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IDENTIFICATION OF PLANT, FLOWER AND DETECTION OF PLANT DISEASE USING MACHINE LEARNING

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Abstract : Early identification of plant diseases is crucial for decreasing losses in agricultural product output and quantity. It's difficult to keep track of plant diseases by hand. It needs a lot of effort, as well as plant disease knowledge and extensive processing time. There are a variety of plants and flowers that may be beneficial or have medical properties. And it's impossible to identify them all. As a result, image recognition is employed for all plant, flower, and plant disease detections. Image recognition involves the steps like image acquisition, image pre-processing, and classification. This paper discusses how the MobileNet CNN model is utilized via transfer learning to identify the images of plant leaves and flowers.

IndexTerms **- plant diseases, MobileNet, CNN, transfer learning**

I. INTRODUCTION

Plants are a major source of energy and a vital element in the solution to the crisis of global warming. There are a number of issues that afflict plants that have the potential to inflict significant economic, social, and environmental harm. These problems include diseases, malnutrition, pests and weeds. In this context, early and accurate detection and identification of these problems are vital.

The flower is a crucial means for a plant to attract pollinators, who are required for the plant to generate seeds, which are the reproductive structures that help a species to survive generation after generation. Flowers are botanically important structures and vital sources of food for many species, in addition to giving beauty, texture and biodiversity to gardens and ecosystems.

For countless generations, humans have carefully picked and grown plants for food, medicine, clothing, shelter and beauty. When plants are taken out of their natural environment and grown under what are sometimes abnormal conditions, diseases are just one of several risks that must be considered. Many valuable crop and ornamental plants are disease-prone and would struggle to survive in the wild without human involvement.

There are numerous approaches to detect plant pathology when it comes to plant diseases. Some diseases have no evident symptoms at all, or only develop them when it is too late to intervene. Vegetable diseases can show up in a variety of places on the plant. Visual cues can be explored in practically all of those sections, including roots, kernels, fruits, stems, and leaves. In a few situations, advanced analysis, such as using strong microscopes, chemical testing, or ultra-sounding is required. However, in the vast majority of cases, the aforementioned issues exhibit themselves in the visible spectrum. Humans usually notice and identify these mostly through their sight. Trained software may improve the efficiency of detecting these issues all the more. This research is focused only on the visible symptoms present on the surface of leaves of the plant.

II. LITERATURE REVIEWS

2.1 Various plant diseases detection using image processing methods

The concepts of image processing come in useful and are utilized to detect diseases. Data set collection, segmentation, image pre-processing, feature extraction from segments, and classification based on the results are all aspects of the detection process. This study outlines the basic approaches for detecting plant diseases using leaf images

2.2 Flower species recognition system using convolution neural networks and transfer learning

A deep learning strategy using convolutional neural networks (CNN) is employed in this presented research work to classify floral species with high accuracy. A transfer learning approach is used to extract features from flower images. To improve accuracy, a classifier model such as random forest or logistic regression is applied on top of it. This method reduces the amount of hardware required to complete the computationally difficult task of training a CNN.

2.3 Plant disease detection using machine learning

From the data sets obtained, random forest is used to distinguish between healthy and unhealthy leaves. It entails a number of steps, including dataset preparation, feature extraction, classifier training, and classification. To detect the infected and healthy images, the produced datasets of diseased and healthy leaves are collectively trained using random forest.

2.4 Deep-plant: plant identification with convolutional neural networks

This research looked at how to use deep learning to learn distinguishable characteristics from leaf photos and use classifiers to identify plants. They have demonstrated that learning features by CNN can provide better feature representation for leaf images than hand-crafted features based on the experimental findings. Furthermore, they revealed that venation structure is a significant trait for identifying various plant species, topping conventional solutions by 99.5 percent. This is confirmed by using the DN visualization approach to examine the network's internal operation and behavior.

2.5 Plant disease and pest detection using deep learning-based features

The performance of nine powerful architectures of deep neural networks for plant disease diagnosis was examined using diverse methodologies in a study on plant disease and pest detection using deep learning-based characteristics. These deep learning models are adapted to the situation at hand using transfer learning and deep feature extraction approaches. The presented work takes into account the used pre-trained deep models for feature extraction and fine-tuning. Extreme learning machine (ELM), support vector machine (SVM) and k-nearest neighbor (KNN) approaches are used to classify the features extracted using deep feature extraction.

2.6 Plant leaf disease classification and detection system using machine learning

Pre-processing, leaf segmentation, feature extraction, and classification are the four phases applied in this paper to determine the type of disease. The k-nearest neighbors (KNN) approach is used to find solutions to classification and regression issues. It is a guided, supervised, and advanced machine learning algorithm. This research presents a representation of leaf disease identification using image processing to identify flaws in tomato plants from photos using colour, binding, and texture to provide farmers with quick and consistent findings.

III. PROPOSED METHODOLOGY

A data-flow diagram is a visual representation of data flowing through a system. The DFD also includes information on each entity's outputs and inputs, as well as the process itself.

The ‘PlantVillage Dataset’ from Kaggle is used to identify 26 plant diseases and 11 healthy plants. And the ‘Oxford 102 Flowers Dataset’ from Kaggle is used for the flower identification. These datasets are first downloaded and pre-processed using the pre-existing MobileNet pre-processing function.

MobileNet is a CNN architecture model for image classification and mobile vision. It is pre-trained to classify 1000 objects from the ImageNet dataset. We remove the last layers and add a Dense layer that corresponds to classifying specific number of categories based on what the model is identifying. That is 11 categories for plant identification model, 102 categories for flower identification model and 26 categories for the plant disease detection model.

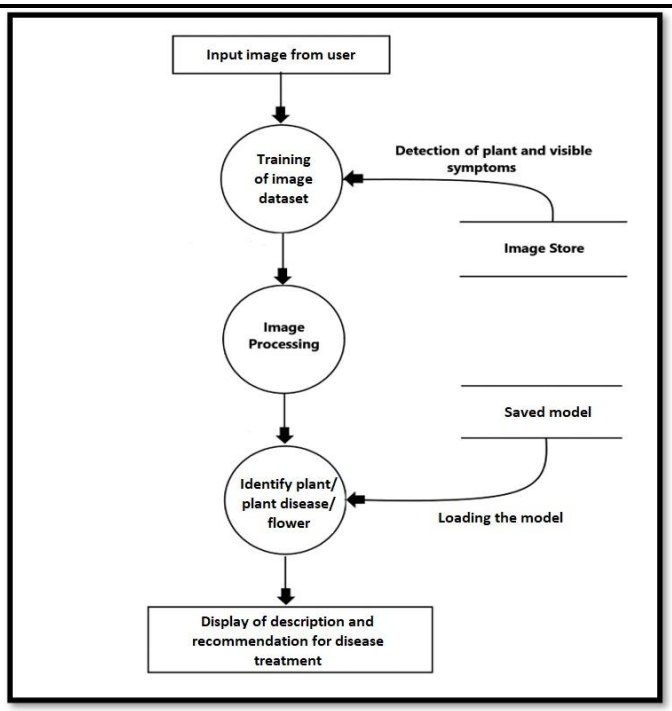

Fig. 1 Data flow chart of the proposed system

Then, thesetransfer learnt models are trained by passing the training dataset images. Using the validation dataset, we find that the accuracy for pant identification is 99.61, for flower identification it is 91.45 and for plant disease detection it is 98.55.

Apart from the models that recognize the image, we have also created a database with descriptions of plant, flower and disease and the recommended solution for the plant disease.

Now referring the Fig. 1, the user has to first select the image via browsing through the files, image will then be pre-processed. Using the MobileNet model that is transfer learnt the image identity will be predicted. The result of prediction and description of the same will be displayed. If the image sent is of a diseased plant, a solution along with the description is suggested. This process can be repeated for another prediction.

IV. RESULTS AND DISCUSSION

4.1 Output Screenshots

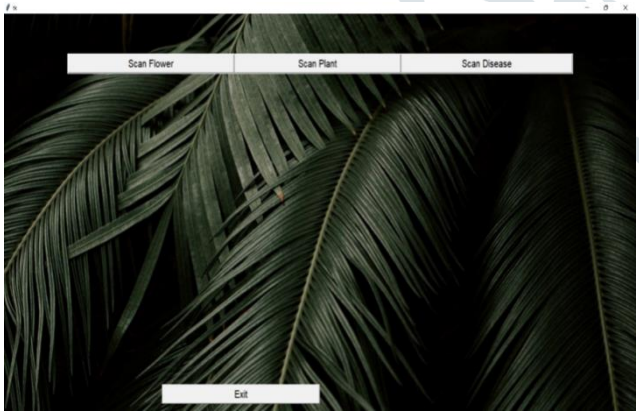

Fig. 2.1 Home Page Screenshot

Fig. 2.2 Flower Scan Screenshot

Fig. 2.3 Flower Detection Screenshot

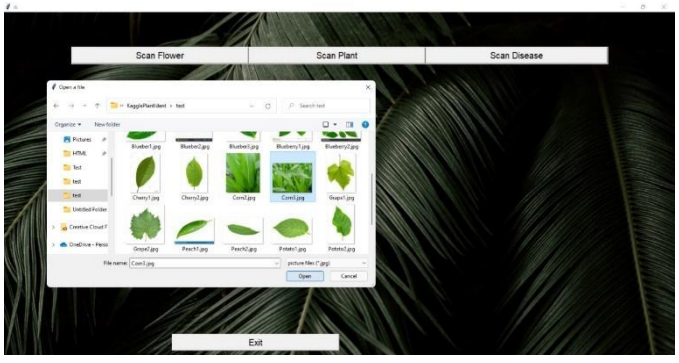

Fig. 2.4 Plant Scan Screenshot

Fig. 2.5 Plant Detection Screenshot

Fig. 2.6 Plant Disease Scan Screenshot

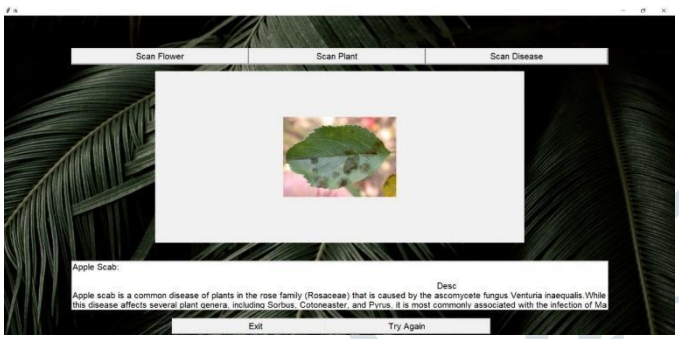

Fig. 2.7 Plant Disease detection Screenshot1

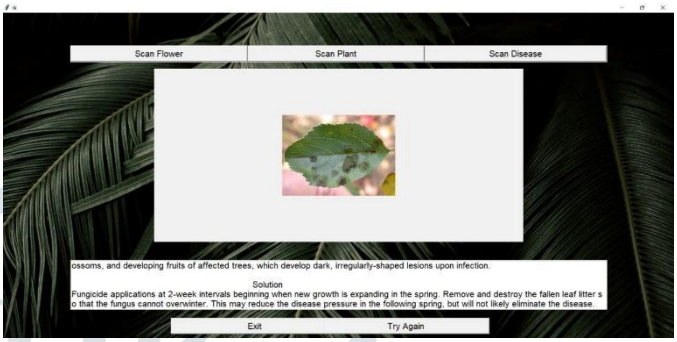

Fig. 2.8 Plant Disease detection Screenshot2

4.2 Conclusion

Plants are crucial to the survival of our civilization. They are a primary source of food and a very important source of energy. Today, they are vital in fixing many problems we face including climate change, world hunger, loss of bio-diversity, just to name a few. With the leaps of development, we have had on the technological fronts, it is time to put them to use where it is of most necessity. Machine learning provides us with abilities that can be used to improve the methodology and results of plant cultivation, be it for agriculture and mass production, or at your home or terrace garden.

In future we would like to work on the following functions, Increasing the size of the Dataset by adding more plants and their respective diseases related information, create a fully functioning Mobile Application that can be downloaded and accessed by public for easy use. Addition of features namely, a follow up reminder for adding manures and fertilizers, access links providing further information on plants and their diseases and “Near Me" option used to track the closest government and private fertilizer dealers selling both organic and chemical fertilizers based on the users current GPS location.

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REFERENCES

[1] Kaur, S., Babbar, G., Sandhu, N., & Jindal, D. G. (2019). VARIOUS PLANT DISEASES DETECTION USING IMAGE PROCESSING METHODS. 4(6), 4.

[2] S. H. Lee, C. S. Chan, P. Wilkin and P. Remagnino, "Deep-plant: Plant identification with convolutional neural networks," 2015 IEEE International Conference on Image Processing (ICIP), 2015, pp. 452-456, doi: 10.1109/ICIP.2015.7350839.

[3] Ramesh, S., Hebbar, R., Niveditha, M., Pooja, R., Shashank, N., & Vinod, P. V. (2018, April). Plant disease detection using machine learning. In 2018 International conference on design innovations for 3Cs compute communicate control (ICDI3C) (pp. 41-45). IEEE.

[4] Guo, Y., Zhang, J., Yin, C., Hu, X., Zou, Y., Xue, Z., & Wang, W. (2020). Plant disease identification based on deep learning algorithm in smart farming. Discrete Dynamics in Nature and Society, 2020.

[5] Gogul, I., & Kumar, V. S. (2017, March). Flower species recognition system using convolution neural networks and transfer learning. In 2017 fourth international conference on signal processing, communication and networking (ICSCN) (pp. 1-6). IEEE.

[6] Türkoğlu, M., & Hanbay, D. (2019). Plant disease and pest detection using deep learning-based features. Turkish Journal of Electrical Engineering & Computer Sciences, 27(3), 1636-1651.

[7] Geetha, G., Samundeswari, S., Saranya, G., Meenakshi, K., & Nithya, M. (2020, December). Plant leaf disease classification and detection system using machine learning. In Journal of Physics: Conference Series (Vol. 1712, No. 1, p. 012012). IOP Publishing.

[8] Arshad, M. S., Rehman, U. A., & Fraz, M. M. (2021, May). Plant Disease Identification Using Transfer Learning. In 2021 International Conference on Digital Futures and Transformative Technologies (ICoDT2) (pp. 1-5). IEEE.

[9] Feng, J., Wang, Z., Zha, M., & Cao, X. (2019, September). Flower recognition based on transfer learning and Adam deep learning optimization algorithm. In Proceedings of the 2019 international conference on robotics, intelligent control and artificial intelligence (pp. 598-604).

[10] Anubha Pearline, S., Sathiesh Kumar, V., & Harini, S. (2019). A study on plant recognition using conventional image processing and deep learning approaches. Journal of Intelligent & Fuzzy Systems, 36(3), 1997-2004