

**A Project Report**  
on  
**CROBADIS: Crop Bacterial Disease Classification**  
**Using Machine Learning Algorithm**

*Submitted in partial fulfillment of the  
requirement for the award of the degree of*

Bachelor of Technology in Computer Science and  
Engineering



(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

**Under The Supervision of**  
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**SCHOOL OF COMPUTING SCIENCE AND ENGINEERING**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**GALGOTIAS UNIVERSITY, GREATER NOIDA, INDIA**  
**DECEMBER - 2021**



**SCHOOL OF COMPUTING SCIENCE AND  
ENGINEERING  
GALGOTIAS UNIVERSITY, GREATER NOIDA**

**CANDIDATE'S DECLARATION**

I/We hereby certify that the work which is being presented in the project, entitled “ **CROBADIS: Crop Bacterial Disease Classification Using Machine Learning** ” in partial fulfillment of the requirements for the award of the **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING**

submitted in the **School of Computing Science and Engineering** of Galgotias University, Greater Noida, is an original work carried out during the period of **JULY-2021 to DECEMBER-2021**, under the supervision of **Mr. Praveen Mishra , Assistant Professor, Department of Computer Science and Engineering** of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the project has not been submitted by me/us for the award of any other degree of this or any other places.

19SCSE1140007 – Sajal Kaushal

19SCSE1010775 - PRATUL PANT

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Supervisor

(Mr. Praveen Mishra, Assistant Professor)

**CERTIFICATE**

The Final Thesis/Project/ Dissertation Viva-Voce examination of **19SCSE1140007 – Sajal Kaushal, 19SCSE1010775 – Himanshu Barach** has been held on \_\_\_\_\_ and his/her work is recommended for the award of **BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING.**

**Signature of Examiner(s)**

**Signature of Supervisor(s)**

**Signature of Project Coordinator**

**Signature of Dean**

Date:

Place:

## **ABSTRACT**

Agriculture is an important source of income for the Indian people. Farmers can grow variety of crops but diseases hinder the growth of crops. One of the major factors responsible for crop destruction is plant disease. Different plants are prone to different diseases. The major categories of plant diseases are based on viral, fungal and bacterial. Diseases on crops can reduce both the quality and quantity of crops and their further growth. The easy way to detect plant diseases is with the help of an agronomist with the knowledge of plant diseases. But this manual detection of plant diseases takes a lot of time and is a painstaking job. Therefore, there is a need for a machine learning method for the detection of leaf diseases. Machine learning can play a major role in developing automated methods for the detection and classification of leaf diseases. There may be different pattern recognition and image processing techniques that can be used to detect the disease. Disease detection and disease classification are the keys to preventing agricultural losses. Different plants tolerate different diseases. There are a variety of methods and classifications for the detection of plant diseases

Auto-detection of plant diseases is an important function as it can prove beneficial in monitoring a large area of crops, and thus automatically detects diseases from the symptoms visible on the plants. Thus, automatic detection of plant disease with the help of image processing techniques provides more accurate and guidance for disease management. By comparison, visual recognition is less accurate and time-consuming. Therefore, there is a need to design an Android application that uses machine learning methodology to detect plant disease in a timely fashion to help farmers in increasing higher yields of mangoes.

## Conceptual Information

In this paper our basic target is the farmers. By various study we will able to determine the disease that is present in the mango plant. In this research Paper we will be dealing with static information which changes very slowly with time that is the fertilizers, diseases, etc. In which diseases can be in various parts of the Plants like fruit, stem, leaves, root and even in the soil for example Verticillium Wilt which is caused by Verticillium albo-truncatum and V. dahliae fungus that lives in the Soil. So, the static information needed by the farmers is shown table.

What is the possible disease of the Crop?
What are the possible Symptoms of the Crops
What is the reason of its Spreading
What is the possible Treatment of the disease

## Formulation Of Problem

There is a lack of knowledge among the farmers about the diseases that are present in the crop for example Red Dust which is caused by an Alga . The alga attack causes reduction in photosynthetic activity and defoliation of leaves thereby lowering of the host plant. The easy method to detect the plant disease is with the help of agricultural expert having knowledge of plant diseases. But this manual detection of plant diseases takes lot of time and is a laborious work. Hence, there is a need for machine learning method to detect the leaf diseases. So we will be making and developing a android application using machine learning model to detect disease of crops in timely fashion to help the farmers to increase more yield of crops.

## Project Design

### 1.2.1. Tools and Technology Used

Crobadis is an Android application developed in java/Kotlin which uses Firebase as a database for storing data. We will train our model using Teachable machine.

- Android SDK tools revision 22.0.5
- SDK platform: Android 4.3 API 18: The minimum requirement for the android application development is Android 2.2 with API level 8. But it is the older version to develop the application. So we have taken the current version as the environmental variable. But it will not create any difficulty in compiling the application in the Android 2.2 version.
- AVD Manager provides the graphical UI which will act as a virtual android device for the compilation of the application file. To test and run the application the need of android device is must. So one can install the developed application in the emulator without any physical android devices. The emulator will emulate an android device in the computer. The facility provided by the android device will also be provided by the emulator but in the virtual manner
- **Software Requirement:**
  - **Operating System:** Window 7/8/10
  - **Front End:** Android Studio
  - **Back End:** Firebase
- **Hardware Requirement:**
  - **Processor:** Intel Core i5
  - **HDD:** 8GB Recommended

## **Design Approach**

For this android application there are 3 building blocks Activity, Intent Receiver, Content Provider. The Activity is a generally a single screen inside the application and is implemented as the single class which extends the base Activity class. Every specified class for each Activity provides a user interface to the application which will be consisting of several views, buttons etc., each of those having some event specified. This application consists of two screens or activity. Moving to another screen intends to accomplish a new activity. When a new screen appears the older one is getting paused and put into a history stack, because when again the same user wants to come back to the previous screen then it is simply extracted back from the history stack. Android takes help of separate class Intent for the navigation between screens. The Intent explains what an activity will do. The Intent Receiver is used to execute the application in reaction to an external event. And the Content Provider is used to share the data between different applications. It is standard set of methods to let the other application share the data between applications. While moving towards the design aspect of the application. The user will first take the image from the camera or will chose the image from the phone. then using the model which we have trained it will predict the output. Then the user will go to other activity in which all the information regarding the disease will be shown. All data for the remedy of the diseases has been taken with the help of several studies from different agricultural Websites. All those remedies will be brought to user in the textual format. The user activity prospects are depicted in the UML diagrams such as E-R Diagram, Activity diagram

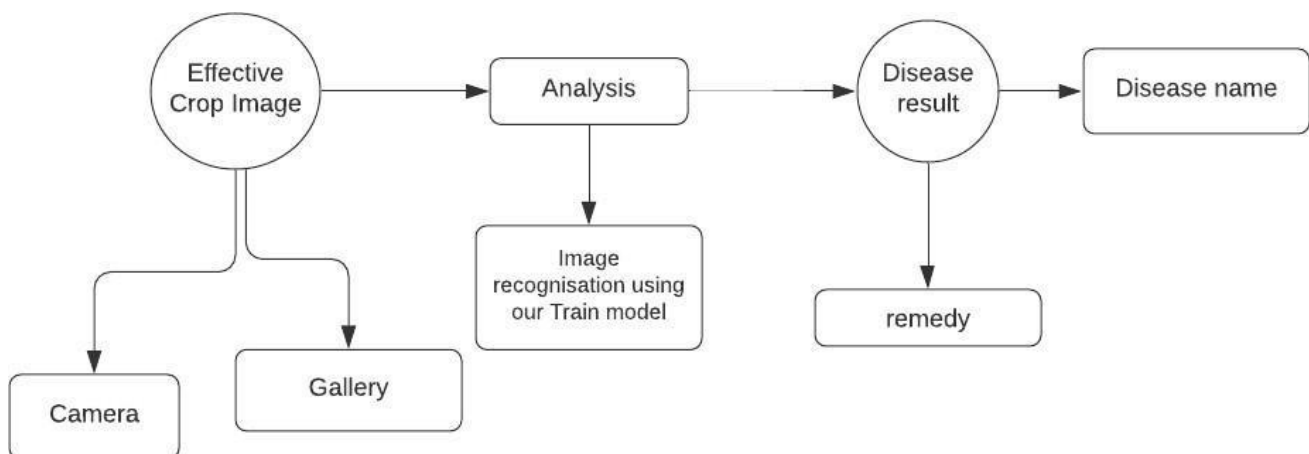
## E-R Diagram

**ER Diagram** stands for Entity Relationship Diagram, also known as ERD is a diagram that displays the relationship of entity sets stored in a database. In other words, ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships. ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships.

**Following are the main components and its symbols in ER Diagrams:**

- **Rectangles:** This Entity Relationship Diagram symbol represents entity types
- **Lines:** It links attributes to entity types and entity types with other relationship types
- **Ellipses:** Symbol represent attributes
- **Double Ellipses:** Represent multi-valued attributes
- **Diamonds:** This symbol represents relationship types

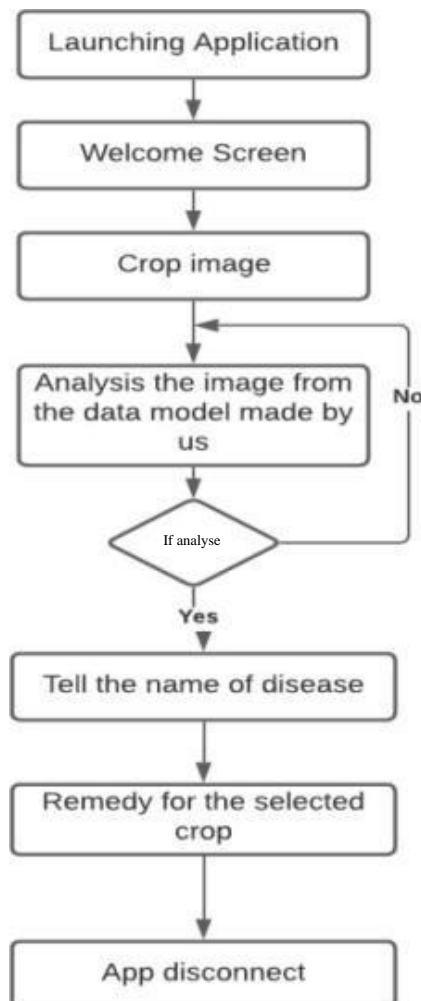
### E R DIARAM FOR Crop disease management system





## Activity Diagram

This activity diagram just indicates all the activities to be performed by the user while using the application. The user will either select the image from the phone or will click the part of crop or fruit that is infected from the camera .then using the ml data model made by us it will check and tell the name of the disease and using firebase as a backend it will tell all the possible remedies that is possible .



## Working of project

### Androidmanifest.xml File and its usage

The androidmanifest.xml file is responsible for the holding the important information used inside the application. All essential content of the application such as activities, content providers etc. must be declared inside the androidmanifest.xml file. After creating the activity for the application, it must be added to the androidmanifest.xml file in order to use the functionalities provided by that activity inside the application. It also declares some kinds of permission like camera access, Bluetooth and internet access inside the application. Figure show the snapshot for the android manifest file which has been used while designing our application.

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.crobadis">
    <uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />
    <uses-permission android:name="android.permission.CAMERA" />

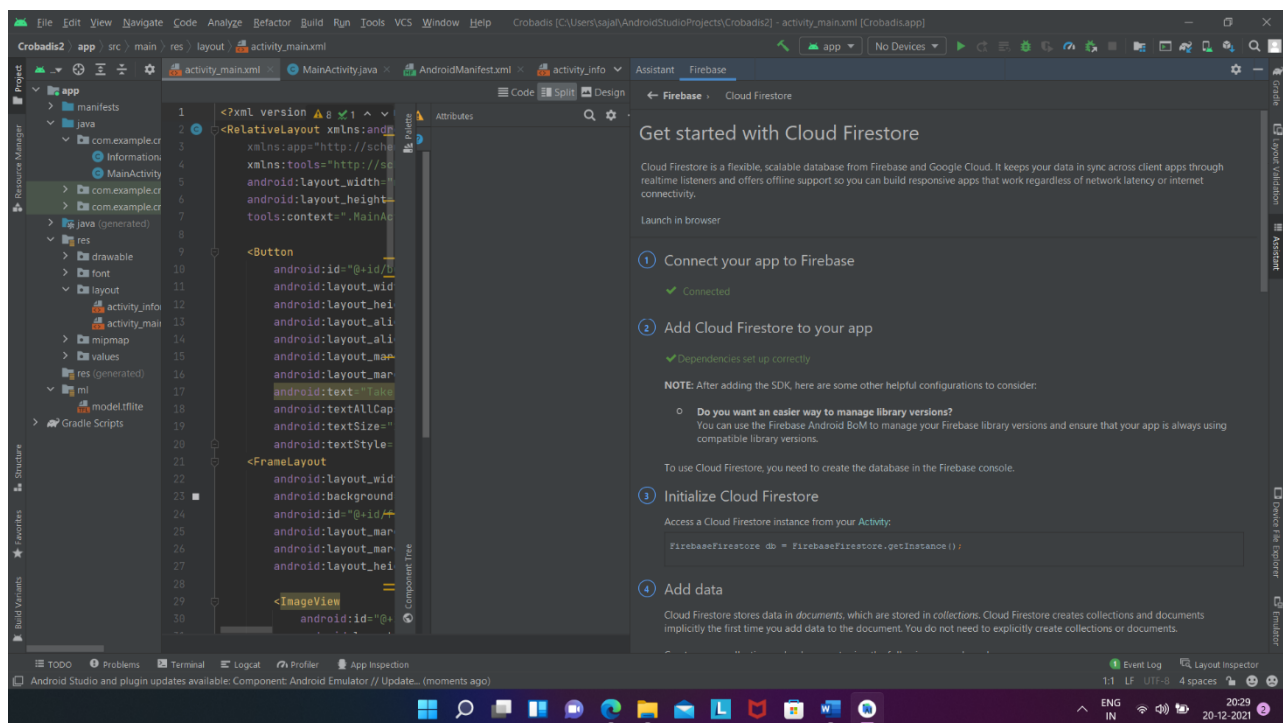
    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="Crobadis"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Crobadis">
        <activity
            android:name=".Informationactivity"
            android:exported="false" />
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

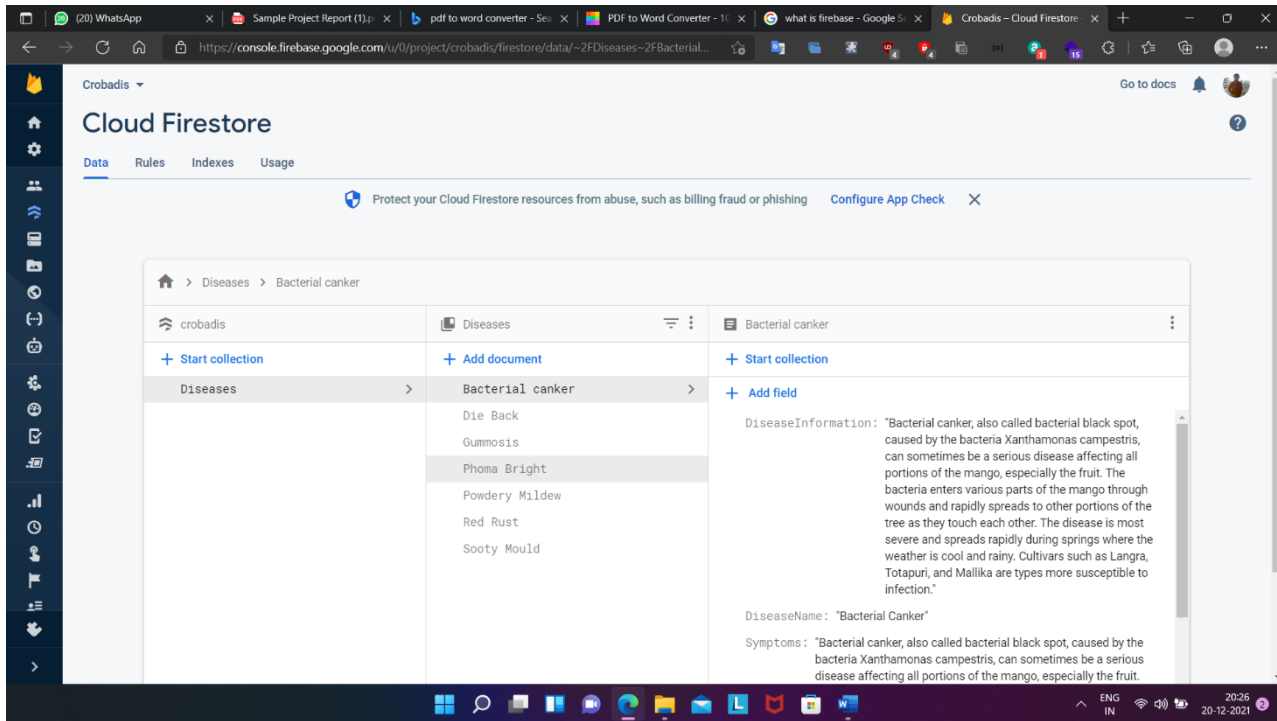
        <meta-data
            android:name="preloaded_fonts"
            android:resource="@array/preloaded_fonts" />
    </application>
```

## Firestore

Firestore is a development platform known originally for its Realtime database that's still at its core a multi-node, key-value database optimized for synchronizing data, often between user machines or smartphones and centralized storage in the cloud. It's designed to make life easier for developers by handling much of the pushing and pulling of data. That relieves app developers of the programming burdens associated with managing versions or locations. They can write the new bits to Firestore and the data will be consistent throughout the system. In our project we will be implementing Firestore as a backend to get all the information regarding the diseases like how it spread, symptoms and treatment. In Firestore we will be using Cloud Firestore. But first we will be adding dependencies for Firestore and connecting it with Firestore.



After adding cloud Firestore to the application we will now initialize the cloud firestore to get the data from the firestore .



## Machine Learning Algorithm

Machine learning is the subfield of computer science. It evolved from the study of pattern recognition and computational learning theory in artificial intelligence, machine learning explores the study and construction of algorithms that can learn from and make predictions on data. We will be using ANN That is Artificial Neural Network.

Artificial Neural network is typically organized in layers. Layers are being made up of many interconnected 'nodes' which contain an 'activation function'. A neural network may contain the following 3 layers:

### a. Input layer

The purpose of the input layer is to receive as input the values of the explanatory attributes for each observation. Usually, the number of input nodes in an input layer is equal to the number of explanatory variables. 'input layer' presents the patterns to the network, which communicates to one or more 'hidden layers'. The nodes of the

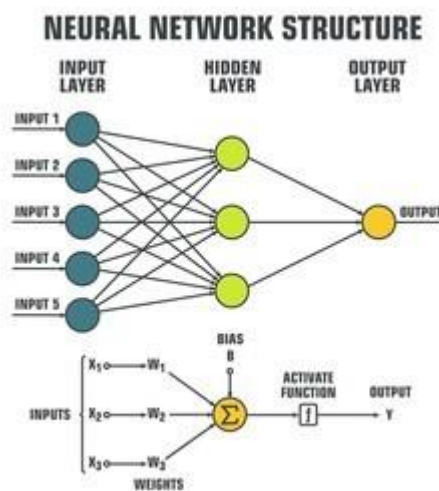
input layer are passive, meaning they do not change the data. They receive a single value on their input and duplicate the value to their many outputs. From the input layer, it duplicates each value and sent to all the hidden nodes.

### **b. Hidden layer**

The Hidden layers apply given transformations to the input values inside the network. In this, incoming arcs that go from other hidden nodes or from input nodes connected to each node. It connects with outgoing arcs to output nodes or to other hidden nodes. In hidden layer, the actual processing is done via a system of weighted 'connections. There may be one or more hidden layers. The values entering a hidden node multiplied by weights, a set of predetermined numbers stored in the program. The weighted inputs are then added to produce a single number.

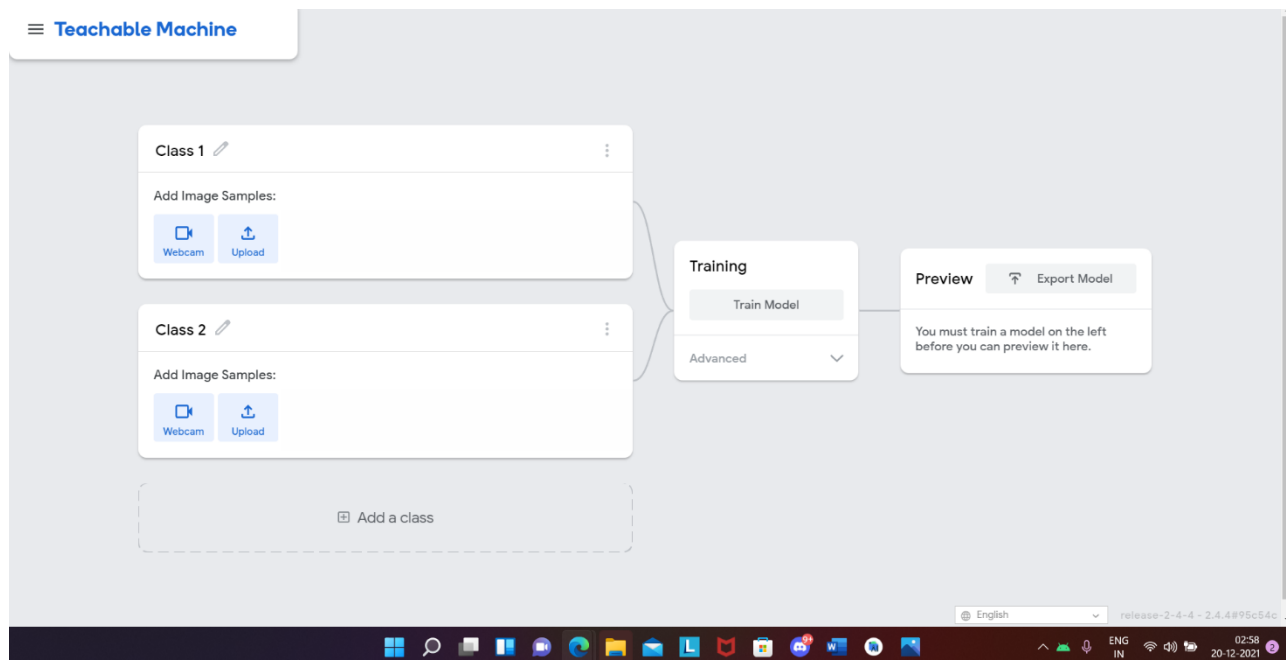
### **c. Output layer**

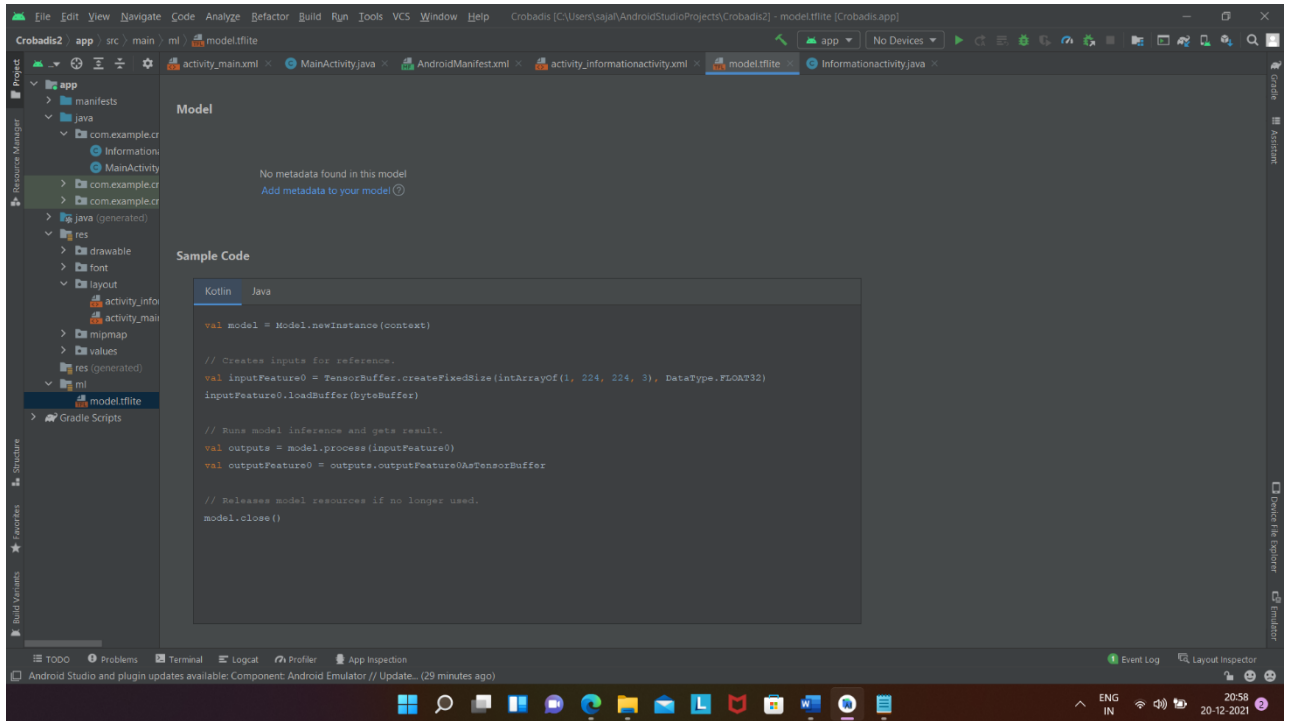
The hidden layers then link to an 'output layer '. Output layer receives connections from hidden layers or from input layer. It returns an output value that corresponds to the prediction of the response variable. In classification problems, there is usually only one output node. The active nodes of the output layer combine and change the data to produce the output values. The ability of the neural network to provide useful data manipulation lies in the proper selection of the weights. This is different from conventional information processing.



We will be using teachable machine to generate tensorflow.js model by which we can do image processing and can classify the image

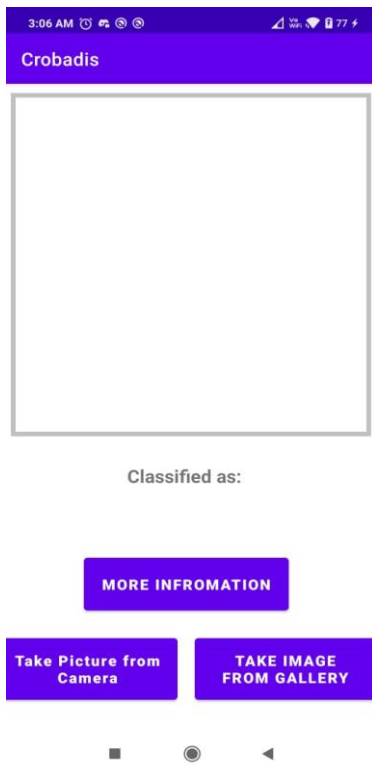
TensorFlow is Created by the Google Brain team, TensorFlow is an open source library for numerical computation and large-scale machine learning. TensorFlow bundles together a slew of machine learning and deep learning (aka neural networking) models and algorithms and makes them useful by way of a common metaphor. TensorFlow can train and run deep neural networks for handwritten digit classification, image recognition, word embeddings, recurrent neural networks, sequence-to-sequence models for machine translation, natural language processing, and PDE (partial differential equation) based simulations. Best of all, TensorFlow supports production prediction at scale, with the same models used for training.



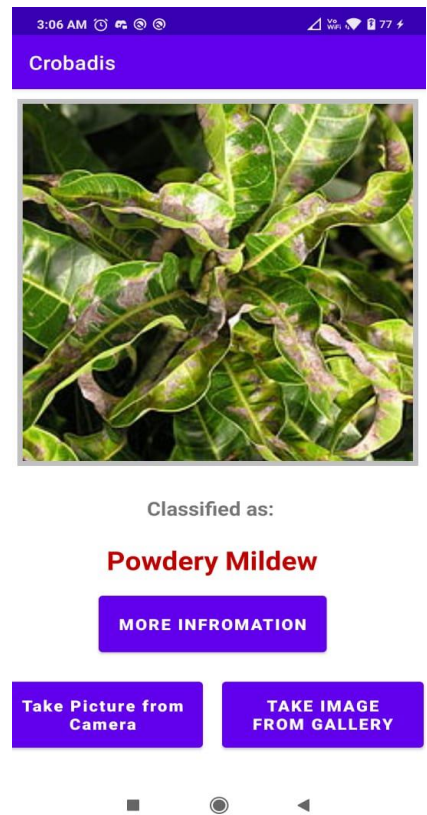
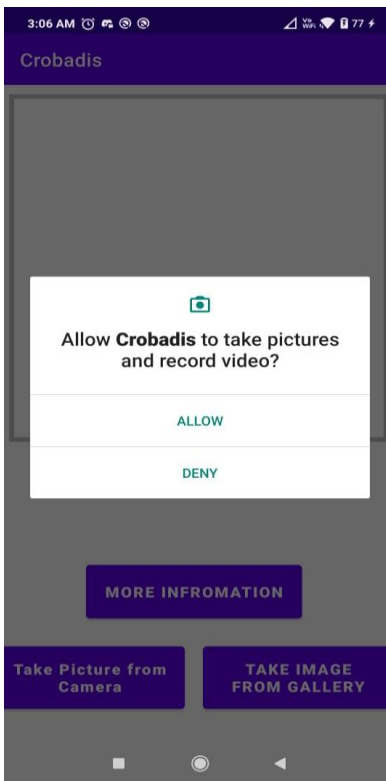


## CROBADIS [Crop Bacterial Disease Classification]

In this section we will describe the developed UI for the application. We have presented here some screen shots of the application. In this app we will train the model using Teachable machine which is made by google which will generate a TensorFlow.js model using ANN which we then integrate with our android application. The image classification is powered by neural network. It was made possible by Nikhil Thorat and Daniel Smikov, the team behind TensorFow.js. It an Open- Source library that allow web developer and android developer to train and run machine learning model locally on the browser or make train model from the model. The first activity that will come will be the Main Activity in which the user take the effected crop image from the gallery or the camera. the using the Tenserflow.js model the image will classify the image and tell the name of the diseases. Then the user will go to second activity is the all the possible remedies, disease information and disease treatment. All the information will be coming from



the Firebase as backend



3:06 AM

**Crobadis**

### Powdery Mildew

#### Disease Information

Powdery mildew is caused by the *Oidium mangiferae* fungus and transported through the wind. It appears when there are prolonged periods of cool, dry temperatures.

#### Symptoms

The symptoms of the disease can be identified with the appearance of a white, powdery-like substance on the panicles, new fruit and the undersides of new leaves. This disease can cause premature leaf and fruit drop and can decimate a crop. Mature leaves that are infected have spots that appear a purplish-brown color. This occurs as the white fungus begins to disappear.

#### Disease Treatment

The treatment for this fungus is a copper fungicide program that begins in early spring just as the flowers develop and extends to the end of the crop season. Prevent the problem. **Powdery Mildew** warmest area of your landscape, pruning so the mango has good air circulation, and keeping the area underneath the tree free of plant debris, fallen fruit, and weeds.



## **CONCLUSION**

Taking the resource constraint into consideration we have developed an android application for the farmers which will tell the various disease name using Machine learning Models. This application provides remedy information to the farmer for individual diseases. All the information and the remedy for the different crop have been taken from different agriculture website.

## **SCOPE**

This scope of the application is that it can be directly connected to the agriculture department by which the farmer can get information regarding the crop, disease and the remedies. This will help the agriculture scientists to know the problem of the farmer and will help to solve the problem permanently

## **REFERENCES**

1. <https://developer.android.com/index.html>
2. <https://www.krishisewa.com/articles/disease-management/731-major-diseases-of-mango-and-their-management.html>
3. <https://vikaspedia.in/agriculture/crop-production/integrated-pest-managment/ipm-for-fruit-crops/ipm-strategies-for-mango/mango-diseases-and-symptoms>
4. <https://developer.android.com>