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Crop Identification using Mobile App

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Abstract: *The primary purpose of doing the project was to determine the species of a plant seedling from an image of the plant seedling using Deep Learning. The need for this project is related to improving farming techniques leading to better crop yields as well as better stewardship of the environment. Computer vision has grew recently in the past few years with the advent of deep learning algorithms. Convolutional Neural Networks have become the state-of-the-art algorithm for image detection and classification tasks. With the help of popular modern deep learning framework Keras, the process of building and deploying a DL model has become easy. As such, more and more focus can be made on solving the actual problem instead of dealing with the intricacies of working of our model.The project involved preprocessing of plant images, masking those images, building the CNN model, validating the model, testing the model, and finally deploying the CNN model to an optimised version that can be used in an Android app. The key challenge in the project was preprocessing and masking the images. These images consisted of unwanted information in the background which was being unnecessarily computed while training the model. With the help of OpenCV library, we could cut out the sections of image containing the plant and darken the background of the image. These images were then directly fed to the CNN model, leading to greater accuracy in the results.*

Keywords: CNN Model, Emotion Detection, Image Processing

I. INTRODUCTION

Indian economy is dependent of agricultural productivity. Over 70% of rural homes depend on agriculture. Agriculture pays about 17% to the total GDP and provides employment to over 60% of the population. Therefore, detection of plant diseases plays a vital key role in the arena of agriculture. Indian agriculture is composed of many crops like rice, wheat. Indian farmers also grow sugarcane, oilseeds, potatoes and non-food items like coffee, tea, cotton, rubber. All these crops grow based on strength of leaves and roots. There are things that lead to different disease for the plant leaves, which spoiled crops and finally it will effect on economy of the country. These big losses can be avoided by early identification of plant diseases. Accurate detection of plant disease is needed to strengthen the field of agriculture and economy of our country. Various types of Disease kill leaves in a plant. Farmers get more difficulties in identifying these diseases, they are unable to take precaution on those plants due to lack of knowledge on those diseases. Biomedical is one of the fields to detect plant diseases. In current day among this field, the image processing methods are suitable, efficient and reliable field for disease detection with help of plant leaf images. Farmers need fast and efficient techniques to detect all types of diseases of plants that can save time. These systems that can reduce efforts and use of pesticides. For measurement of yields in agriculture different ideas are proposed by scientists with the help of laboratory and systems for efficient identification of plant leaf diseases. Image Processing is only an aspect of Computer Vision, and they are not the same. Image Processing systems focus on transforming images from one form to another, and Computer Vision systems help the computer to understand, and get meaning from an image. Many Computer Vision systems employ Image Processing algorithms. For example, a face enhancement app may use computer vision algorithms to detect faces in a photo, and then apply Image Processing techniques like smoothing or grayscale filters to it.Many advanced Image Processing methods leverage Machine Learning Models like Deep Neural Networks to transform images on a variety of tasks, like applying artistic filters, tuning an image for optimal quality, or enhancing specific image details to maximize quality for computer vision tasks.

Convolutional Neural Networks (CNN) take in an input image and use filters on it, in a way that it learns to do things like object detection, image segmentation and classification. ResNet50 is a residual deep learning neural network model with 50 layers. ResNet was the winning model of the ImageNet (ILSVRC) 2015 competition and is a popular model for

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image classification, it is also often used as a backbone model for object detection in an image. Which would be used in our project.

II. LITERATURE SURVEY

Literature survey is a critical analysis of a portion of the published body of knowledge available through the use of summary, classification, and comparison of previous research studies, reviews of literature, and journal articles. A literature survey examines the current scholarly work available on a particular subject, perhaps within a given time period. It is the summary and synthesis of material gathered from various sources and organized to address an issue, research objective, or problem statement.

2.1 Plant identification system using its leaf features:

Author: Pradeep Nijalingappa; V.J.Madhumathi
Publisher: IEEE Year: 2017
In this paper they have done Plant identification based on leaf is becoming one of the most interesting and a popular trend. Each leaf carries unique information that can be used in the identification of plants. In the identification of plants based on leaf, the leaf images needs to be pre-processed accordingly to extract the various critical features. In this paper, we present the identification of plants based on leaf features using Multiclass SVM (MSVM) as a classifier.

2.2 An Android Application for Plant Identification:

Author: Qian Cheng; Hongyan Zhao; Publisher:IEEE
Year:2018
This paper presents an Android application to automatically identify plant species using a single leaf image as input. At the pre-processing phase, we proposed an improved segmentation method to eliminate the noise caused by capturing on non-uniform background so we can obtain the binary image which only contains the leaf shape. Then, several morphological features and Hu moment invariants descriptors were extracted as inputs of a joint classifier which combines the back propagation neural network(BPNN) with a weighted k-nearest-neighbor (KNN) to distinguish 220 species of plants. The outputs of the joint classifier are the top ten species that best match the query leaf image. At the end, we implemented these algorithms on Android OS and the application we developed has been downloaded about a million times.

2.3 Classification of Leaf Images for Species Identification:

Author: Santhosh; A.FahimaZulfath Publisher: IEEE
ear: 2019
In this paper they speak about that There are several million species of plants in the world, of which most of the species are not yet identified and recognized. Many species look similar, but they are actually not genetically the same, may belong to different families. It is very important to identify the plant species. Often taxonomist finds it difficult to classify the plants and sometimes may go wrong while grouping them. The key focus of this paper is to identify the variety of species by classifying the plant's leaves. This paper takes leaf image features to classify the species by using Support Vector Machines (SVM). This classification helps to recognize and identify the population of endangered and extinct species for preservation.

2.4 Mobile Leaf Identification System using CNN applied to plants in Hokkaido

Author: Tatsuhiro Akiyama; Yosuke Kobayashi;
Publisher: IEEE Year: 2019
In this paper they explained about the ability to identify plant types is important when conducting vegetation surveys. This ability requires investigators experience. We propose a mobile application using convolutional neural networks (CNNs) that will help beginners identify plant species. We compare three CNN models, VGG19, MobileNet, and MobileNetV2. Our plant identification application using MobileNetV2 shows an average F1 score of 0.992, indicating its high performance and practicality. The implemented system shows a practical performance of 338.1ms per picture on tablet type device.

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III. REQUIREMENTS ANALYSIS

The study of existing systems helps for a new system to be developed. Analysis starts with requirements and produces a specification of what the specification of what the system does. In order to implement any project, one has to gather requirement specifications. Hence the software and hardware requirements for development of the work along with the functional and non-functional requirements are specified.

3.1 Functional Requirements

A functional requirement specifies a function that a system or component must be able to perform. These include input, calculator, external interfaces, communications and special management information needs. Functional requirements are also called behavioural requirements because they address what the system does. Functional requirement specification contains the way in which a given task is to be performed, the results to be obtained as well as the elements of functional entities.

3.2 Non-Functional Requirements

A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. Non-functional requirements are often called qualities of a system.

- **Usability**: This project will take user input images which are captured using the mobile camera and has a very simple mobile interface to interact with.
- **Reusability**: Each module of this project is written and tested independently so that they can be reused. Reusable modules and classes will reduce implementation time, and have eliminated bugs and localized code modification when a change in implementation is required.
- **Scalability**: Even if there are additions of any number of nodes into the network the application will function normally. Hence the project provides scalability and also has the ability to work without internet

3.3 Software Specification

A. Software Requirements

- Operating System - Windows Programming Language - Python & Kotlin
- IDE - Kaggle Notebook & Android Studio
- Library - TensorFlow

B. Hardware Requirements

Processor	Intel Core i5 and above
Speed	2 GHz or above
RAM	4 GB
Hard disk	40GB
Input Device	Mobile phone

3.4 System Design

The purpose of the design phase is to plan a solution of the problem specified by the requirements document. This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed; design takes us toward how to satisfy the needs. The design of a system is perhaps the most critical factor affecting the quality of the software; it has a major impact on the later phases particularly testing and maintenance.
The design activity often results in three separate outputs –

- Architecture design.
- High level design.
- Detailed design.

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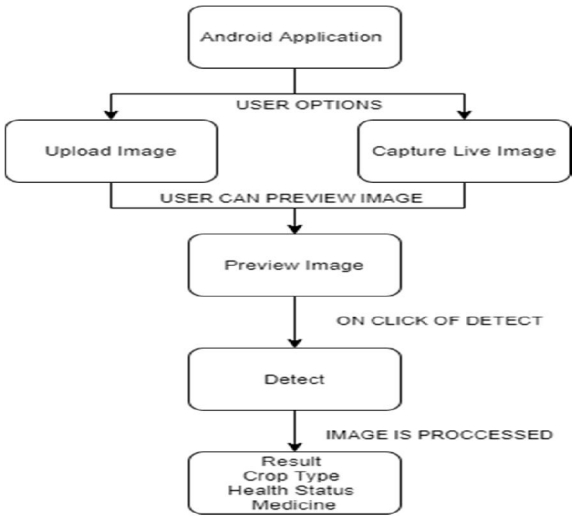
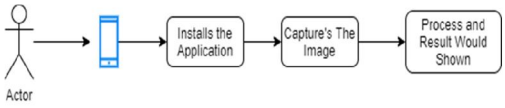
IV. DATA FLOW DIAGRAMS



Definition

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language, activity diagrams are intended to model both computational and organizational processes. Activity diagrams show the overall flow of control

Activity Diagram for Plant Doctor



Module 1 - Preparing the Machine Learning Model

The dataset was taken from the open source https://www.kaggle.com/emmarex/plantdisease where we have collected all dataset which was needed in order to develop the calcification model. We have used the CNN machine learning concept in order to develop our model. The Inception network was an important milestone in the development of CNN classifiers. The Inception network on the other hand, was complex (heavily engineered). It used a lot of tricks to push performance; both in terms of speed and accuracy. Its constant evolution lead to the creation of several versions of the network. We have used the inception model 3.

This image represents the placement of the input devices and demonstrates the input received

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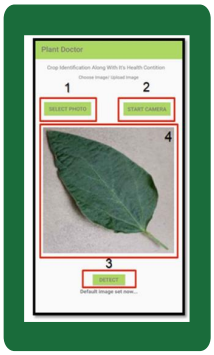
RESULT

Plant Doctor
An Offline Mobile Application for Crop Identification and check it's Health Status along with recommended Fertilizers.

7.1 Screen of Mobile Application



This is our Application's landing page. Where user has the options to interact with our Application.

1. User can Select the existing image from the gallery
2. can capture real Time Image and upload
3. Once the image is uploaded/Selected User can detect
4. Preview Screen of the image uploaded/selected

Here, we have uploaded the image using the start camera option. And Captured A leaf (Pepper Plant's)
Result: Detected Crop : Pepper Bell
Health Status: Bacterial Spot
Medicine: Natria 706240A

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CONCLUSION

Our application relies on the underlying algorithms for several key aspects, including Classifying images as leaves or not, obtaining leaf contour, extracting key features of the leaf, comparing it with the dataset and displaying the matching species. A high level engagement in this application may allow for many possible future directions. The application can be tuned to improve the accuracy and speed. The dataset can be provided through a spatial database for easy access and substantially decrease the application size. Finally, we would like to further explore the educational aspects of this project Education aspects of this project. This includes adding more collaborative features in the application. We believe that the area of our project has greater scope and futher study is necessary to put computer vision system to efficient vision system to efficient use for the betterment of the society.

REFERENCES

[1]. Wenjiang Huang, Qingsong Guan, Juhua Luo, Jingcheng Zhang, Jinling Zhao, Dong Liang, Linsheng Huang, and Dongyan Zhang, "New Optimized Spectral Indices for Identifying and Monitoring Winter Wheat Diseases", IEEE journal of selected topics in applied earth observation and remote sensing,Vol. 7, No. 6, June 2018.

[2]. .K.Thangadurai, K.Padmavathi, "Computer Visionimage Enhancement For Plant Leaves Disease Detection", 2017 World Congress on Computing and Communication Technologies.

[3]. Monica Jhuria, Ashwani Kumar, and Rushikesh Borse, "Image Processing For Smart Farming: Detection Of Disease And Fruit Grading", Proceedings of the 2017 IEEE Second International Conference on Image Information Processing.

[4]. ulkifli Bin Husin, Abdul Hallis Bin Abdul Aziz, Ali Yeon Bin, Md Shakaff Rohani Binti S Mohamed Farook, "Feasibility Study on Plant Chili Disease Detection Using Image Processing Techniques", 2015 Third International Conference on Intelligent Systems Modelling and Simulation.

[5]. [5] Mrunalini R. Badnakhe, Prashant R. Deshmukh, "Infected Leaf Analysis and Comparison by

[6]. Otsu Threshold and k-Means Clustering", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 3, March 2017