

A Decision Support System for Farmers: Pest Identification and Pesticide Recommendations

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ABSTRACT_

This project offers a pest identification system for classifying helpful and harmful pests in crops. To that end, the initiative first gives a full summary of the available pest-identification techniques, as well as their advantages and disadvantages. This research proposes a revolutionary categorization technique based on the inquiry. The Convolutional Neural Network was used to create the proposed

pest identification and classification model (CNN). A dataset of 9,500 photos of 20 distinct pests was used to train the model. The system has been validated against other traditional classification models after being evaluated with a large amount of data. The proposed technique has a classification accuracy of 90%, which is much superior to other conventional methods.

1.INTRODUCTION

Agriculture is one of the most important aspects of Bangladesh's financial system.

Almost 65% of the complete populace is immediately or not directly involved in agricultural practises, which has a huge impact on the country's economic system [1]. As a result, inhabitants in this agricultural nation are constantly conscious of farming and crop production. However, some manufacturing elements, like as pests, fertiliser, and water, are always present in bumper production. Pests and their effects on agriculture productivity is discussed in this paper. It accomplishes this by introducing the deep learning approach to figuring out as well as dividing pests into two groups: dangerous pests and harmless pests. Unfortunately, the majority of Bangladeshi farmers are insufficient Because they are inexperienced and lack the knowledge to distinguish between unsafe and safe pests, they frequently seek to destroy both types of pests, lowering the manufacturing rate in the long term. As a result, distinguishing between pests that are truly beneficial and

those that are harmful is a major difficulty. For the next few decades, scientists have been seeking to solve this problem and suggesting a variety of solutions.

2.LITEARATURE

2.1 V. Singh, V. and P. A. K. Misra , "Detection of unhealthy region of plant leaves using Image Processing and Genetic Algorithm," in 2015 International Conference on Advances in Computer Engineering and Applications (ICACEA), Ghaziabad, India, 2015.

Agricultural productiveness is the single most important factor in the Indian economy. This is among the reasons why alimentrecognition in plants is so important in the agriculture area, because plant aliment are rather common. If appropriate precautions is not provided, given in this area, major consequences occur on flowers, affecting product quality, volume, and productiveness. Plant aliment detection using an automated method is hugely advantageous since it lowers a tremendous amount of screening work in large farms of crops, and it detects the signs and indications of aliments at an early stage when they appear on leaf tissue. This work presents a photo segmentation technique for digital detection and classification of plant leaf diseases, as well as a survey of unique disease classification strategies that can be employed for plant leaf disease detection. The usage of a genetic algorithm is used to do image segmentation,

which is a necessary component for detecting disorder in plant leaf disease.

2.2 W. Ding and G. Taylor, "Automatic moth detection from trap images for pest management", Computers and Electronics in Agriculture, vol. 123, pp. 17-28, 2016. Available: 10.1016/j.compag.2016.02.003.

We advocate an automated moth detection pipeline according to convolutional neural networks. A set of strategies for enhancing uncooked moth entice pictures is described. On a dataset of codling moth pictures collected in the area, our approach showed excellent overall effectiveness. Our species-agnostic technique can easily be adjusted to unique pests and/or settings. In pheromone-based pest management systems, controlling the range of insect pests is vital. In this study, we suggest a computerised recognition method for identifying and quantifying pests in photos taken inside area traps that is based entirely on deep learning. When applied to a dataset of industrial codling moths, our method shows promise in both qualitative and quantitative terms. Despite of prior pest-detection endeavors,, our technique employs no pest-specific engineering, allowing it to acclimatize to a wide range of species and habitats while requiring little human intervention. It can be implemented on parallel hardware, making

it suitable for deployment in situations where real-time actual quality is necessary.

3.PROPOSED SYSTEM

TensorFlow, a powerful Python package, was used to create the proposed model. The suggested model, like existing CNN architectures, has three layers: input, hidden, and output. Model we've suggested comprises of four Convolutional layers and equal number of activation functions. The model has four max polling layers, a later flattened layer, and a fully linked layer to connect the output layer. The suggested model has 48x48x32 neurons, 22x22x64 neurons, 9x9x128, 2x2x200 neurons, and 1x1x64 neurons.

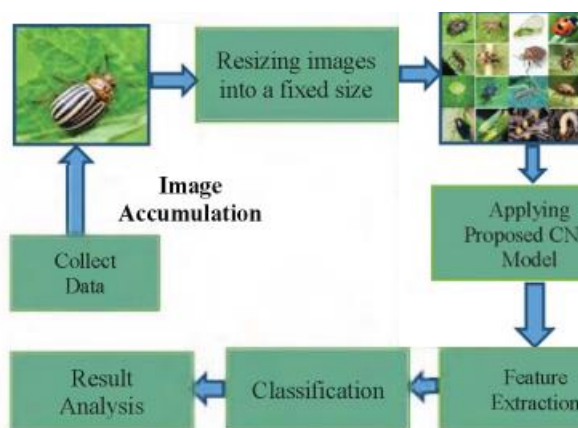


Fig 1:Proposed Model

3.1 ALGORITHM IMPLEMENTATION

Convolutional Neural Networks (CNN) are used in a variety of applications. It is, without a doubt, the most well-known profound study of architecture. Because of the widespread recognition and success of convnets, there has been a recent increase

in interest in deep learning. AlexNet launched the pastime in 2012, and it has developed enormously since then. Researchers went from an eight-layer AlexNet to a 152-layer ResNet in just three years.

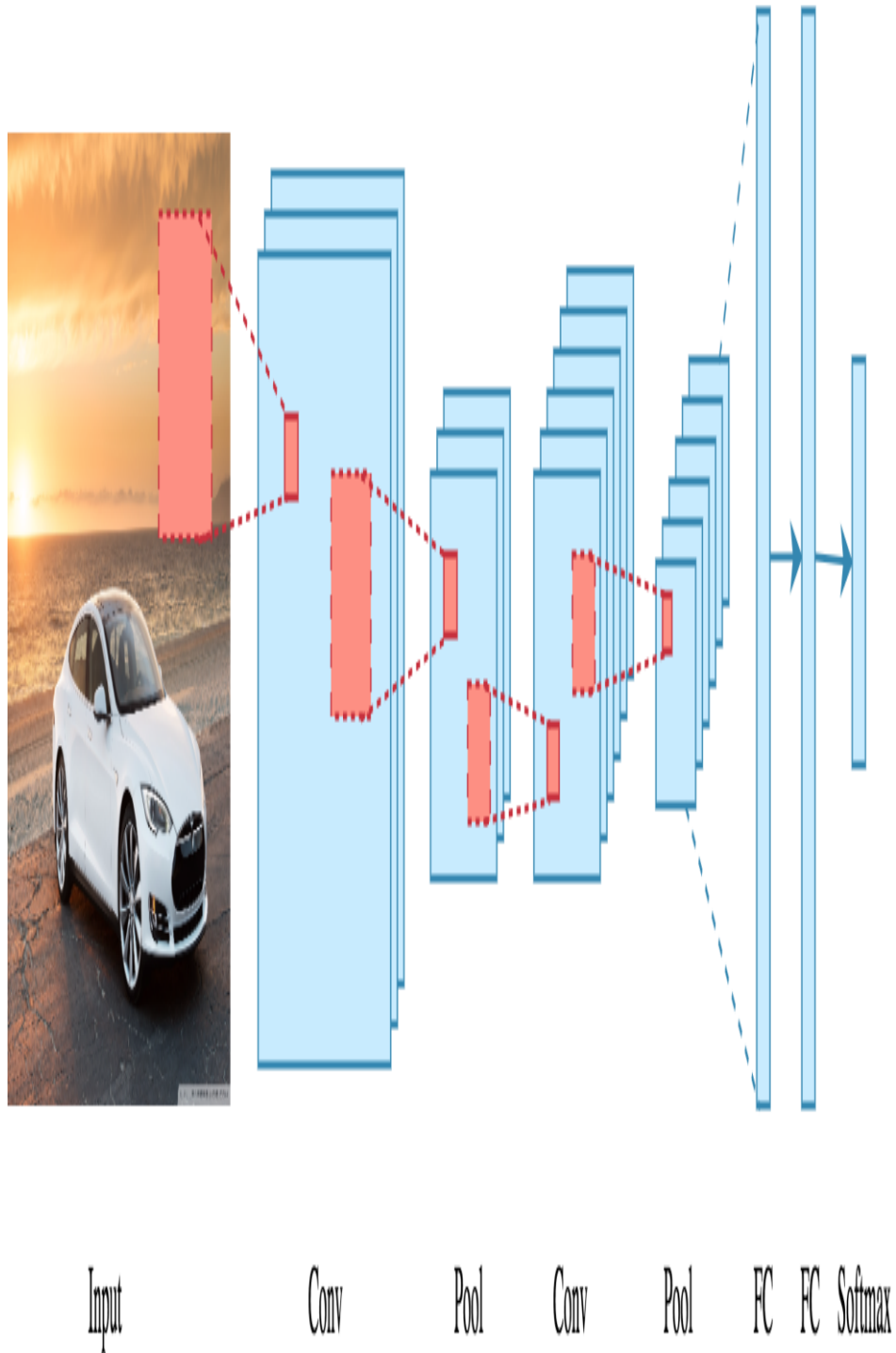
CNN has become the easy mannequin for any photograph-related issue. They blow opposition out of the water with precise language. It's also useful in recommender systems, herbal text analysis, and other applications. CNN's key benefit over its antecedents is that it detects the key features without requiring human intervention.. For example, given a large number of photographs of cats and puppies, it learns unique facets for each category on its own.

Furthermore, CNN is highly scalable. It accomplishes parameter sharing and uses one-of-a-kind convolution and pooling procedures. CNN styles may now be viewed on any device, making them widely appealing.

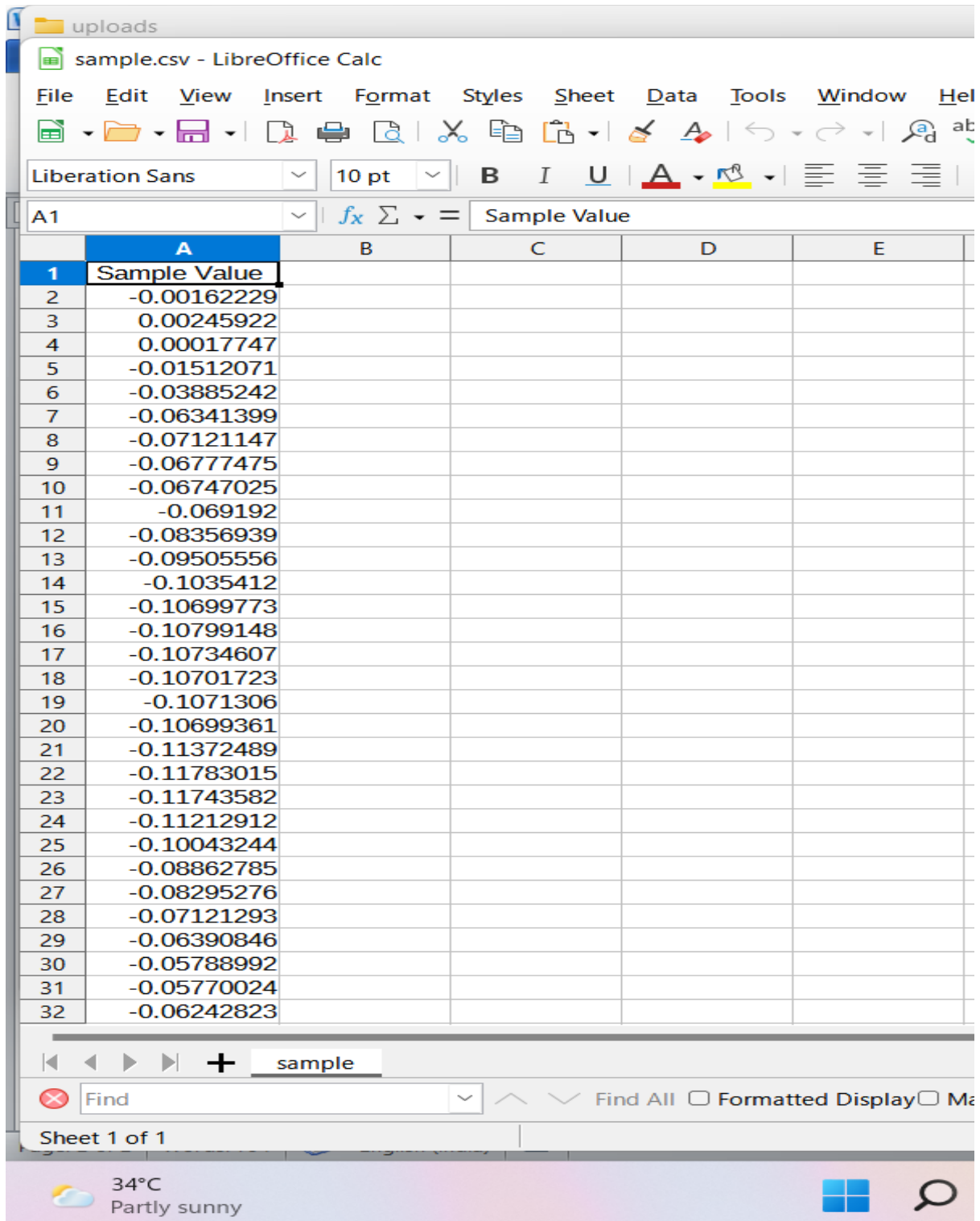
Overall, this appears to be truly magical. We're working with a highly effective and environmentally friendly mannequin that uses automatic characteristic enhancement to achieve superhuman accuracy (yes CNN models now do photograph classification higher than humans). Perhaps, this post

will assist us in discovering the techniques and procedures of this wonderful

technology..



4.DATASET INFORMATION



The screenshot displays the LibreOffice Calc application window titled "sample.csv - LibreOffice Calc". The spreadsheet contains the following data:

	A	B	C	D	E
1	Sample Value				
2	-0.00162229				
3	0.00245922				
4	0.00017747				
5	-0.01512071				
6	-0.03885242				
7	-0.06341399				
8	-0.07121147				
9	-0.06777475				
10	-0.06747025				
11	-0.069192				
12	-0.08356939				
13	-0.09505556				
14	-0.1035412				
15	-0.10699773				
16	-0.10799148				
17	-0.10734607				
18	-0.10701723				
19	-0.1071306				
20	-0.10699361				
21	-0.11372489				
22	-0.11783015				
23	-0.11743582				
24	-0.11212912				
25	-0.10043244				
26	-0.08862785				
27	-0.08295276				
28	-0.07121293				
29	-0.06390846				
30	-0.05788992				
31	-0.05770024				
32	-0.06242823				

Fig 2:Dataset Details

predicted positive observations to the total actual positives, providing insights into a model's completeness in capturing instances of a given class.

$$Recall = \frac{TP}{TP + FN}$$

Here we are presenting our results

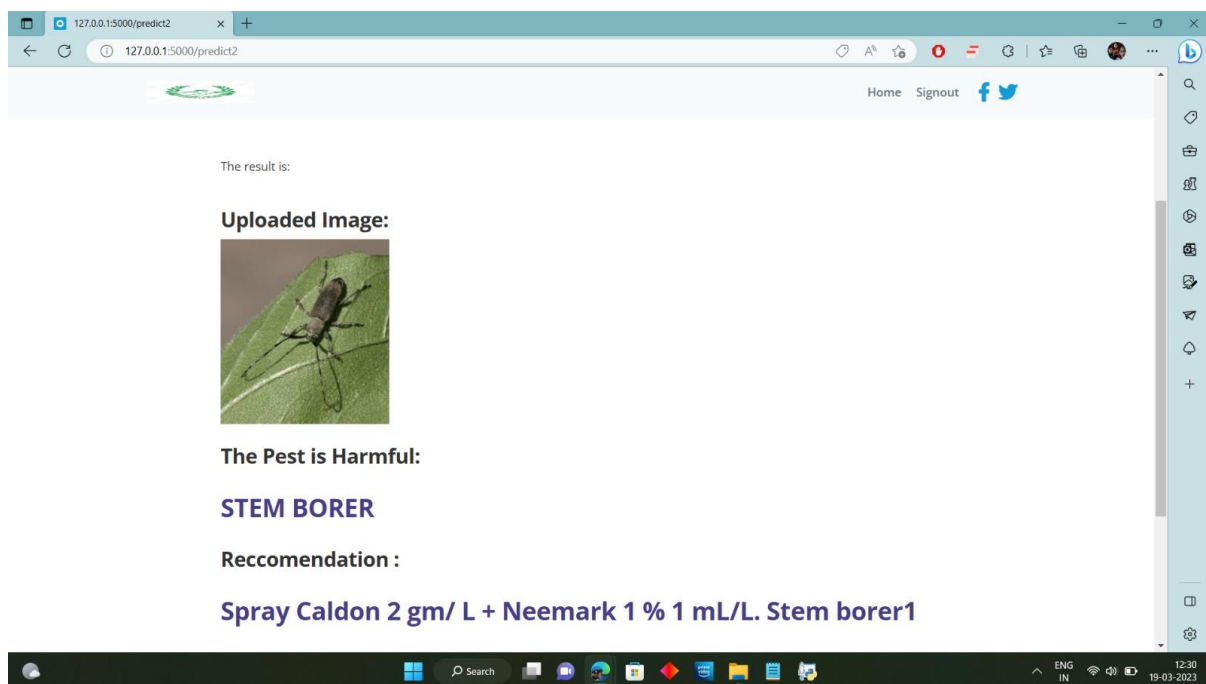


Fig 4:In the above screen we can see the output our project .first we have to upload input image based on that we get pest information

6.CONCLUSION

A pests-classification mannequin set totally on CNN utilized to be cautioned in this article. The proposed mannequin gives great amenities to the ranchers to understand really useful and detrimental bugseffectively. To set up the mannequin bugs with two special lessons have been viewed the place every type take 10 extraordinary species. A massive quantity of pests' pics have been taken to educated and check the Framework. The machine

considers more than a few sorts of CNN based Completely classification strategies for discovering the fabulous predictor. Table three suggests that nearly all CNN strategies have been extraordinarily precise, be that as it may the proposed one is the pleasant amongst all. Other than, the time and complexity of Execution of the proposed CNN structure are diminish than the extraction and switch models. Within the future, a greater correct and sturdy mannequin will be Created for bettering

the exactness of the pests-identification framework. A smartphone utility will additionally be created within the future to realize pests and to exhibit the pest information to the Agriculturists. The utility will place a high priority on prompt bug detection and preventing trim damage from hazardous pesticides and harmful pesticides for helpful pests.

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