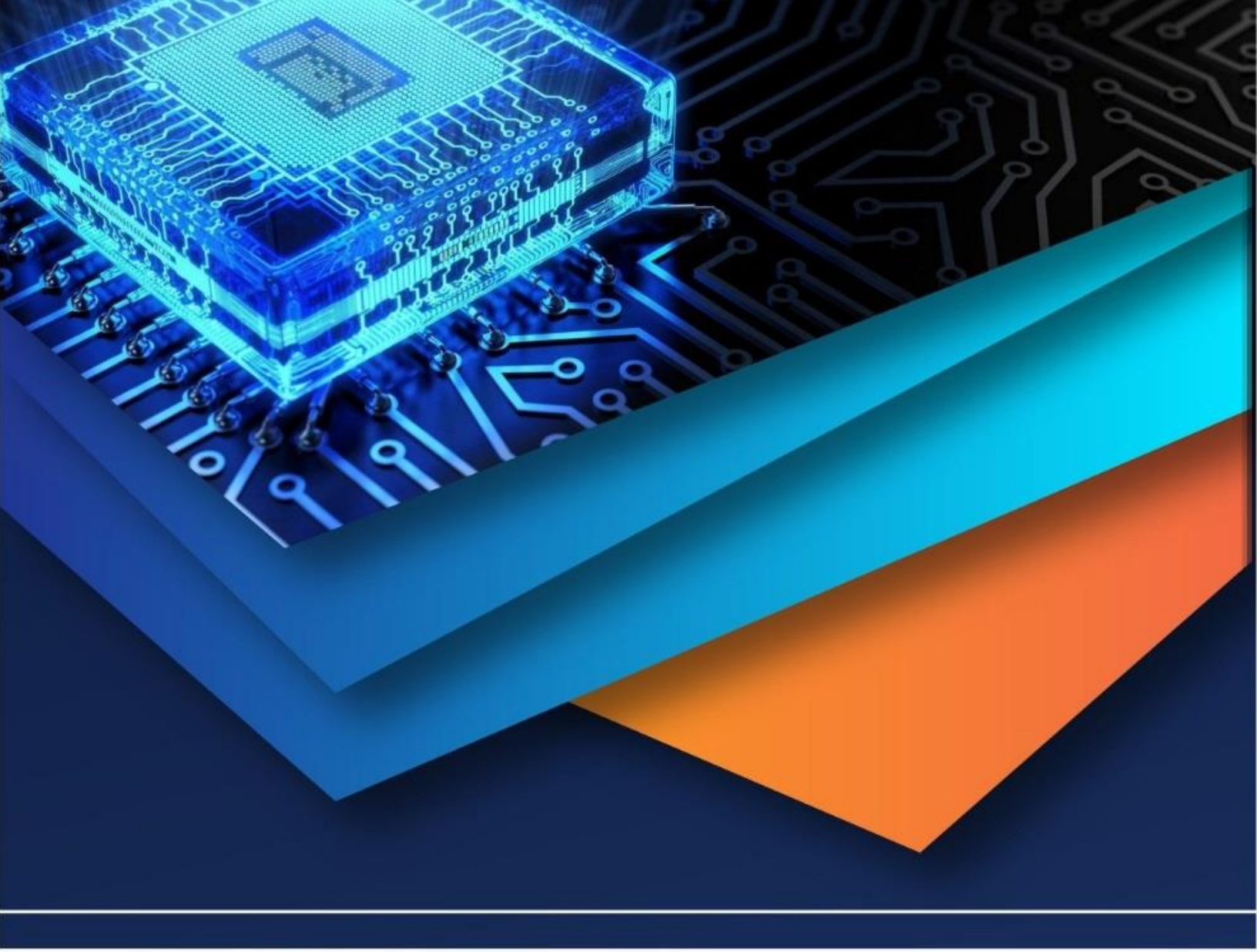
6.	Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks	ROI Pooling , Convolutinal layers were used for object region identification.	It detects objects of wide range of scales and aspect ratio.it require only 198ms to identify regions which is faster the normal rpn.	The system failed in high noises area.
7.	GCRNN: Group-Constrained Convolutional Recurrent Neural	Sparse group lasso , CNN	The output is satisfying classification and also good interpretability.	classification accuracy is not large
8.	Efficient training algorithms for a class of shunting inhibitory convolutional neural networks	CNN , first order ,second order training methods and conjugate gradient optimization methods	error rates of lesss than 3% across all architectures	: it takes more time in training the data sets
9.	CNN based Leaf Disease Identification and Remedy Recommendation System	CNN, leaf disease, Classification, deep learning, remedies	The network is trained with 99% classification ability with CNN to provide remedy	99.32% is achieved yet it can be generalized to classify for other diseases.
10.	Deep Convolutional Neural Networks for Computer-Aided Detection: CNN Architectures, Dataset Characteristics and Transfer Learning	pre trained images ,CNN	High performance for medical imagining tasks	It needs collection of more data sets and takes more time

III. CONCLUSIONS

CNN can be used to give high accuracy in detection and classification of insects compared to other algorithms. A variety of insects detected and thus generalizing for a number of diseases. The insects images provided as input can be in any of the classes of pest images included in the training set. The model trained as a result can classify a number of diseases by CNN to give high accuracy unlike other algorithms as high upto 90%.

REFERENCES

[1] Liu, L., Shen, C., & Hengel, A. van den. (2017). Cross-Convolutional-Layer Pooling for Image Recognition. IEEE Transactions on Pattern Analysis and Machine Intelligence, 39(11), 2305–2313.
[2] Chauhan, R., Ghanshala, K. K., & Joshi, R. . (2018). Convolutional Neural Network (CNN) for Image Detection and Recognition. 2018 First International Conference on Secure Cyber Computing and Communication (ICSCCC).
[3] Fattal, A.-K., Karg, M., Scharfenberger, C., & Adamy, J. (2017). Saliency-guided region proposal network for CNN based object detection. 2017 IEEE 20th International Conference on Intelligent Transportation Systems (ITSC).
[4] K. Gu, Z. Xia, J. Qiao and W. Lin, "Deep Dual-Channel Neural Network for Image-Based Smoke Detection," in IEEE Transactions on Multimedia, vol. 22, no. 2, pp. 311-323, Feb. 2020.
[5] Y. Jian, S. Peng, L. Zhenpeng, Z. Yu, Z. Chenggui and Y. Zizhong, "Automatic Classification of Spider Images in Natural Background," 2019 IEEE 4th International Conference on Signal and Image Processing (ICSIP), Wuxi, China, 2019, pp. 158-164
[6] Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun
[7] Lin, S., & Runger, G. C. (2017). GCRNN: Group-Constrained Convolutional Recurrent Neural Network. IEEE Transactions on Neural Networks and Learning Systems.
[8] Tivive, F. H. C., & Bouzerdoum, A. (2005). Efficient Training Algorithms for a Class of Shunting Inhibitory Convolutional Neural Networks. IEEE Transactions on Neural Networks,
[9] Suma V R Amog Shetty, Rishab F Tated, Sunku Rohan and Triveni S Pujar “CNN based Leaf Disease Identification and Remedy Recommendation System” , Proceedings of the Third International Conference on Electronics Communication and Aerospace Technology [ICECA 2019] IEEE Conference Record , Vol. ,pp:395-399
[10] H. Shin et al., "Deep Convolutional Neural Networks for Computer-Aided Detection: CNN Architectures, Dataset Characteristics and Transfer Learning," in IEEE Transactions on Medical Imaging, vol. 35, no. 5, pp. 1285-1298, May 2016.



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