GOOGLE HACXMAS 2021

UTPAL MISHRA

INDEX

- Introduction
- Idea
- Idea Architecture
- Image Classifier Architecture
- Applications Screenshots
- Conclusion
- References

PROBLEM STATEMENT (Track C: Environment)

How can we satisfy the growing food requirements of the world population using Machine Learning?

INTRODUCTION

- Shortage of Food Resources is not a new expression to us and it has been years and decades but still we are unable to meet the global food requirements.

- Facing problem of food sufficiency, food deficiency and food insecurity.

- Almost 100 million people faced food crisis in 2020 due to food insecurity.

- Economic crisis was the major factor affecting at least 24 million in 2019 and to approx. 40 million in 2020.

- And with the global population on its way to hitting 8.5 billion by 2030

IDEA

- Building a Machine Learning Web and Android Application *(Downloadable .apk) in helping the FARMERS to increase the food production.

- Building Plant Disease Classifier and Tea Leaves Classifier

- Integrating Plant Disease specific information such as:
  - About the Disease
  - Symptoms of Disease
  - Solutions

- Integrating Tea Leaves specific information such as:
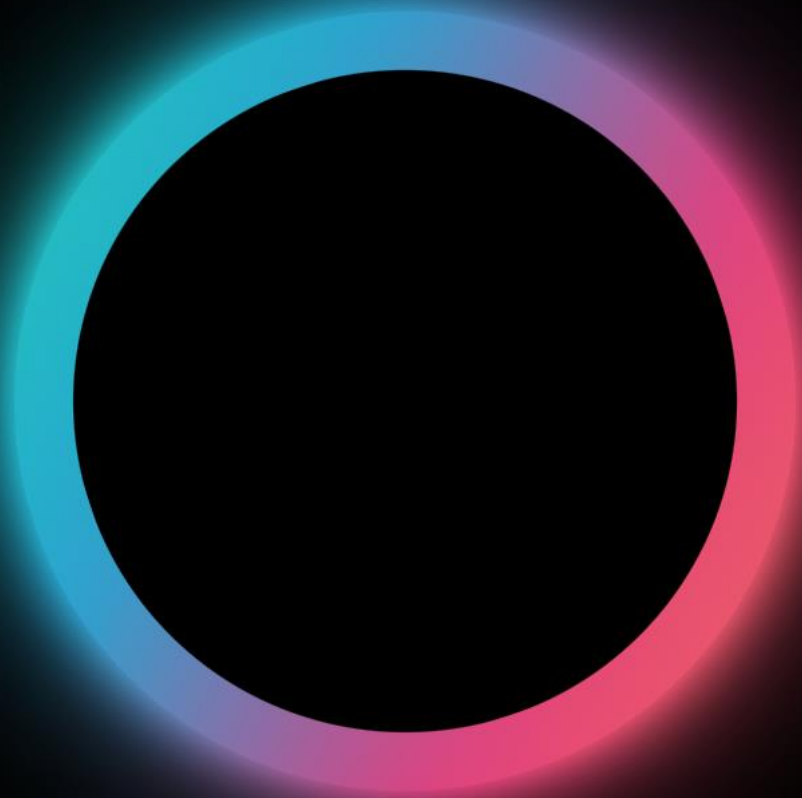 - About the Disease
  - Symptoms of Disease
  - Solutions

IMAGE CLASSIFIER ARCHITECTURE

*Data Source: Kaggle

GOOGLE HACXMAS

IMPROVING FOOD SECURITY AND CROP YIELD

Help
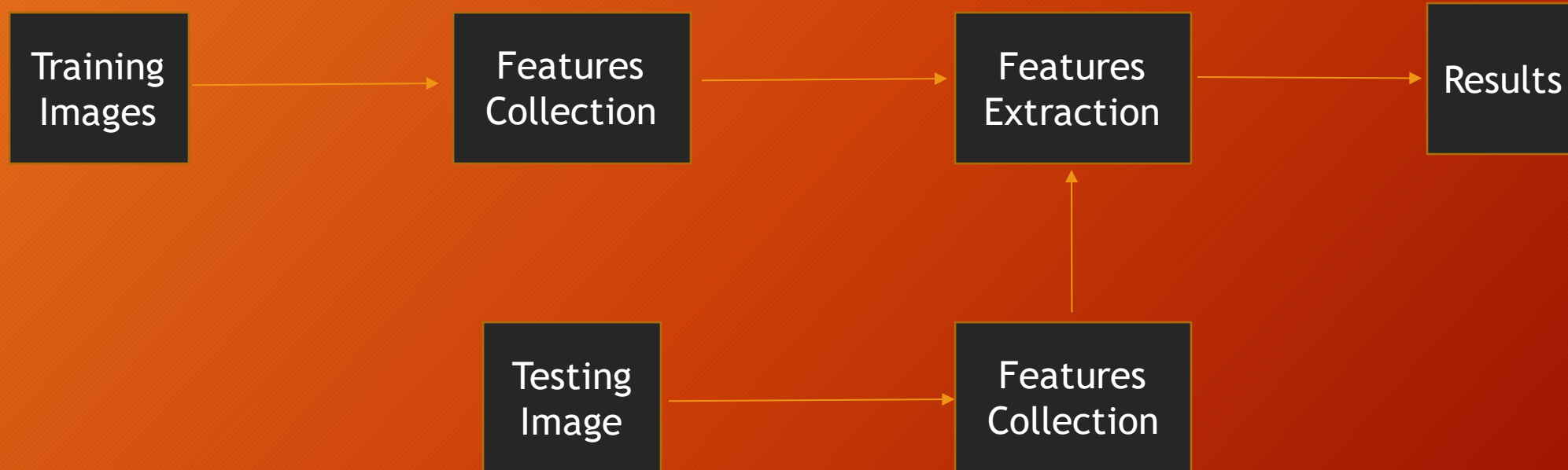
More Plant Disease Classification

Climate Risk Prediction

Plant Disease Classification

Crop Yield Prediction

Banana Leaf Disease Classification

GOOGLE HACXMAS

TEA LEAF CLASSIFICATION

Help

Tea Leaf Detection

Withered Tea Leaf Classification

Fresh Tea Leaf Classification

Image Classifier

Choose...
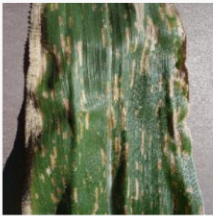

Plant Disease Classification

Climate Risk Prediction

Crop Yield Prediction

More Plant Disease Classification

Image Classifier

Choose...

Result: Gray Leaf Spot

ABOUT:

Gray leaf spot (GLS) is a common fungal disease in the United States caused by the pathogen Cercospora zeae-maydis in corn.

Disease development is favored by warm temperatures, 80°F or 27 °C; and high humidity, relative humidity of 90% or higher for 12 hours or more.

Cercospora zeae-maydis overwinters in corn residue, allowing inoculum to build up from year to year in fields.

Cropping systems with reduced- or no-till and/or continuous corn are at higher risk for gray leaf spot outbreaks.

Conducive weather conditions encourage the rapid spread of disease near the end of summer and early fall, when corn plants allocate more resources to grainfill.

SYMPTOMS:

Early Symptoms

SYMPTOMS:

Early Symptoms

Gray leaf spot lesions begin as small necrotic pinpoints with chlorotic halos, these are more visible when leaves are backlit.

Coloration of initial lesions can range from tan to brown before sporulation begins.

Because early lesions are ambiguous, they are easily confused with other foliar diseases such as anthracnose leaf blight, eyespot, or common rust.

Later Symptoms

As infection progresses, lesions begin to take on a more distinct shape.

Lesion expansion is limited by parallel leaf veins, resulting in the blocky shaped "spots".

As sporulation commences, the lesions take on a more gray coloration.

Entire leaves can be killed when weather conditions are favorable, and rapid disease progression causes lesions to merge.

SOLUTION:

Apply water early in the morning only when water is needed. Avoid evening waterings which keep the leaf surface wet for long periods. Catch and remove grass clippings where gray leaf spot is a problem. Several fungicides (See the section Chemical Controls for Turfgrass Diseases) are recommended for gray leaf spot control.

production practices such as tillage and crop rotation that reduce the amount corn residue on the surface will decrease the amount of primary inoculum.

Planting hybrids with a high level of genetic resistance can help reduce the risk of yield loss due to gray leaf spot infection.

During the growing season, foliar fungicides can be used to manage gray leaf spot outbreaks.

REFERENCE LINK: https://bit.ly/3yKkUIM

More Plant Disease Classification

Climate Risk Prediction

Crop Yield Prediction

Banana Leaf Disease Classification

Image Classifier

Choose...

Result: Sigatoka

ABOUT:
Sigatoka, also known as leaf spot, is caused by the fungus Mycospharella musicola. It is most commonly found in areas of poorly draining soil and areas of heavy dew.

SYMPTOMS:
The initial stages show small, pale spots on the leaves that gradually enlarge to about a half inch (1 cm.) in size and become purple/black with gray centers. If the whole plant is infected, it looks as if it has been burned.

SOLUTION:
Orchard grade mineral oil can be sprayed on the banana every three weeks for a total of 12 applications to control Sigatoka.

Plant Disease Classification

Climate Risk Prediction

Crop Yield Prediction

More Plant Disease Classification

CLASSIFY IMAGE

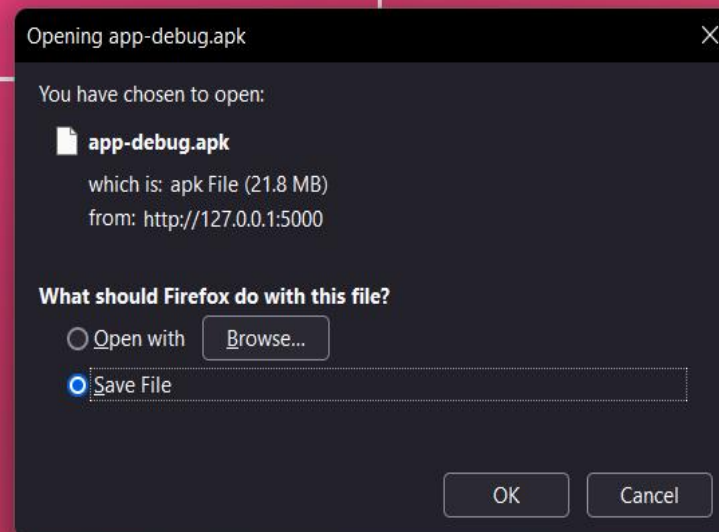Prediction

5 Low Withered - Poor

4 Low Withered - Best

3 Low Withered - Below Best

2 Low Fresh - Poor

1 Low Fresh - Best

0 Low Fresh - Below Best

Description Label

Class

GOOGLE HACXMAS

Opening app-debug.apk   ✕

You have chosen to open:

app-debug.apk

which is: apk File (21.8 MB)
from: http://127.0.0.1:5000

What should Firefox do with this file?

○ Open with   Browse...

⦿ Save File

OK   Cancel
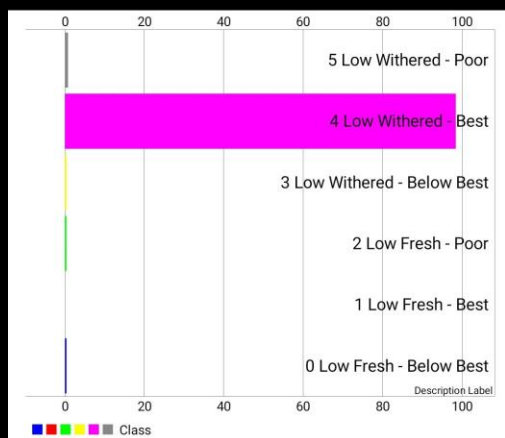
CONCLUSION

Using this working web and/ or android application:

- the farmers will be able to increase the keep the track and maintain healthy leaves

- the farmers can increase the food production

- support to the economy

FUTURE WORK

Further the idea is to extend this project to:

- use more data samples with more categories/ labels
- application deployment
- identify and classify soil
- analyze weather and perform weather forecasting using API
- considering the fertility conditions, the application will be predict the list of suitable crops that can grown
- personalized account with the application for each farmers with notification updates
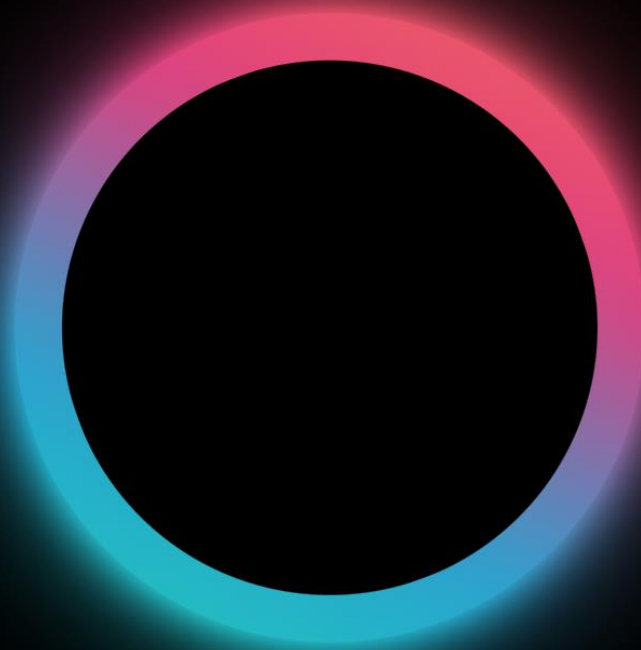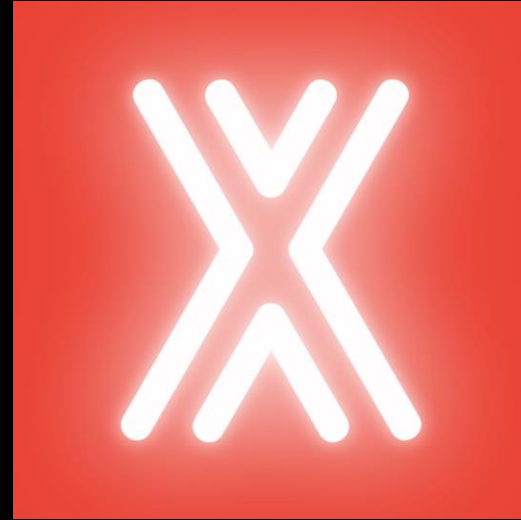
REFERENCES

- https://phys.org/news/2021-05-pandemic-war-climate-fuel-food.html

- http://thebritishgeographer.weebly.com/food-security-and-strategies-to-alleviate-food-shortage.html

- http://geographylaunchpad.weebly.com/areas-of-food-sufficiency-and-deficiency.html

- https://www.bloomberg.com/news/features/2021-09-02/food-prices-driven-up-by-global-worker-shortage-brexit

- https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19

- https://www.un.org/en/food-systems-summit/news/2021-going-be-bad-year-world-hunger

THANK YOU