



IIT DELHI COURSE UNDER MPFITT

TOMATO LEAVE DISEASE CLASSIFIER



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Introduction

- Tomato is one of the most popular vegetables grown all over the world. It is a day neutral plant and can be grown throughout the year depending on the climate.
- In India, it is grown in an area of 7.89 lakh hectare with a production of 197.59 lakh tonnes.
- Despite the massive market for tomatoes, research shows that more than 12% of the annual tomato harvest is lost to wastage in the farm-to-fork chain, the highest among vegetables, due to its highly perishable nature.
- As per past research, 80–90% of diseases of plants appear on leaves



A Brief of Our Vision

The Aim of our Project model is that we upload an image of a tomato leaf plant on our website and the model linked to the website will predict the type of the disease from which the plant is suffering along with the accuracy that how much accurately the disease is being predicted.



Different data Set Classes

Dataset has 10 categories



Tomato__Septoria_leaf_spot



Tomato__Late_blight



Tomato__Early_blight



Tomato__Tomato_mosaic_virus



Tomato__Tomato_Yellow_Leaf_Curl_Virus



Tomato__healthy



Tomato__Septoria_leaf_spot



Tomato__Leaf_Mold



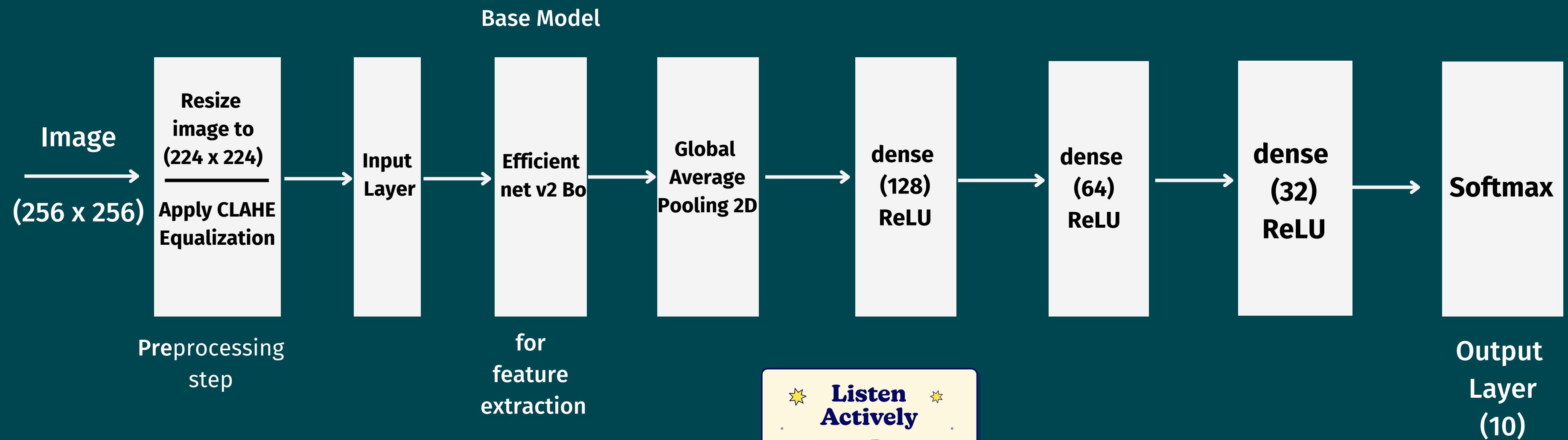
Tomato__Spider_mites



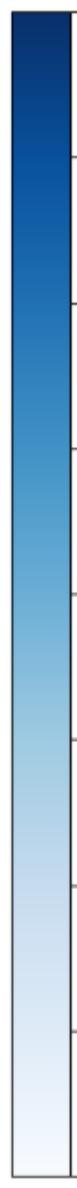
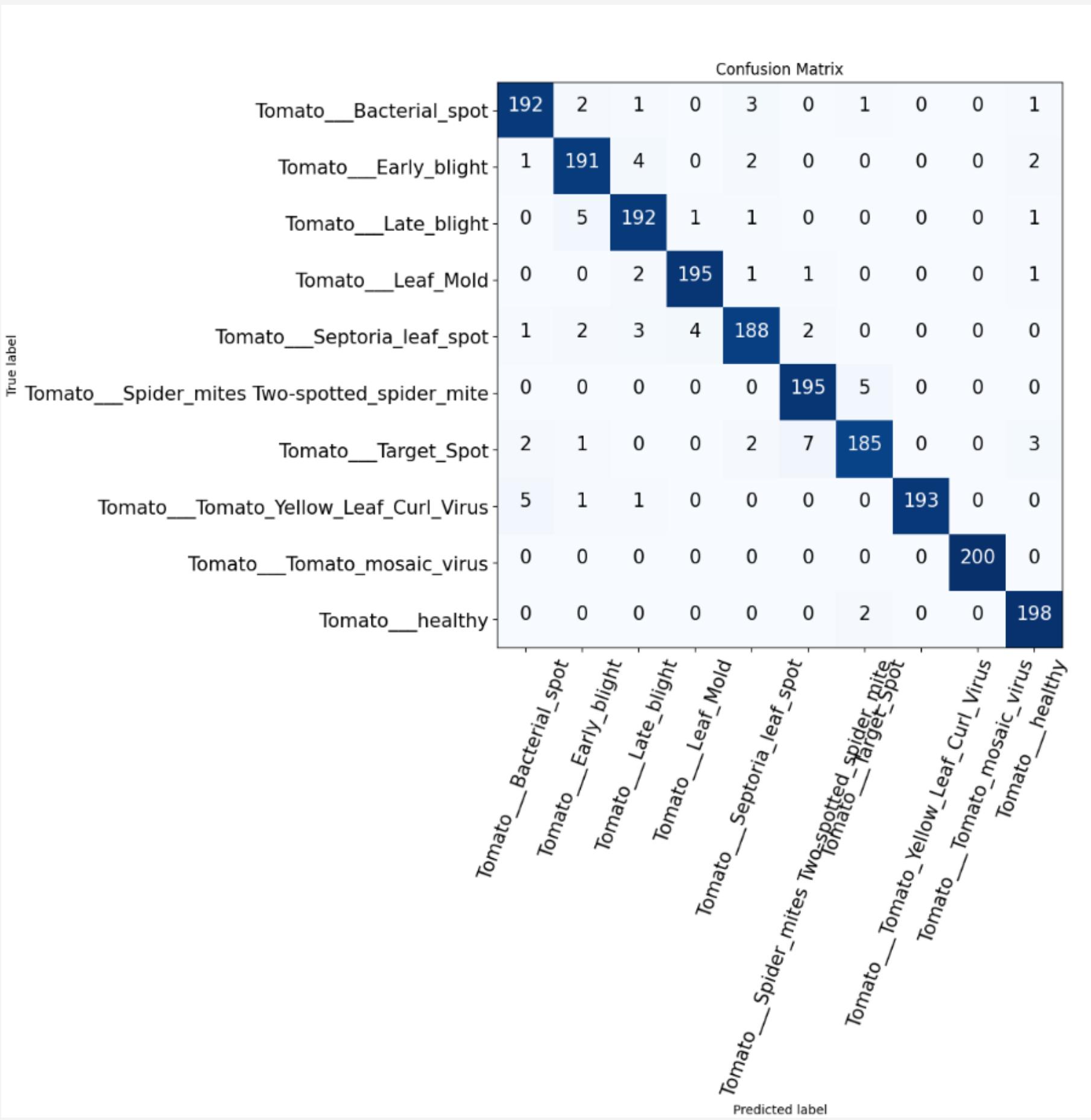
Two-spotted_spider_mite



Our Training Architecture



Confusion Matrix



Matrix related to Training

	precision	recall	f1-score	support
Tomato__Tomato_mosaic_virus	1.000000	1.000	1.000000	200.0
Tomato__Tomato_Yellow_Leaf_Curl_Virus	1.000000	0.965	0.982188	200.0
Tomato__healthy	0.961165	0.990	0.975369	200.0
Tomato__Leaf_Mold	0.975000	0.975	0.975000	200.0
Tomato__Spider_mites Two-spotted_spider_mite	0.951220	0.975	0.962963	200.0
Tomato__Bacterial_spot	0.955224	0.960	0.957606	200.0
Tomato__Late_blight	0.945813	0.960	0.952854	200.0
Tomato__Early_blight	0.945545	0.955	0.950249	200.0
Tomato__Septoria_leaf_spot	0.954315	0.940	0.947103	200.0
Tomato__Target_Spot	0.958549	0.925	0.941476	200.0



How do we serve our Project



1.) HomePage

The screenshot shows a web browser window titled "Tomato Disease Detection" with the URL "127.0.0.1:5000". The page content is as follows:

- Section Header:** Tomato Disease Detection
- Welcome Message:** Welcome to the Tomato Disease Detection Website
- Description:** Learn about common diseases that affect tomato plants and how to detect them using leaf images.
- Input Field:** Upload an Image
- Text Input:** Choose a Leaf Image:
- Submit Button:** Submit

The browser interface includes a search bar, taskbar icons (File Explorer, Mail, etc.), and system status indicators (Wi-Fi, battery, date/time).

How do we serve our Project



2.) Select Image



The image shows a screenshot of a web browser window titled "Tomato Disease Detection" with the URL "127.0.0.1:5000". The page content is as follows:

Welcome to the Tomato Disease Detection Website

Learn about common diseases that affect tomato plants and how to detect them using leaf images.

Upload an Image

Choose a Leaf Image:

A green leaf with brown spots is displayed, representing a diseased tomato leaf.

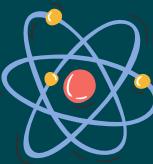
Submit

At the bottom of the page, it says "© 2024 Tomato Disease Detection".

On the left side of the browser window, there is an illustration of a scientist in a lab coat, holding a test tube and pointing upwards.



How do we serve our Project



3.) Prediction

Your Image

**And Your Tomato leaf image belonging to deases Tomato Bacterial Spot.
What is it?**

Tomato Bacterial Spot is a plant disease caused by the bacterium *Xanthomonas campestris* pv. *vesicatoria*. It affects tomato plants by causing small, water-soaked lesions to form on the leaves, stems, and sometimes fruit. These lesions later turn brown and develop yellow halos, leading to defoliation and reduced fruit quality and yield.

Why does it occur?

The bacterium responsible for Tomato Bacterial Spot thrives in warm, humid conditions. It can enter tomato plants through natural openings or wounds, such as stomata or injuries caused by insects or cultural practices. Once inside the plant, the bacterium multiplies and spreads, particularly during periods of high moisture.

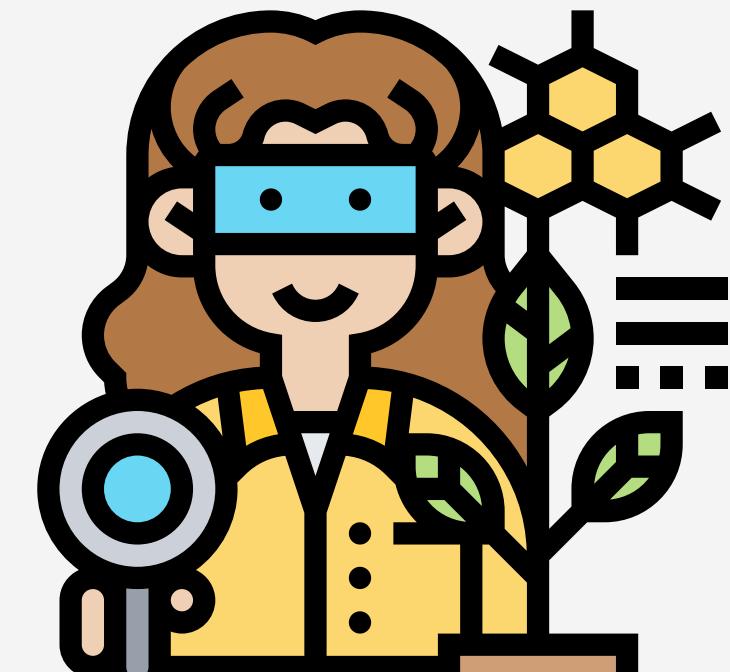
Prevention:

- Plant Resistant Varieties: Choose tomato varieties that are resistant to bacterial spot if available in your area.
- Crop Rotation: Rotate tomatoes with unrelated crops to reduce the buildup of bacteria in the soil.
- Sanitation: Practice good garden hygiene by removing and disposing of infected plant debris promptly. Clean tools and equipment to prevent the spread of bacteria.
- Water Management: Avoid overhead watering, which can spread bacteria. Instead, use drip irrigation or water at the base of plants.
- Weed Control: Remove weeds that can harbor bacterial spot and serve as alternative hosts.

Type here to search 19:12 ENG 25-02-2024

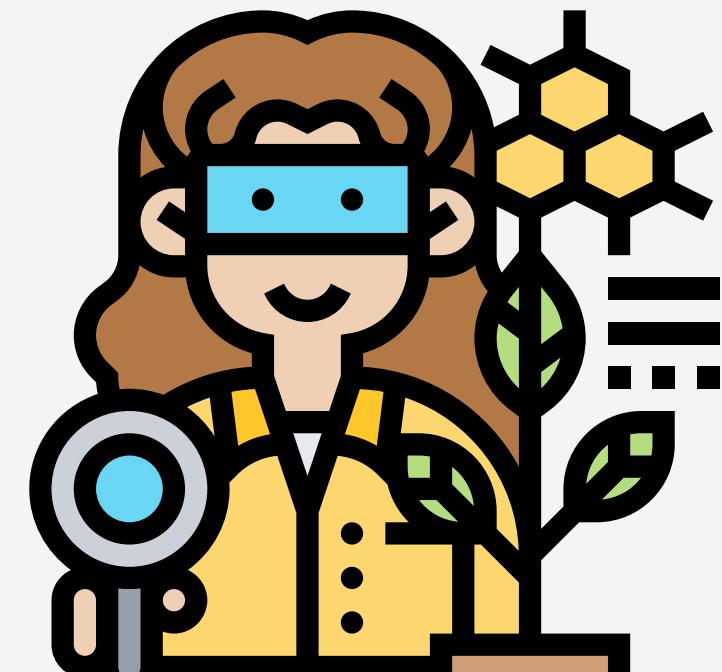
Conclusion

- Developed a Tomato Leaf Disease Classification System using deep learning techniques.
- Achieved a 96.44% F1-score in classifying ten types of tomato leaf diseases. Implemented transfer learning with the EfficientNet-v2-B0 architecture and created a user-friendly web interface using HTML, CSS, and Flask.
- The system allows users to upload tomato leaf images for disease classification, enhancing accessibility and usability.



References

- <https://ieeexplore.ieee.org/document/9810234>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8659659/>
- <https://www.sciencedirect.com/science/article/pii/S1877050920306906>
- <https://www.nature.com/articles/s41598-022-21498-5>
- <https://github.com/redwankarimsony/project-tomato>
- Kaggle
- Google scholar



Thank You
Everyone For
Patiently
Listening us

