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Classification of Plant Species from Images Using CNN

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Abstract

The automatic classification and identification of various plant leaf species has become a popular practice among academics and scholars. They create a model using a variety of deep learning approaches and strategies in order to get a result with more precision. Scientists are increasingly using convolutional neural networks to categorize plant leaves. With increasingly rare species and complex backdrops, classification of plant leaves can be difficult, thus researchers used many models to attain high levels of accuracy. We developed a model for plant leaf classification in the current work for the classification of leaves based on a dataset we gathered. We employed the Resnet-50 model, a well-known CNN architecture, which offered an effective way to organize and analyze a deep classification in order to reduce the complexity and make training use fewer parameters and take less time. We wanted to create a noteworthy result for our classification model using Resnet-50. The influence of the convolutional neural network in feature extraction and classification is well known. We were able to train deep networks in our model thanks to Resnet-50, a residual network. While the average testing accuracy was 92.5%, the average training accuracy was 98.3%. Effective accuracy and the fact that we trained the model using our own prepared dataset, which we created from real-world data, are the study's two main contributions.

Keywords: Pneumonia, Chest X-ray images. Deep Learning, CNN, CovXNet, RNN, VGG16.

1. INTRODUCTION

1.1 Introduction

Plants are primarily multicellular, photosynthetic eukaryotes belonging to the kingdom Plantae. In the past, all algae and fungi were considered to be part of the kingdom of plants, one of the two kingdoms that included all living things other than animals. However, all current definitions of Plantae do not include bacteria, archaea, or some types of algae, nor do they include fungi. According to one definition, all living things belong to the clade Viridiana, which is Latin for "green plants" and includes flowering plants, conifers and other gymnosperms, ferns and their allies, hornworts, liverworts, mosses, and green algae but not red or brown ones. Green plants need primary chloroplasts, which are produced as a result of an endosymbiotic relationship with cyanobacteria, to photosynthesize most of the energy they receive from the sun. They are green because their chloroplasts contain chlorophylls a and b. The ability to produce normal levels of chlorophyll or to photosynthesize has been lost in some parasitic or mycotrophic plants, although they still have flowers, fruits, and seeds. Although asexual reproduction is also frequent, sexual reproduction and generational alternation are what define plants. There are around 320,000 different plant species, and between 260 and 290 thousand of them generate seeds. Green plants support the majority of Earth's ecosystems and contribute significantly to the global supply of molecular oxygen. For thousands of years, people have domesticated plants that yield grains, fruits, and vegetables, as well as other essential human foods. Plants are used for a wide range of cultural and practical purposes, such as decorations, building materials, writing materials, and the source of numerous medications and psychotropic substances. Botany is the scientific study of plants and is a subfield of biology. From the first algae mats, bryophytes, lycopods, ferns, to the sophisticated gymnosperms and angiosperms of today, the development of plants has produced increasing levels of complexity. In the settings where they evolved, plants in all these groupings are still thriving.

2. Literature Survey

[1] Trishen Munisami, Mahess Ramsurn, Somveer Kishnah, and Sameerchand Pudaruth:, Plant classification into the relevant taxonomies can be done automatically using plant recognition software. Medical professionals, industrialists, food engineers, and botanists can all benefit from this information. This work develops an identification system that can recognize plants based on photographs of their leaves. Additionally, a smartphone app was created that enables users to take photos of leaves and upload them to a server. Before a pattern matcher compares the data from this image with the ones in the database to get probable matches, the server executes pre-processing and feature extraction procedures on the image. The dimensions of the leaf's length and width, its area, and its circumference are among the various properties that are extracted. the hull perimeter, the hull area, a color histogram, a centroid-based radial distance map, and a distance map along the vertical and horizontal axes. 640 leaves from 32 distinct plant species were used to develop and test a k-Nearest Neighbor classifier. A precision of 83.5% was achieved.

In this study, an identification system that can recognize plants from photographs of their leaves has been created. Additionally, a smartphone app was created that enables users to take photos of leaves and upload them to a server. Before a pattern matcher compares the data from this image with the ones in the database to get probable matches, the server executes pre-processing and feature extraction procedures on the image..

[2] Olfa Mzoughi, Itheri Yahiaoui, Nozha Boujemaa, and Ezzeddine Zagrouba In this study, an identification system that can recognize plants from photographs of their leaves has been created. Additionally, a smartphone app was created that enables users to take photos of leaves and upload them to a server. Before a pattern matcher compares the data from this image with the ones in the database to get probable matches, the server executes pre-processing and feature extraction procedures on the image.Plant leaves can be categorized as simple or compound depending on how they are shaped. Compound leaves can be thought of as a grouping of straightforward leaf-like structures known as leaflets. But the majority of computer vision-based methods characterize these two leaf categories similarly. In this study, a novel technique of describing and classifying compound leaves is put forth that takes into account specifics pertaining to the arrangement of their morphologies, more specifically, the split of the leaves into leaflets. In fact, a novel strategy to multiple-leaflet-based identification is suggested. The primary reason for our decision is that some species of compound leaves may exhibit variations in the quantity, size, and even shape of their leaflets. A local description that is based on a given quantity of leaflets may therefore be more accurate. In our method, we were only able to extract three leaflets from the image automatically, using certain geometrical ideas drawn from botany. Then, utilizing cutting-edge fusion algorithms to aggregate the results of each leaflet query, we design and assess our identification technique based on some traditional texture descriptors for local leaflets description.

3. OVERVIEW OF THESYSTEM

3.1 Existing System

This model focuses an existing method that is created utilizing some deep learning methods. The technique is carried out here utilizing the ResNet50, which is a transfer learning method, however it does not achieve great accuracy.

3.1.1 Disadvantages of Existing System

- Less feature compatibility
- Low accuracy.

3.2 Proposed System

In our suggested method, we use Convolution Neural Network (CNN) deep learning coupled with CNN transfer learning methods VGG16, CovXNet, and RNN to determine whether a person is sick with pneumonia or not. Pneumonia produces pleural effusion, which is a disease in which fluids fill the lung and cause respiratory problems. Early detection of pneumonia is critical for curative therapy and increasing survival rates. As a result, appropriate classification is essential for the proper therapy that will be feasible with our proposed strategy. The proposed method's block diagram is illustrated below.

3.3 Methodology

In this project work, I used five modules and each module has own functions, such as:

1. System Module
2. User Module

3.3.1 Dataset Collection:

The dataset containing images of the plant species images with the five different classes which are to be classified is split into training and testing dataset with the test size of 30-20%.

3.3.2 Preprocessing:

Resizing and reshaping the images into appropriate format to train our model.

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3.3.3 *Training:*

Use the pre-processed training dataset is used to train our model using CNN algorithm along with some of the transfer learning methods.

3.3.4 Classification

The results of our model are display of classified images with their species names.

3.3.5 User Module

Upload Image

The user must upload an image which needs to be classified.

View Results

The classified image results are viewed by user.

4 Architecture

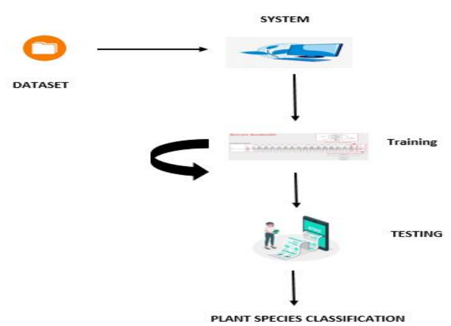
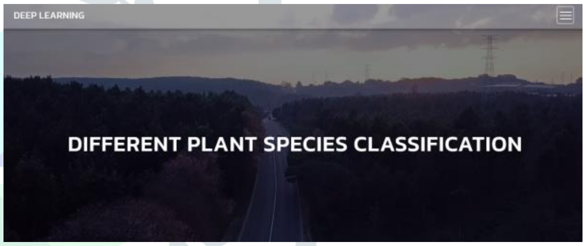


Fig 1: Frame work of proposed method

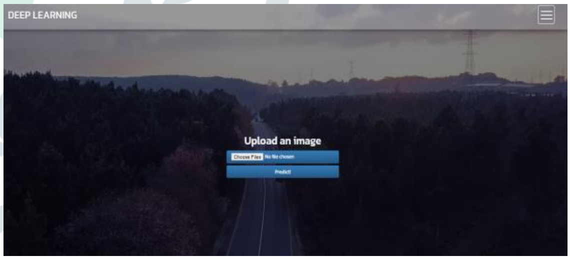
Above architecture diagram shows three stages of data flow form one module to another module. Data collection, preprocessing, and algorithm training.

5. RESULTS SCREEN SHOTS

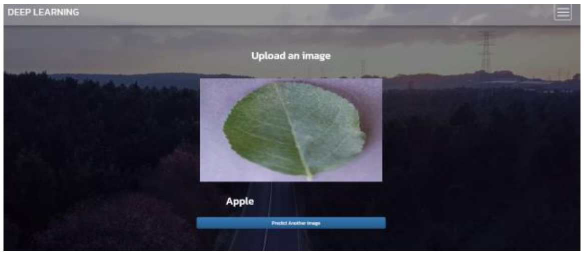
Home Page:



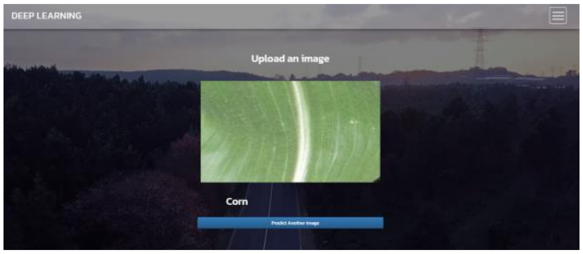
Upload image:



Choose options:



Predict Result:



7. CONCLUSION

In this study, we successfully used deep learning to classify photos of several plant species. Here, we have used CNN training to consider the dataset of five different plant species classes. After training, the user can input a picture and verify the results for classification.

8. FUTURE ENHANCEMENT

This method can be expanded in the future to categorize more plant species and plant types, creating a vast dataset that will make it easier to forecast and classify different species of planes without the need for further human labor.

9. REFERENCES

- [1] S. Karanam, R. Li, F. Yang, W. Hu, T. Chen, and Z. Wu, “Towards contactless patient positioning,” IEEE Transactions on Medical Imaging, vol. 39, no. 8, pp. 2701–2710, Aug. 2020.
- [2] “WHO coronavirus disease (COVID-19) dashboard.” World Health Organization (WHO). https://covid19.who.int/ (accessed Jul. 15, 2020).
- [3] W. Wang et al., “Detection of SARS-CoV-2 in different types of clinical specimens,” Journal of the American Medical Association (JAMA), vol. 323, no. 18, pp. 1843–1844, May 2020, doi:10.1001/jama.2020.3786.
- [4] G. D. Rubin et al., “The role of chest imaging in patient management during the COVID-19 pandemic: A multinational consensus statement from the Fleischner society,” Radiology, vol. 296, no. 1, pp. 172–180, Jul. 2020, pMID: 32255413, doi: 10.1148/radiol.2020201365.
- [5] M. Hosseiny, S. Kooraki, A. Gholamre zanezhad, S. Reddy, and L. Myers, “Radiology perspective of coronavirus disease 2019 (COVID-19): Lessons from severe acute respiratory syndrome and middle east respiratory syndrome,” American Journal of Roentgenology, vol. 214, no. 5, pp. 1078– 1082, May 2020, doi: 10.2214/AJR.20.22969.
- [6] “ACR recommendations for the use of chest radiography and computed tomography (CT) for suspected COVID-19 infection.” American College of Radiology (ACR). https://www.acr.org/Advocacy-and-Economics/