© 2020 IJSRST | Volume 5 | Issue 7 | Print ISSN : 2395-6011 | Online ISSN: 2395-602X

4th National Conference on Advances in Engineering and Applied Science
Organized by : Anjuman College of Engineering and Technology (ACET) Nagpur, Maharashtra, India, In association with
International Journal of Scientific Research in Science and Technology

Plant Species Detection Using CNN Deployed on Android App

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ABSTRACT

There are hundreds of kinds of trees in the natural ecosystem, and it can be very difficult to distinguish between them. Botanists those who study plants however, are able to identify the type of tree at a glance by using the characteristics of a leaf. Plant identification is not exclusively the job of botanists and plant ecologists. It is required or useful for large parts of society, from professionals (such as landscape architects, foresters, farmers, conservationists, and biologists) to the general public (like Eco tourists, hikers, and nature lovers). But the identification of plants by conventional means is difficult, time consuming, and frustrating for novices. Machine learning is used to automatically classify leaf types. Currently, relevant technologies, such as digital cameras, mobile devices, and remote access to databases, are ubiquitously available, accompanied by significant advances in image processing and pattern recognition. The idea of automated species identification is approaching reality. Deep learning is itself a self-learning technique used on large amounts of data, and recent developments in hardware and big data have made them more practical. We propose a method to classify plants (their species, diseases, uses etc.) using the CNN model, which is often used when applying deep learning to image processing. Crop disease is a major threat to food security, but their rapid identification remains difficult in many parts of the world due to the lack of the necessary infrastructure. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification.

Keywords : Plant Detection, CNN, Machine learning, Artificial Intelligence, Image Processing.

I. INTRODUCTION

As the machine learning technology advances, sophisticated models have been proposed for automatic plant identification. Nowadays, many efforts have been conducted in extracting local characteristics of leaf, flower, or fruit. Crop disease is a major issue but their identification remains difficult. In the developing world, more than 80 percent of the agricultural production is generated by smallholder farmers, and reports of yield loss of more than 50% due to pests and diseases are common. Furthermore, the largest fraction of hungry people (50%) live in smallholder farming households, making smallholder farmers a group that's particularly vulnerable to pathogen-derived disruptions in food supply. As the machine learning technology advances, sophisticated models have been proposed for automatic plant identification. It is clear that identifying large number of plants is a complex process. Identifying plants requires information such as leaf shape, branch shape, shape of the whole plant, plant size, flower shape, flowering time and fruit. Most of the plant identification algorithm is based on Convolutional

Neural Network. It is a deep learning algorithm which can take an input image, assign importance to various aspects/objects in the image and be able to differentiate one from the other. In order to develop accurate image for the purpose of plant disease diagnosis, we need a large, verified data set of images of diseased and healthy plants. Training large neural network can be very time consuming, but the trained models can classify images very quickly, which also makes them suitable for consumer application and smartphones.

Many of the trees/plants are in tropical regions, and because only limited botanical research has been carried out in these areas, it is believed that there are many undiscovered species. It is clear that identifying large numbers of such trees is a complex process.
For ex. plums and apricots, these are very similar in shape, the shape of the leaf, tree, and even in the shape of the young fruit. To identify trees like these, considerable information is required, shape of the leaves, branch shape, shape and size of the tree/plant, flower shape, flowering time, and fruit.

II. Technology Used

2.1 Android Studio:

Android Studio is also defined as integrated development environment (IDE) for Android development application. Android Studio uses a emulator, Gradle-based build system, etc. to run the program. Android Developer include various testing and debugging. Versions of Android Studio are adaptable with some Apple, Windows and Linux operating systems. With run for Google Cloud Platform and Google app integration, Android Studio offers developers a well-stocked toolkit for creating Android apps or other projects, and has been an integral part of Android development since 2013.

2.2 .Net Programming Language:

The .Net framework is a s/w development form developed by Microsoft for running and service that it uses. The framework was creating an application, which would run on the Windows Platform. The first version of the .Net framework was released in the year 2002.The .Net framework can create both - Form-based and Web-based applications. Web services can be used to developed using .Net framework. It also supports various programming languages such as Visual Basic etc. So developers choose and select the language to develop the required application.

2.3 Java

Java is a broadly used programming language exactly designed for use in the distributed environment of the internet.[5] It is the most popular programming language for Android smartphone applications and is also among the most recommend for the development of edge devices and the IOT. Java is object-oriented. Java was designed to have aspect of the C++ programming language, but is simpler to use and enforces an object-oriented programming model.
Java can be used to create applications that may run on a single computer or be share out among servers and clients in a network. It can also be used to build a small application module for use as part of a web page.

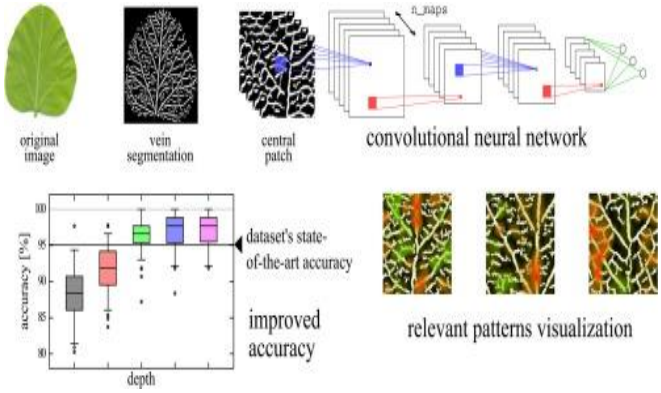
2.4 Firebase:

Firebase is a technology that allows you to create web applications without server-side programming, making development faster and easier. It supports Web, iOS, OS X and Android clients. Apps that use Firebase can use and control data without thinking about how data is stored and synchronized across different instances of the application in real-time. Working with Firebase from a developer's perspective is a wonderful benefit, as they are the core

technology of development. Firebase gives you service like analytics, databases, messaging and crash reporting so you can move quickly and focus on your users.

III. Problem Definition

Dataset Description: We analyze images of plant leaves, which have a spread of class labels assigned to them. Each class label is a crop-disease pair, and we make an attempt to predict the crop-disease pair given just the image of the plant leaf. Figure 1 shows one example each from every crop-disease pair from the PlantVillage dataset. In all the approaches described in this paper, we resize the images to 256 × 256 pixels, and we perform both the model optimization and predictions on these downscaled images.



3.1 Aims and Objectives:

The patient has no longer have to wait for the information to be passed on manually rather they can get information anywhere just by our application.
It will save time and make the patient process faster. Our project will help patient to find information for pathology location.

This application will be designed in a way which will make their work comfortable.

IV. Proposed System

In order to overcome all the above issue proposed system is to design and implementing the digital locker of all medical reports which may accessible through right channel of authentication and sharable with doctors. The following figure depicts the Digital Locker Landscape. Citizens, Issuers, Requestors and Digital Locker are the main components. Digital Locker links various issuer repositories using a set of APIs. The plan will be developed in the following modules described below.

Module 1 (creating user interface):

This module is a frontend that facilitates information for pathology to user of different categories which are represented using tabs, navigation bar etc.

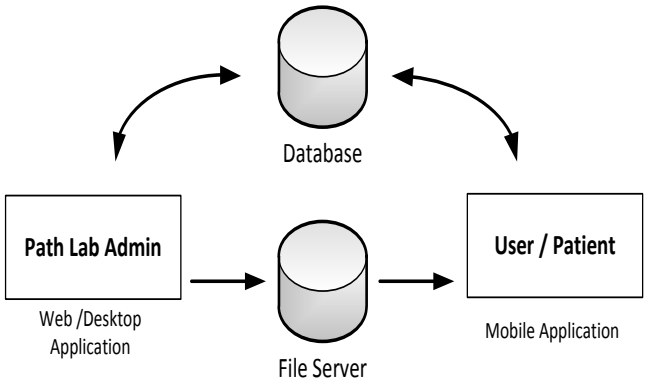


Figure 3 : Flow of Module1

Module 2 (link between pages and database):

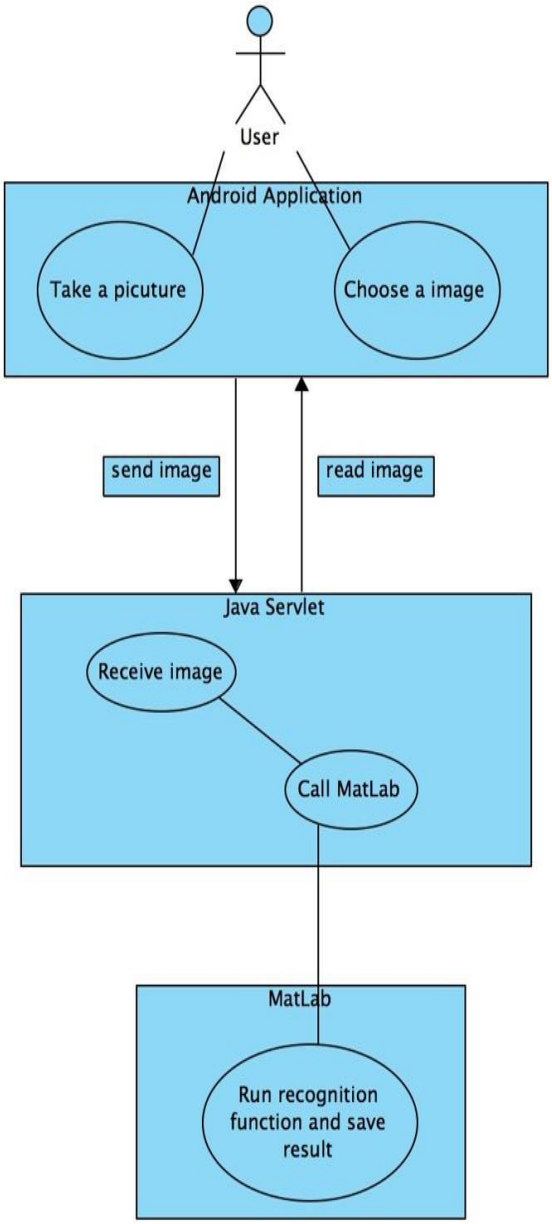
This module is the middle end where the link between all the pages and link between the tables and buttons will be established in the form of tables which show the details of patient who has get appointment online.

Module 3 (database creation):

This module is the backend where the database is developed for the project consisting of different tables for login, patient details etc.

5. Implementation Details

5.1 Diagram:



V. CONCLUSION

This system will be helpful to a large variety of peoples such as the farmers, Ayurveda doctors and public in general. Hence we propose this system to identify different plants, their species, uses, disease etc. using Artificial Intelligence and Convolution Neural Network deployed on an android application.

VI. REFERENCES

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