APPLICATION ON DETECTING AND TREATING THE DISEASE IN PLANT/CROPS

A DESIGN PROJECT II REPORT

Submitted by

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in partial fulfillment for the award of the degree of

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(DEEMED TO BE UNIVERSITY)

BONAFIDE CERTIFICATE

Certified that this design project II report **Application on detecting and treating the diseases in crop/plant** is the bonafide work **ADINARAYANA REDDY (20113128), RUKESH REDDY (20113119)** who carried out the design project work under my supervision during the academic year **2022-2023**.

Dr. MUTHUKUMARAN M
Associate Professor
(Supervisor)

INTERNAL EXAMINER

Name:_____

Designation: _____

EXTERNAL EXAMINER

Name: _____

Designation:_____

Design Project II Viva - voice conducted on _____

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ABSTRACT

The detection of plant disease is the premise of the prevention of a plant disease efficiently and precisely in the complex environment. Now a days identification of plant disease becomes digitalized and enabling advanced decision support, smart analysis, and planning. This method shows the accuracy, which is better than the traditional method by reducing influence of disease on agricultural production and being favorable to sustainable development of agriculture.we identified and summarized several problems and solutions corresponding to the CNN used in plant leaf disease detection. Moreover, This model is trained on image data were the most effective method for detecting early disease detection.We expressed the benefits and drawbacks of utilizing CNN in agriculture, and we discussed the direction of future developments in plant disease detection Therefore, the deep learning algorithm helps not only identifying the disease but it tells the solution to cure the disease and intelligent agriculture and agricultural production.

LIST OF FIGURES

LIST OF ABBREVIATIONS

AI	Artificial Intelligent
TF	TensorFlow
GPU	Graphic Processing Unit
ML	Machine Learning
NVE	Networked Virtual Environment
RGB	Red Green Blue
CNN	Conventional Neural Network

CHAPTER 1

INTRODUCTION

1.1 Overview

The detection and treating the disease in plants and crops helps in maintain the crops and fruits healthy by preventing the insects and diseases that spoils the crop. Plant diseases is important as they cause loss to the plant as well as plant production.The traditional methods mainly used by specialists, experience, and manuals, but the majority of them are expensive, time-consuming, and labor-intensive with difficulty detecting precisely. This detecting and treating the disease in plants and crops increases a rapid and accurate approach to detect the plant/crop diseases seems so urgent for the benefit of business and ecology to agriculture.

1.2 Motivation for the project

Mostly farmers use the traditional method for spraying and using the fertilizers and pesticides to the diseases and pests, without proper knowledge of the disease about plant or a crop. By using the pesticides will harm the crop as well as fruits. If the unknown disease is detected the image with problem is posted to community then the agriculture experts or well-known farmers can give solution to it. The main motivation is about to identify the plant and crop diseases using CNN image processing. It also, after identification of the disease and suggest the name of pesticide to be used as the treatment.

1.3 Problem Definition

A mechanism that required to detect and provide treatment to the disease to the infected crop and plant with the proper knowledge of pesticides and fertilizers with the help of agriculture experts and well-known farmers.

1.4 SIH Problem and description

Problem Number-RK1129

Farmers can upload the photographs of disease affected plants/crops and solutions may be provided by experts/scientists linked to the app.

1.5 Organization of the Report

The following is the thesis's structure is as follows. Chapter 1 introduces the motivation and problem definition of the project in detail. The reference document that was collected for this project, as well as the takeaways, are noted in the Literature Survey. In Chapter 3, the Project Description is mentioned along with existing work, proposed work, and benefits of project. In Chapter 4, the Architecture Design is mentioned along with full explanation for the project. In Chapter 5, the Software and Hardware Requirements and technologies being implemented in the project is mentioned.In Chapter 6, the Module Description of the project is mentioned and the subdivisions are explained in detail. In Chapter 7, the whole implementation of the project is discussed. In Chapter 8 , the Results and Explanations are mentioned and the outcomes of every module are shown in graphic detail. In Chapter 9, a Conclusion for this project is made and the further enhancements are also mentioned. In Chapter 10, the Individual Report of the Team Members is mentioned along with the objective, role, and contribution of each member.

1.5 Summary

An application is been developed for the detection and treating the disease in plant and crop to good accuracy with good User Interface that the user will understand the friendly interface with additional information on diseases and its preventive measures .

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter examines the numerous papers that have been published up to this point., as well as the project details that are supplied and addressed in length in the analysis of the article.

2.2 Literature Review

Digital Image processing techniques for detecting and classifying plant diseases (2021, Institute of Advanced Engineering and Science)

Author examined the that this model detects the disease of leaf using colour analysis such as white spot algorithm. As the outlier of the image are applied and then extracted to spot that the patterns held on leaf.They evaluated the significant problems and solutions of CNN used for plant disease classification.

Infected Leaf analysis and K-Means clustering (2019, International Journal and advanced Research in computer science and Engineering)

In this paper they developed a model by taking the leaf Image, that they seperate the image pixels into two clusters then multiplying the clusters times the number of others to detect it is infected or not. first random two centers or pixels are chosen from the infected leaf. The centers represent the faulty and faultless regions of the leaf. It is done based on similar kind of featured weights. It is done to identify the infected cluster by a specific type of disease.Then for all the pixels the nearest center is calculated and assigned to the corresponding centers to detect.

Android based app to prevent crop disease in various season(2020, International Research journal of Engineering and Technology)

In this paper, the author has used different techniques to detect the disease and give treatment. In this providing them with vital information and recommendations to help them manage their crops effectively and reduce the impact of diseases on their yields. Then they have developed an android application which helps the users to better understand of the user interface than the web application it gives more convinient way and good reach of the people who wants reach. It helps a lot for the agriculture that which and when fertilizers, pesticides are used to save various crops from the diseases in various seasons.

Applying Image processing technique to detect plant diseases(2018, International Conference on computer and Information Technology)

In this paper, the author has described a a methodology for early and accurately plant diseases detection, using artificial neural network (ANN) and diverse image processing techniques.As this system uses the pattern recognition such as boundary detection and spot detection that helps to find the infected part on the leaf or the crop.As the proposed approach is based on ANN classifier for classification and Gabor filter for feature extraction, it gives better results with a recognition rate of up to 91%.

Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features (2020, International Research journal of Engineering and Technology)

In this paper, disease identification process includes four main steps as follows: first, a color transformation structure is taken for the input RGB image, and then by means of a specific threshold value, the green pixels are detected and uninvolved, which is followed by segmentation process, and for obtaining beneficial segments the texture statistics are computed. By identifying

the color features of the leaves image processing helps in the detection of the diseases and also provides prevention to the particular diseases.This study says that in this model they have developed image processing algorithm to detect plant leaf infection by identifying the colour feature of the leaf infected and remaining area.At last, classifier is used for the features that are extracted to classify the disease..

2.6 Conclusion/GAP

Many existing systems have different models to detect the disease of the crops and plants. But this convention neural network image classification has more scope as it's one among the mostly used algorithms responsible for the incredible development over the last few years.

CHAPTER 3

PROJECT DESCRIPTION

3.1 Objective of the Project Work

The main objective is to detect the disease and pests in the plant, crop and provide the treatment with proper knowledge to the farmer when image is uploaded through this application in any format and the known disease is detected and treatment is given with proper pesticides and fertilizers within this application. If the unknown disease is detected the image with problem is posted to community then the agriculture experts or well-known farmers can give solution to it.

3.2 Existing System

The existing systems that have been developed till now by using the different machine learning algorithms such as Random Forest, Naive bayes, Artificial Neural network the accuracy of those models are low and the works using those classification techniques is done with the mind set of detecting disease for only one species of plants.This is done by identifying the color features of the leaves image processing helps in the detection of the diseases and also provides prevention to the particular diseases.At the first, the image is segmented by taking the picture of the plant or the crop in the RGB form and later the green pixel is detached by the original one and then by the colour variations from the infected part to the healthier part the disease is detected and classified. .The farmers still use naked eyes to detect diseases which is serious problem as a farmer is not aware of what type of disease the plant is infected. Farmers are still facing the issues and the techniques they are using to detect the disease are time consuming.

3.3 Proposed Solution

The proposed system was developed with the benefits of the farmers and agricultural sector .The developed system can detect disease in plant and crops with the weather information.This system not only detects the disease of the plant and crop but also gives the treatment against the disease.When the unknown disease is detected through the CNN image classification then the image with problem is posted on community. Agriculture experts and well-known farmers can give solution to their problem. By proper knowledge of the disease and the treatment can be taken for improving the health of the plant or crop with fertilizers and pesticide.

Mostly farmers uses the traditional method for spraying and using the fertilizers and pesticides to the diseases and pests, without proper knowledge of the disease about plant or a crop. By using the pesticides will harm the crop as well as fruits.The uploaded image through this application by the farmer can be in any format and the known disease is detected and treatment is given with proper pesticides and fertilizers with this application. If the unknown disease is detected the image with problem is posted to community then the agriculture experts or well-known farmers can give solution to it.In this application we have provided the additional information such a preventive measures for the diseases which have been spotted regularly now a days.

3.4 Benefits of Proposed System

The proposed system will bring the higher accuracy of this model of integration with application will make the agriculture or the farming more easier with lot of well researched knowledge about the diseases and pests that should used for infected plants and crops. In this application we have provided the additional information such a preventive measures for the diseases which have been spotted regularly now a days.

CHAPTER 4
SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

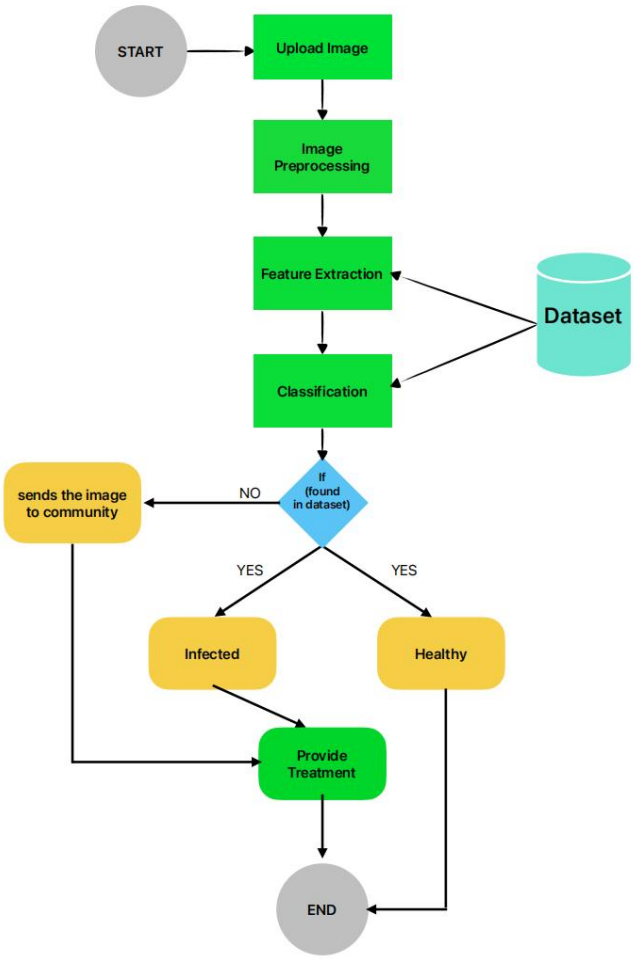


Fig 4.1: Flow Diagram for crop disease detection and treatment

The above diagram depicts the system's architecture, which is used to follow the model's flow and design. Firstly, home page of the mobile application where the crop or infected plant leaf image is uploaded to detect the disease.After that by using the CNN image classification which is done by color variation, pattern and spot recognition with other infected and healthy part of the leaf or the crop. By detecting the disease the following treatment is provided, if the unknown disease is known then the following image with problem is posted on the community of application developers. Agriculture experts and well-known farmers can give solution to their problem.

CHAPTER 5

PROJECT REQUIREMENTS

5.1 Hardware and Software Specification

5.1.1 Google collaboratory:

The Google Research Collaboratory, is a product developed by Google Research. Colab is especially well suited to machine learning, data analysis, and teaching Because it allows anybody to build and execute arbitrary python code over the web. Colab is used to develop the Machine learning model over web using this and convert into tflite model.

5.1.2 Windows 11 operating system:

In October 2021, Microsoft launched Windows 11, the most recent major release of its Windows NT operating system. It's a free update to Windows 10 (2015), and it's available for Windows 10 devices that meet the new Windows 11 system requirements

5.1.3 Android Studio:

Android Studio which is used to develop the applications using the different languages such as flutter, kotlin, java and etc with lot of features and pre-built software and web integrations.

5.2 Summary

This chapter discusses the software used in this project, and the technology applied to design the sign language detection system. The software used for coding the sign language detection system were selected and used after a lot of research and deliberation.

CHAPTER 6

MODULE DESCRIPTION

6.1 Modules

Module 1 discuss about detecting and treatment of the disease from plant or crop user interface to make the understand of the process easier to the user or the farmer . In module 2 we implemented machine learning conventional neural network algorithm to detect the disease with good accuracy and in the last module we connect the database to give solutions and integrate the converted tflite model into the application.

6.2 Module 1 : User Interface

To deploy the above machine learning model to android we have to convert it into the tensor flow lite then through the android studio we have to deploy it in our application. Adding the mostly used crops and plant around twelve with the major diseases that appears on crops and plant leaf. Along with the disease it also providing the treatment to the following disease that is detected in the database.

6.3 Module 2 : Machine Learning Model

In this system we used the CNN image classification techniques that uses the image for recognition of patterns, color variation and spots on the plant leaf or the crop.It is based on the color transformation structure is taken for the input RGB image then is undergoes to the colour variation to seperate the diseased leaf from the infected part and the . By recognition of the features it tells the disease or pest that occurred.

6.4 Module 3 : Integration and database connectivity

To deploy the above machine learning model to android we have to convert it into the tensor flow lite then through the android studio we have to deploy it in our application. Adding the mostly used crops and plant around twelve with the major diseases that appears on crops and plant leaf. Along with the disease it also providing the treatment to the following disease that is detected in the database.

6.5 Summary

This chapter presents the split up of the project into modules, and the role of each module towards completing the project. In the first module, we discuss about user interface to make the understand of the process easier to the user or the farmer . In second module we implemented machine learning algorithm to detect the disease with good accuracy and in the last module we connect the database to give solutions and integrate the converted tflite model into the application. It also has a brief explanation of how each module is executed and the concept behind the working of those modules.

CHAPTER 7

IMPLEMENTATION

The proposed system was developed with the benefits of the farmers and agricultural sector. The developed system can detect disease in plant and crops . The proposed system was developed with the benefits of the farmers and agricultural sector. This system not only detects the disease of the plant and crop but also gives the treatment against the disease. By proper knowledge of the disease and the treatment can be taken for improving the health of the plant or crop with fertilizers and pesticide.

In this system we used the CNN image classification techniques that uses the image for recognition of patterns, color variation and spots on the plant leaf or the crop. By recognition of the features it tells the disease or pest that occurred to detect the disease and pests in the plant, crop and provide the treatment with proper knowledge to the farmer when image is uploaded through this application in any format and the known disease is detected and treatment is given with proper pesticides and fertilizers within this application. If the unknown disease is detected the image with problem is posted to community then the agriculture experts or well-known farmers can give solution to it.

To deploy the above machine learning model to android we have to convert it into the tensorflow lite then through the android studio we have to deploy it in our application.
Adding the mostly used crops and plant around twelve with the major diseases that appears on crops and plant leaf. Along with the disease it also providing the treatment to the following disease that is detected in the database.It gives the well known knowledge about the diseases occuring in the crop or plant with the addition information such as preventive measures.

7.1 Summary

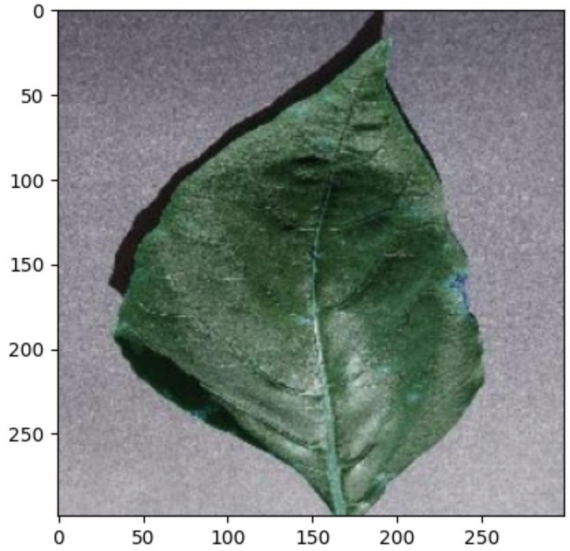
The chapter explains each section on how the system works . the algorithm used in disease detecting and treatment in plants and crops is integrated with the application then it will detect the disease along with the treatment that disease detected in the plant or crop.

CHAPTER 8

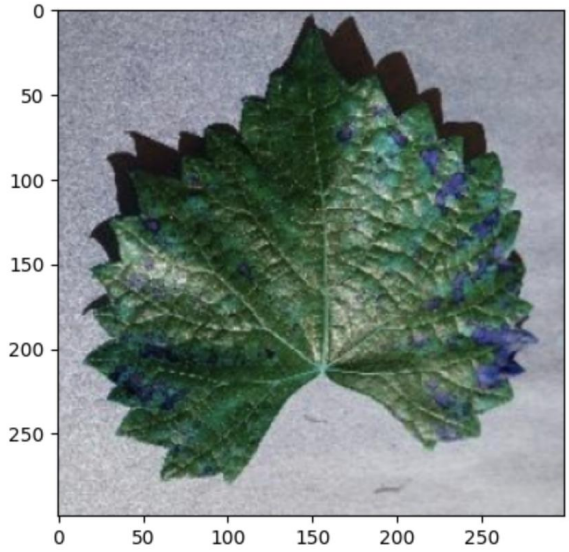
RESULT & ANALYSIS

8.1 Results Obtained

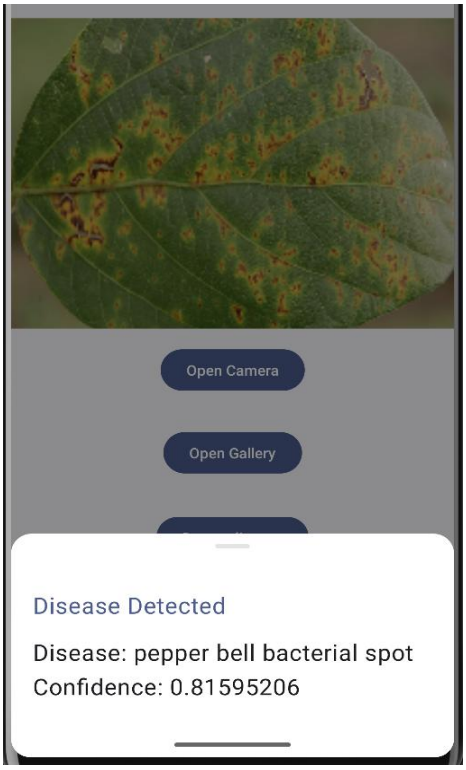
```
SOURCE: class: Pepper,_bell___Bacterial_spot, file: Pepper,_bell___Bacterial_spot/1044c742-39a0-4b1a-984f-3cb2bdeda94b
1/1 [==============================] - 0s 86ms/step
PREDICTED: class: Peach___Bacterial_spot, confidence: 0.074471
```




```
SOURCE: class: Grape___Esca_(Black_Measles), file: Grape___Esca_(Black_Measles)/eda4c723-94b7-496a-8b24-107d453f6787_
1/1 [==============================] - 0s 89ms/step
PREDICTED: class: Peach___Bacterial_spot, confidence: 0.091944
```

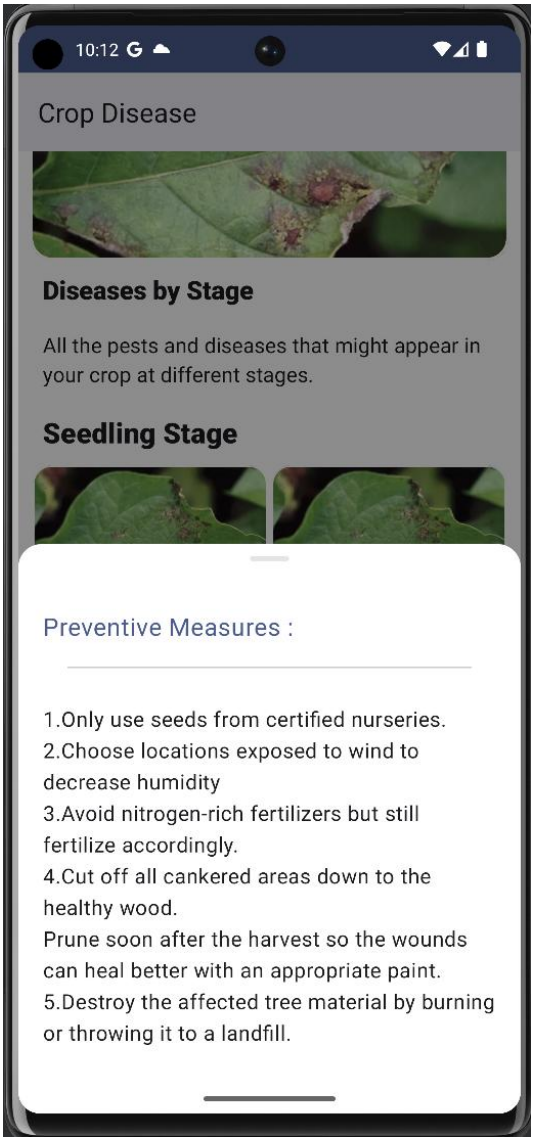


8.2 Treatment to disease



8.3 Post unknown disease

8.4 Preventive Measures



CHAPTER 9

CONCLUSION AND FUTURE WORK

9.1 Conclusion

This CNN based method for plant disease classification using the leaves of diseased plants. Building such a neural network with high efficiency is a complex task. Transfer learning can be employed to achieve greater efficiency . Inception v3 is one of the models available that inherently have the capability to classify images and further can be trained to identify different classes. Also by dataset classification using contour method, the training set can be chosen to ensure proper training of model for all features. This provides better feature extraction than randomly classifying the dataset.Thus, with implementation and use of these methods for plant disease classification losses in agriculture can be reduced.

9.2 Future Work

With the knowledge we have gained by developing this project, we are confident that in the future we can make the application more effectively by adding this services.

- Extending this application by making it as a hardware project with IOT.
- We will add more diseases for the taken plant and crops.
- To maintain or improve the accuracy of the CNN model.

9.3 Summary

This chapter concludes the project and talks about the targets that were set for the project and the success in achieving them. It also mentions the list of future developments that can be done to scale up the project and increase the usefulness of the system for the user.

CHAPTER 10

INDIVIDUAL TEAM MEMBER REPORT

10.1 Individual Objective

Name: Rukesh Reddy

The objective was to plan the phases and set up a proper roadmap for the project in the first place.The objective was to integrate CNN model into application by tensorflow lite. Also, plan and design the flow, time planner, and implementation. Contributing to the research paper.

Name: Adinarayana Reddy

The objective was to review the available concepts and literature and referring to documents on various sites. To do the testing part and identifying the errors and various corner cases. Contribute to the team report and presentation.

10.2 Role of the Team Members

Name: Rukesh Reddy

Role: Project Management and Programmer.

Name: Adinarayana Reddy

Role: Testing and Documenting work.

10.3 Contribution of the Team Members

Name: Rukesh Reddy

Contribution: Project Management; UI design and integration of model with android studio; Testing; Team Presentation.

Name: Adinarayana Reddy

Contribution: Research on plant and crop preventive measures and treament of disesaes ; Testing; Documentation; Finding publication resources,Team Report.

10.4 Summary

This chapter talks about the role and individual contribution of each member, and how every input added contributed significantly to the overall success of the project. The combined efforts of every member were equally important in every aspect, and helped achieve the target set out for the project.

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APPENDIX A

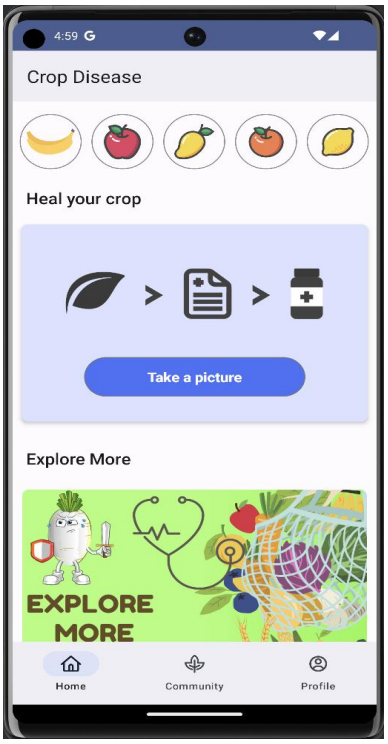
SAMPLE CODE

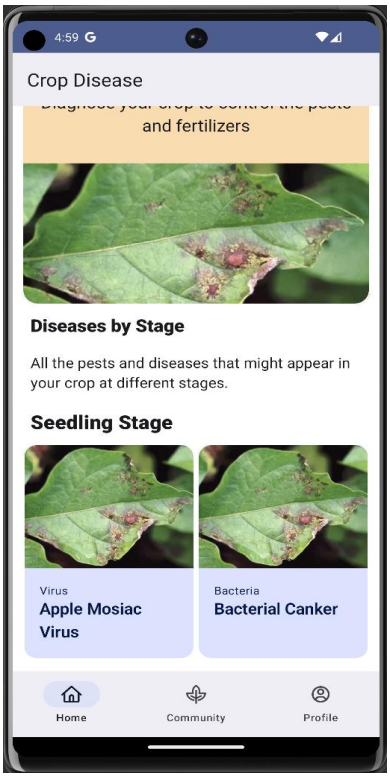
```
@Composable
fun HomePage(navController: NavHostController) {
   Column(modifier = Modifier
      .verticalScroll(rememberScrollState())
      ) {
      Column(modifier = Modifier) {
         Spacer(modifier = Modifier.height(8.dp))
         Horz(navController)
         Text(
            text = "Heal your crop",
            fontSize = 20.sp,
            fontWeight = FontWeight.Medium,
            style = MaterialTheme.typography.titleLarge,
            overflow = TextOverflow.Ellipsis,
            modifier = Modifier.padding(15.dp)
         )
         ElevatedCard(
            //shape = MaterialTheme.shapes.medium,
            shape = RoundedCornerShape(8.dp),
            // modifier = modifier.size(270.dp, 240.dp)
            modifier = Modifier
               .padding(10.dp, 5.dp, 10.dp, 10.dp)
               .height(250.dp),
            //set card elevation of the card
            elevation = CardDefaults.cardElevation(defaultElevation = 3.dp),
            colors = CardDefaults.cardColors(
               containerColor = MaterialTheme.colorScheme.primaryContainer,
            ),
         ) {
            Column(modifier = Modifier.clickable(onClick = { })) {

               Image(
                  painter = painterResource(R.drawable.first),
                  contentDescription = null, // decorative
                  contentScale = ContentScale.Crop,
                  modifier = Modifier
                     .height(150.dp)
                     .fillMaxWidth())
```

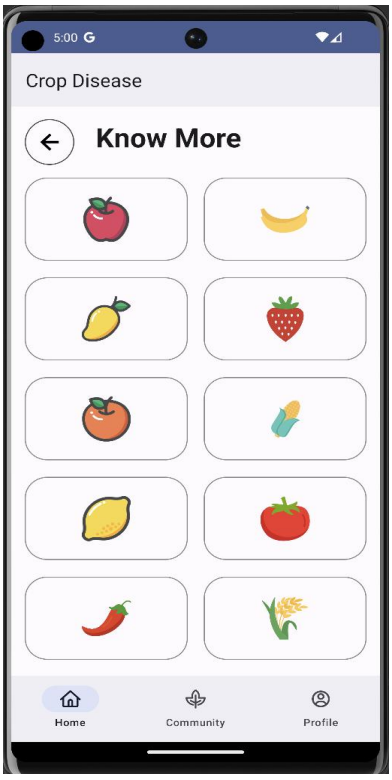
```
            Column(
                modifier = Modifier
                    .padding(18.dp)
                    .fillMaxWidth(),
                verticalArrangement = Arrangement.Bottom,
                horizontalAlignment = Alignment.CenterHorizontally
            ) {
                OutlinedButton(
                    modifier = Modifier
                        .height(50.dp)
                        .width(250.dp),
                    shape = RoundedCornerShape(50.dp),
                    colors = ButtonDefaults.buttonColors(
                        contentColor = Color.White,
                        containerColor = Color(red = 72, green = 113, blue = 247)
                    ),
                    onClick = { navController.navigate("detectdisease") }
                ) {
                    Text(
                        text = "Take a picture",
                        fontSize = 17.sp,
                        fontWeight = FontWeight.ExtraBold,
                        style = MaterialTheme.typography.titleLarge,
                        overflow = TextOverflow.Ellipsis
                    )
                }


class MainActivity : ComponentActivity() {
    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContent {
            CropDiseaseTheme {
                // A surface container using the 'background' color from the theme
                NavigationPage()}
        }
    }
}
```

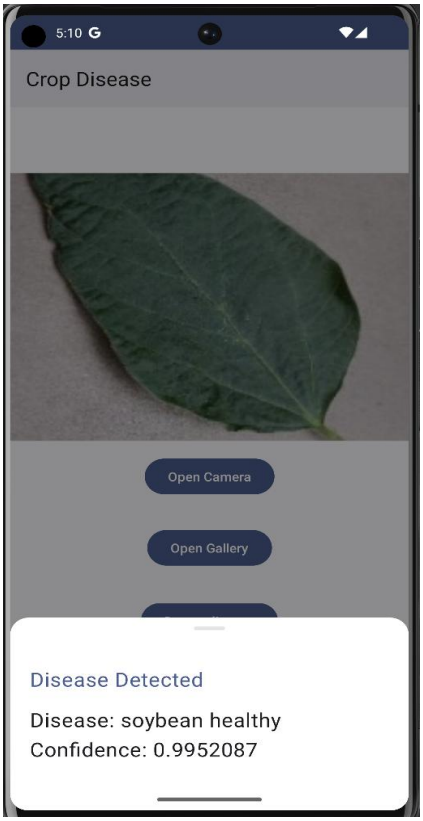
APPENDIX B

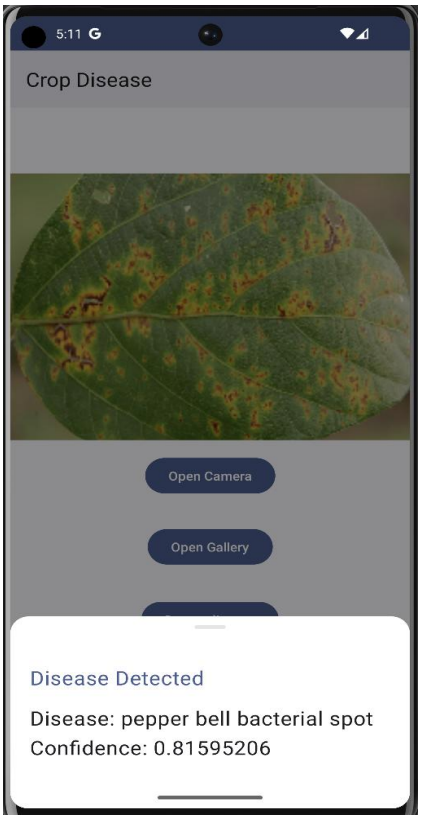
SAMPLE SCREEN

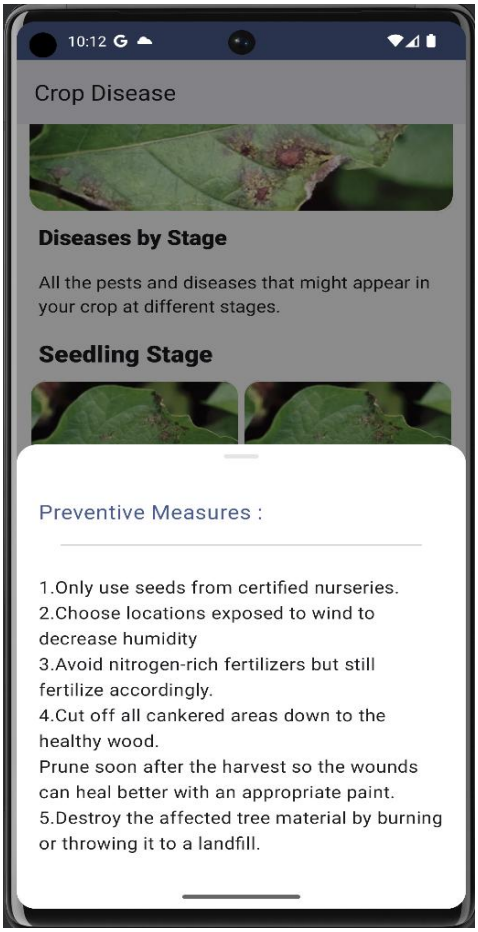


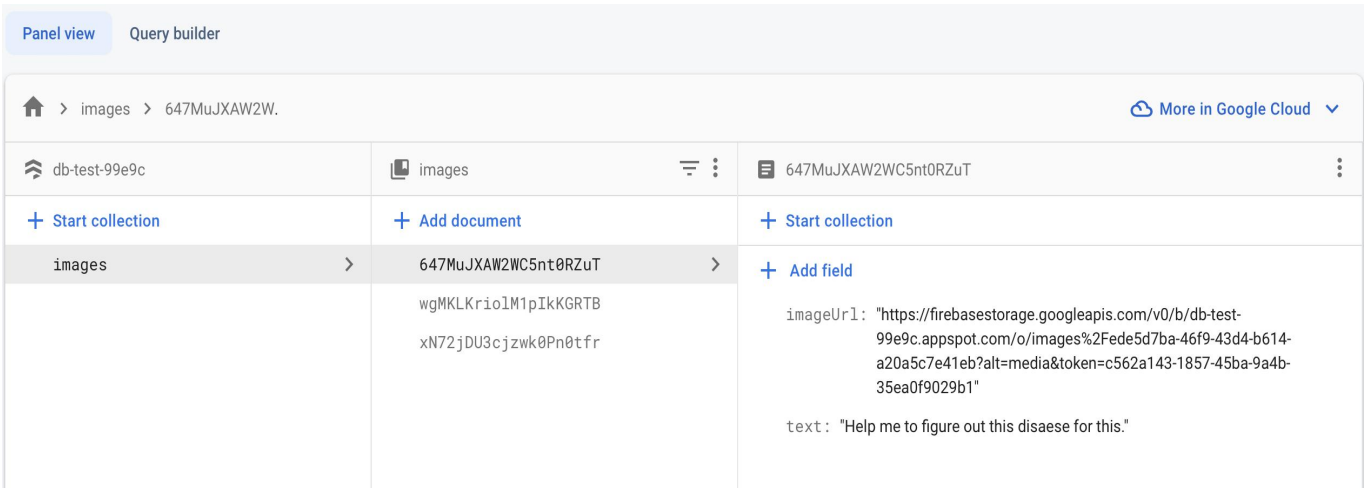





5:10
Crop Disease
Open Camera
Open Gallery
Disease Detected
Disease: soybean healthy
Confidence: 0.9952087


5:11
Crop Disease
Open Camera
Open Gallery
Disease Detected
Disease: pepper bell bacterial spot
Confidence: 0.81595206


10:12
Crop Disease
Diseases by Stage
All the pests and diseases that might appear in your crop at different stages.
Seedling Stage
Preventive Measures :
1.Only use seeds from certified nurseries.
2.Choose locations exposed to wind to decrease humidity
3.Avoid nitrogen-rich fertilizers but still fertilize accordingly.
4.Cut off all cankered areas down to the healthy wood.
Prune soon after the harvest so the wounds can heal better with an appropriate paint.
5.Destroy the affected tree material by burning or throwing it to a landfill.


Panel view
Query builder
images
647MuJXAW2W.
More in Google Cloud
db-test-99e9c
images
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Start collection
Add document
Start collection
images
647MuJXAW2WC5nt0RZuT
wgMKLKriolM1pIkKGRTB
xN72jDU3cjzwk0Pn0tfr
Add field
imageUrl: "https://firebasestorage.googleapis.com/v0/b/db-test-99e9c.appspot.com/o/images%2Fede5d7ba-46f9-43d4-b614-a20a5c7e41eb?alt=media&token=c562a143-1857-45ba-9a4b-35ea0f9029b1"
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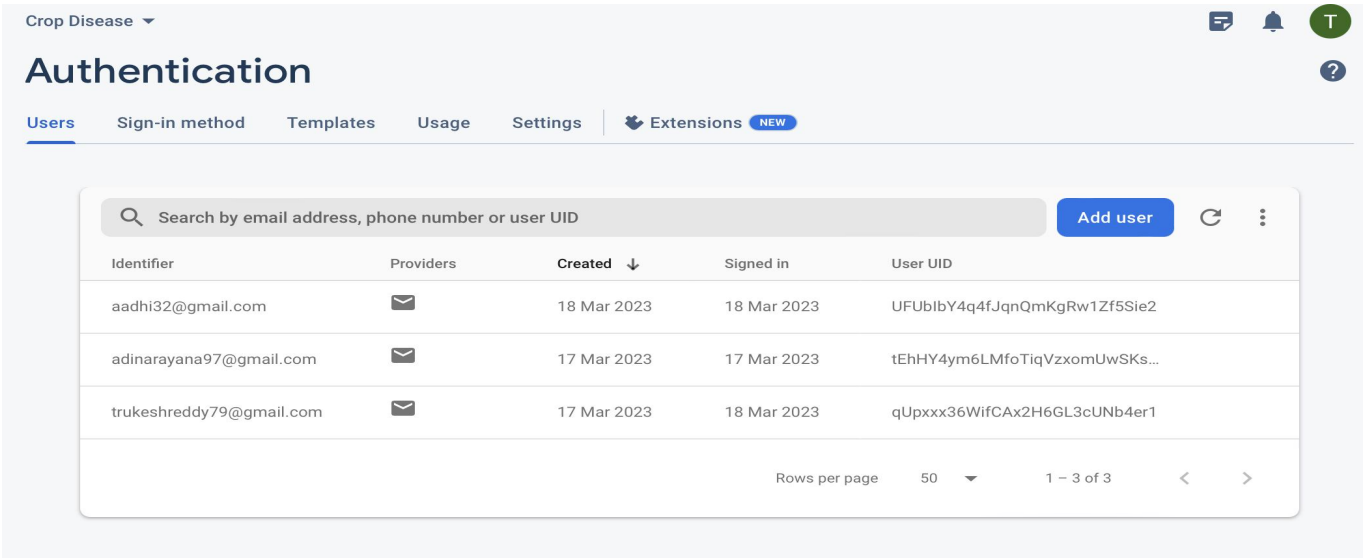
Crop Disease
Authentication
Users
Sign-in method
Templates
Usage
Settings
Extensions
NEW
Search by email address, phone number or user UID
Add user
Identifier
Providers
Created
Signed in
User UID
aadhi32@gmail.com
18 Mar 2023
18 Mar 2023
UFUbIbY4q4fJqnQmKgRw1Zf5Sie2
adinarayana97@gmail.com
17 Mar 2023
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trukeshreddy79@gmail.com
17 Mar 2023
18 Mar 2023
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Rows per page
50
1 – 3 of 3

APPENDIX C

PLAGIARISM REPORT

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APPENDIX E
TEAM DETAILS

NAME
ROLL NO
EMAIL
CONTACT NO

NAME
ROLL NO
EMAIL
CONTACT NO

NAME
ROLL NO
EMAIL
CONTACT NO