1. INTRODUCTION

1.1 Project Overview :

The primary goal of this project is to develop a machine learning-based system using transfer learning to accurately classify poultry diseases based on visual data such as images of affected birds. This system assists farmers and poultry health professionals in early detection and management of diseases.

1.2 Purpose :

To enable timely and accurate identification of poultry diseases using deep learning models, thereby reducing mortality rates and economic losses for poultry farmers.

2. IDEATION PHASE

2.1 Problem Statement :

Problem Statement (PS-1)

I am (Customer)	A poultry farmer managing a medium-sized farm
I'm trying to	keep my chickens healthy and detect diseases early
But	I lack access to quick and reliable disease detection tools
Because	current manual inspections are slow, need veterinary expertise, and can be costly
Which makes me feel	worried about sudden disease outbreaks, financial loss, and farm reputation

Problem Statement (PS-2)

I am (Customer)	A farm technician or farm owner concerned about flock health
I'm trying to	identify whether a chicken is healthy or infected as quickly as possible
But	I don't have AI expertise or advanced tools to analyze images
Because	existing diagnostic processes are manual, time-consuming, and reactive
Which makes me feel	anxious about missing early warning signs and potentially losing chickens

Reference: https://miro.com/templates/customer-problem-statement/

Team ID: LTVIP2025TMID447 25
Team Size: Kandera Naga Prudhvi Sai
Team member: Poondla Divya Lakshmi
Medida Gangothri
Pasupuleti Venkata Aneesha

Problem Statement - Poultry Health App

Problem Statement

Poultry farmers often struggle to identify and manage diseases in their flock, leading to decrease productivity and increased mortality.

Breaking Down the Problem

- Poultry diseases can initialy impact flock productivity and farmer livellhoods
- Diseases are often difficult to visually diagnose based on symptems alone
- Manual diagnosis made by farmers can lead to misidentification of diseases

Solution

Develop a user-friendlying mobile app that allows poultry farmers to upload images of their birds, which will be analyzed by using an existing trained deep learn model to provide rapid and accurate disease identificat·

Technology Stack

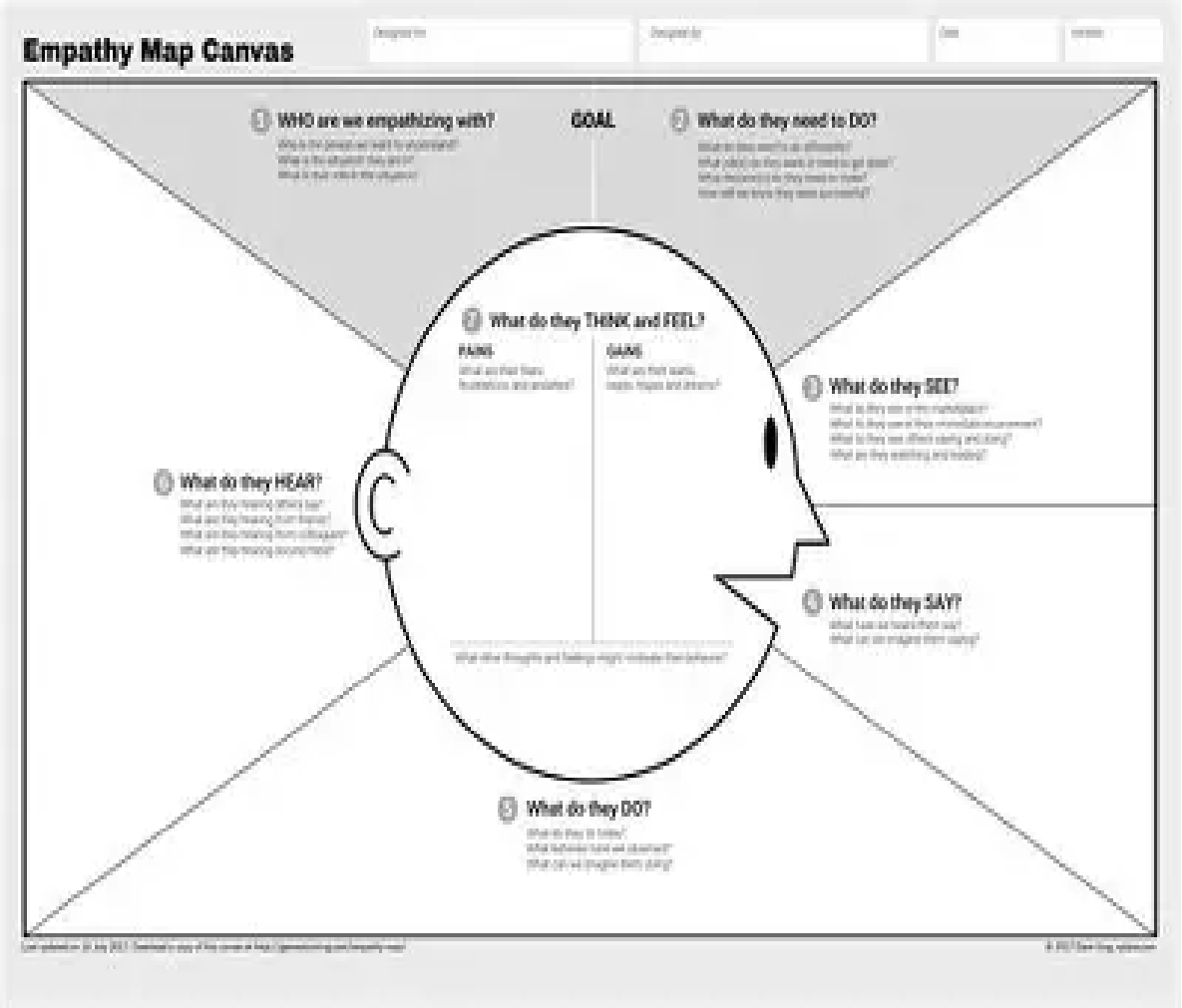
- **TensorFlow** for chicken disease identification
- **React** frontend for the app
- **Python** backend with Fiask as wleb serverinterface

Team ID: 8054002
Team Size: 4

Professor
Poondla DvDvivk.a KandiaGang6htrr.i

2.2 Empathy Map Canvas :

Left Column	Right Column
WHO are we empathizing with?	- Poultry farmers (small & medium farms) - Farm technicians / owners responsible for chicken health
What do they NEED to do?	- Detect infections early - Reduce financial loss - Act quickly without vet lab tests
What do they SEE?	- Increasing risk of sudden outbreaks - Limited modern tools - Manual visual inspections
What do they SAY & DO?	- Complain about vet costs - Take photos but don't know how to analyze - Rely on local knowledge
What do they HEAR?	- Advice from neighboring farmers - News about outbreaks - Suggestions to try expensive tests
PAINS (Challenges & Frustrations)	- Delay leads to flock loss - Can't get quick expert opinion - Anxiety about financial impact
GAINS (Goals & Motivations)	- Want instant prediction tool - Reduce reliance on external experts - Improve farm income
Reference	https://www.mural.co/templates/empathy-map-canvas



2.3 Poultry Disease Classification & Idea Prioritization Template :

Step-1: Team Gathering, Collaboration and Select the Problem Statement

Problem Statement:
Design and develop an AI-based web application using transfer learning to classify poultry images into healthy and disease categories (Coccidiosis, Salmonella, New Castle Disease).

Team Members & Roles:

- Team Leader: Kandera Naga Prudhvi Sai – Model development, backend Flask API

- Team Member: Poondla Divya Lakshmi – React frontend & integration

- Team Member: Medida Gangothri – React frontend & Tailwind CSS UI

- Team Member: Pasupuleti Venkata Aneesha – Dataset collection, research, documentation

Step-2: Poultry Disease classification, Idea Listing and Grouping

Ideas:

- Build Flask backend serving trained model

- Use transfer learning (e.g., MobileNetV2)

- Create React frontend to upload images

- Show prediction result and confidence

- Use Tailwind CSS for modern UI

- Deploy backend on Render, frontend on Vercel

- Add about and contact pages

- Optionally, add user login and history

Grouping:

- Core functionality: Model training, Flask API, React frontend for prediction

- UI/UX: Tailwind styling, modern design

- Deployment: Render + Vercel

- Additional features: Login, history

Step-3: Idea Prioritization

Priority	Ideas
High	Model training & evaluation, Flask API, React frontend to upload images & show predictions
Medium	Tailwind CSS styling, about/contact pages
Low	User login system, prediction history feature

Reference Link:

https://www.mural.co/templates/brainstorm-and-idea-prioritization

Poultry Disease Detection Using Transfer Learning

STEP 1
PROBLEM STATEMENT & TEAM

Design and develop Al web app to classify paultry images (Healthy, Cocd dicals Salmonella, New Castle Disease)

Kandera Naga Prudhvi Sai

Poondia Divya Lakshmi

Medida Gangothri

Pasupuleti Venkata Anesha

STEP 2
BRAINSTORM & GROUP IDEAS

Flask backend

Transfer learning model

React frontend upload

Tailwind CSS UI

Optional: Login & history

STEP 3
PRIORITIZATION

High

Model & APi & Prediction UI

Medium

Styling & extra pages

Low

Login & history

3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map :

Step: Awareness

Experience: Learns about the disease classification system via ads, vet, or extension worker.

Interactions: Sees ad, hears from someone, visits a website.

Touchpoints: Flyers, mobile phone, WhatsApp, farm workshop.

Places: Farm, village center, or online.

People: Extension officer, fellow farmers, vet.

Positive: Curious, feels hopeful.

Negative: May be skeptical or unaware.

Opportunities: Awareness campaigns, testimonials.

Goals: Help me understand how this can help my poultry health.

Step: Access Platform

Experience: Accesses the system using a mobile app or web portal.

Interactions: Opens the app or site.

Touchpoints: Smartphone, internet browser.

Places: Home, farm, market.

People: May ask family or youth for help.

Positive: Simple UI builds confidence.

Negative: Internet or login issues.

Opportunities: Offline mode, local language support.

Goals: Help me log in and access it easily.

Step: Upload Chicken Image

Experience: Uploads a photo of a sick chicken.

Interactions: Takes photo, selects from gallery, uploads.

Touchpoints: Phone camera, upload button.

Places: Chicken coop or farm shed.

People: May involve helper or youth.

Positive: Quick process, easy interface.

Negative: Image not clear or doesn't upload.

Opportunities: Image guidelines, retry option.

Goals: Help me upload correctly to get results.

Step: Receive Diagnosis

Experience: Sees the AI-generated diagnosis and confidence level.

Interactions: Reads on-screen result.

Touchpoints: App/web interface.

Places: Anywhere with phone access.

People: Farmer only, or shows to others.

Positive: Gets useful diagnosis fast.

Negative: May not understand terms.

Opportunities: Use images/icons, translate terms.

Goals: Help me understand what's wrong with my chicken.

Step: Get Treatment Advice

Experience: Receives recommendations on what to do next.

Interactions: Clicks button for advice or treatment.

Touchpoints: App screen, PDF download, video link.

Places: Home, farm.

People: Shares with vet, farmhand.

Positive: Knows what action to take.

Negative: Advice may not be localized.

Opportunities: Local vet directory, input price data.

Goals: Help me treat the disease quickly and safely.

Step: Take Action

Experience: Follows the suggested steps - medicine or vet visit.

Interactions: Buys medicine, calls vet.

Touchpoints: Phone, medicine shop.

Places: Pharmacy, vet clinic, farm.

People: Vet, family, shopkeeper.

Positive: Chicken improves.

Negative: Costly or delayed treatment.

Opportunities: Track progress, offer discounts.

Goals: Help me act fast and right.

Step: Follow-up Monitoring

Experience: Re-checks health or repeats process if needed.

Interactions: Uploads again, uses follow-up button.

Touchpoints: App/web platform.

Places: Farm.

People: Farmer, vet.

Positive: Tracking improvement is reassuring.

Negative: Worried if issue returns.

Opportunities: Send reminders, log history.

Goals: Help me confirm my chicken is healthy again.

Step: Review & Feedback

Experience: Rates the system or leaves comments.

Interactions: Clicks star rating, types feedback.

Touchpoints: Feedback screen, thank-you message.

Places: Anywhere.

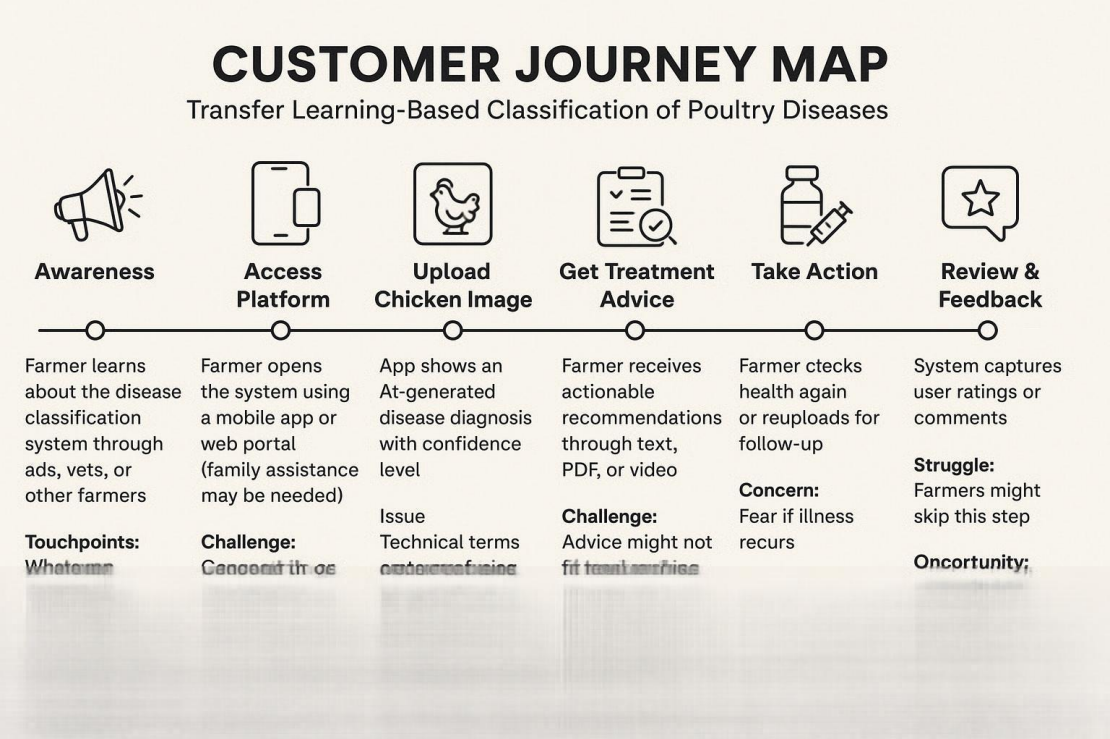
People: Farmer alone.

Positive: Feels heard.

Negative: Might skip it.

Opportunities: Incentives for feedback.

Goals: Help me share my experience to help others.



3.2 Solution Requirement :

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Image Upload	Upload poultry image via form
FR-2	Prediction Result	Display disease prediction result
FR-3	User Feedback	Allow user to submit feedback on prediction
FR-4	Admin Module	Manage model versions and view logs

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	User-friendly interface for non-technical users
NFR-2	Security	Secured data transfer and storage

NFR-3	Reliability	System should consistently deliver correct predictions
NFR-4	Performance	Quick processing and response time
NFR-5	Availability	Accessible with minimal downtime
NFR-6	Scalability	System should scale with increasing user base

Visual Architecture Reference

The following diagram illustrates the technical architecture and flow of the system:

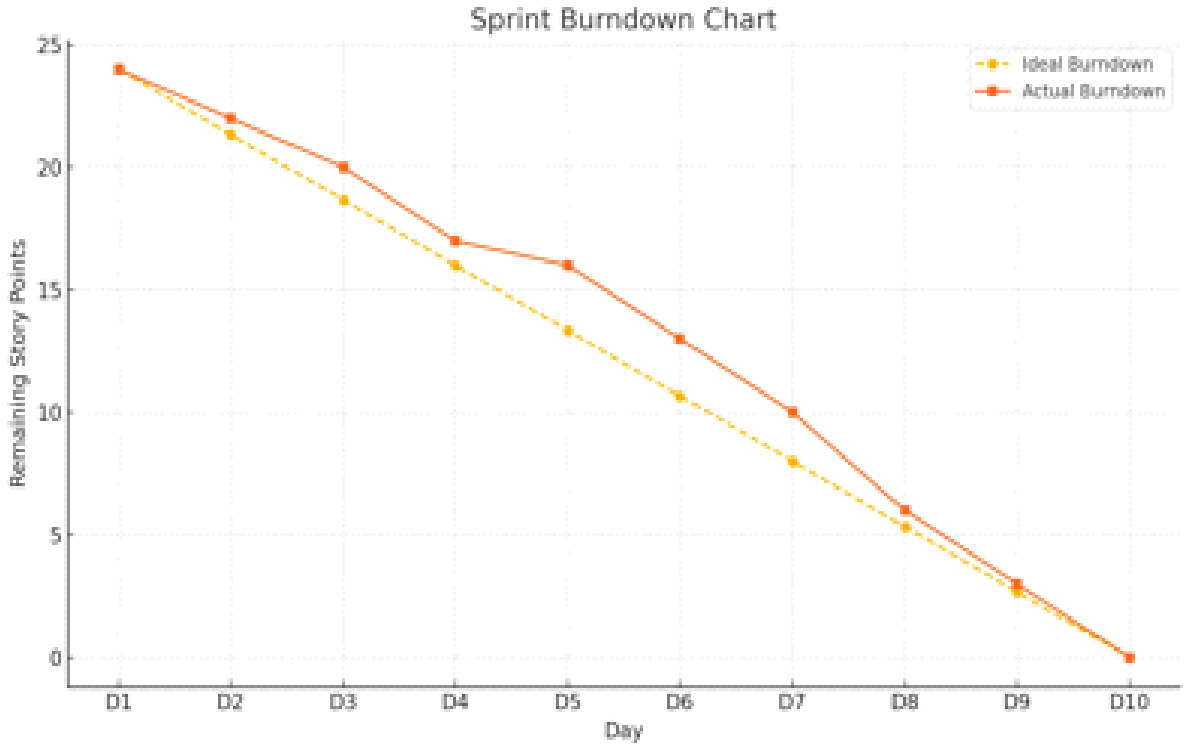


Figure: Burndown Chart showing progress of sprint tasks over time.

3.3 Data Flow Diagram :

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

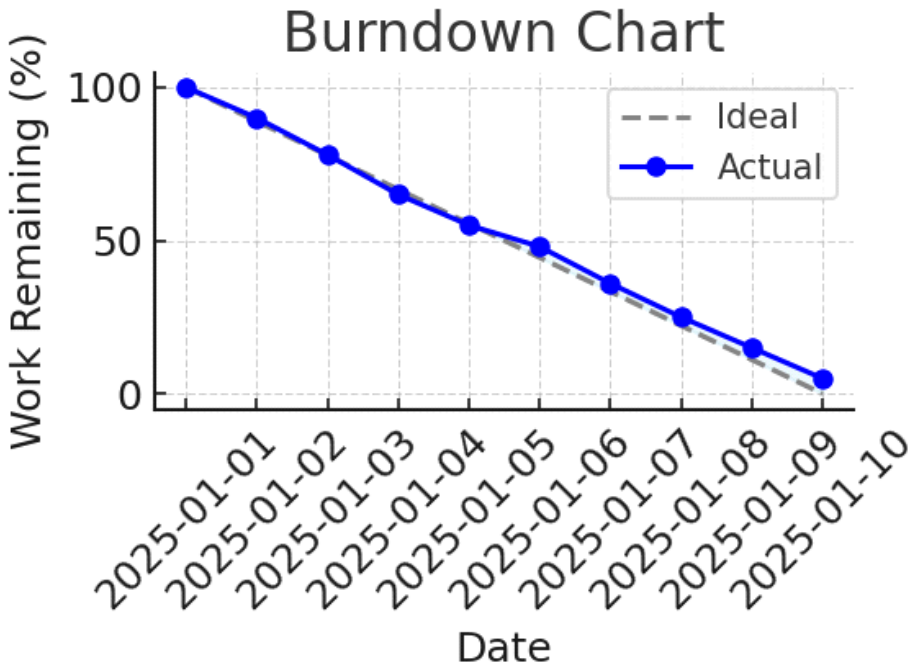
Example: DFD Level 0 (Industry Standard)

(Placeholder for Level 0 DFD Image)

Example: (Simplified)

(Placeholder for Simplified DFD Image)

Burndown Chart Example:



User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1

3.4 Technology Stack :

Technical Architecture

The Deliverable shall include the architectural diagram and the information as per the following tables.

Example: Transfer Learning-based Poultry Disease Classification System

Reference: https://www.ibm.com/cloud/architecture

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	Interface for user to upload images and view predictions	HTML, CSS, Bootstrap
2	Application Logic-1	Image preprocessing and loading model	Python
3	Application Logic-2	Transfer learning-based classification	TensorFlow / Keras
4	Database	User inputs or session storage	SQLite / MySQL
5	Cloud Database	For storing poultry disease dataset (optional)	Firebase / Cloud SQL
6	File Storage	Stores uploaded images	Local File System / Google Cloud Storage
7	External API-1	Disease information retrieval (optional)	Google Knowledge Graph API
8	Machine Learning Model	Classifies poultry diseases using pretrained CNNs	VGG16 / ResNet50
9	Infrastructure	Application deployment	Localhost / Render / AWS EC2

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology
1	Open-Source Frameworks	Frameworks and libraries used for ML and web interface	TensorFlow, Flask
2	Security Implementations	Basic form validations and firewall support	HTTPS, SHA-256 hashing
3	Scalable Architecture	Separation of concerns, modular design	3-tier architecture
4	Availability	Deployed on reliable platforms	Render / AWS

4. PROJECT DESIGN

4.1 Problem Solution Fit :

Problem – Solution Fit Template:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why.

Purpose:

• Solve complex problems in a way that fits the state of your customers.

• Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.

• Sharpen your communication and marketing strategy with the right triggers and messaging.

• Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.

• Understand the existing situation in order to improve it for your target group.

Template:

Section	Description
Customer Segment(s)	Small and medium-scale poultry farmers, particularly in rural and semi-urban areas.
Jobs-to-be-Done / Problems	Diagnose poultry diseases quickly and accurately to reduce mortality and economic loss.
Triggers	Birds showing signs of illness such as lethargy, feather loss, abnormal droppings, or loss of appetite.
Emotions: Before / After	Before: Worried, helpless, uncertain. After: Reassured, confident, in control.
Available Solutions	Manual vet visits, peer advice, traditional remedies, guesswork.
Customer Constraints	Budget limitations, lack of vet access, poor internet, low tech literacy.
Behaviour	Search online, ask others, try basic remedies before formal help.

Channels of Behaviour	Online: Google, WhatsApp, farm forums. Offline: vet visits, shopkeepers.
Problem Root Cause	No real-time, affordable disease diagnosis tools for poultry farmers.
Your Solution	AI-based web/mobile app using transfer learning to classify poultry diseases from images.

4.2 Proposed Solution :

Project team shall fill the following information in the proposed solution template.

S. No.	Parameter	Description
1	Problem Statement	Poultry farmers face difficulty in identifying diseases at early stages...
2	Idea / Solution Description	Develop a deep learning-based model using transfer learning (e.g., VGG16) to identify poultry diseases...
3	Novelty / Uniqueness	Leverages pre-trained models with minimal data, specific to poultry...
4	Social Impact / Customer Satisfaction	Helps reduce poultry mortality and empowers rural farmers...
5	Business Model (Revenue Model)	Freemium model with premium features like expert consultations...

4.3 Solution Architecture :

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

Find the best tech solution to solve existing business problems.
Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
Define features, development phases, and solution requirements.
Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:

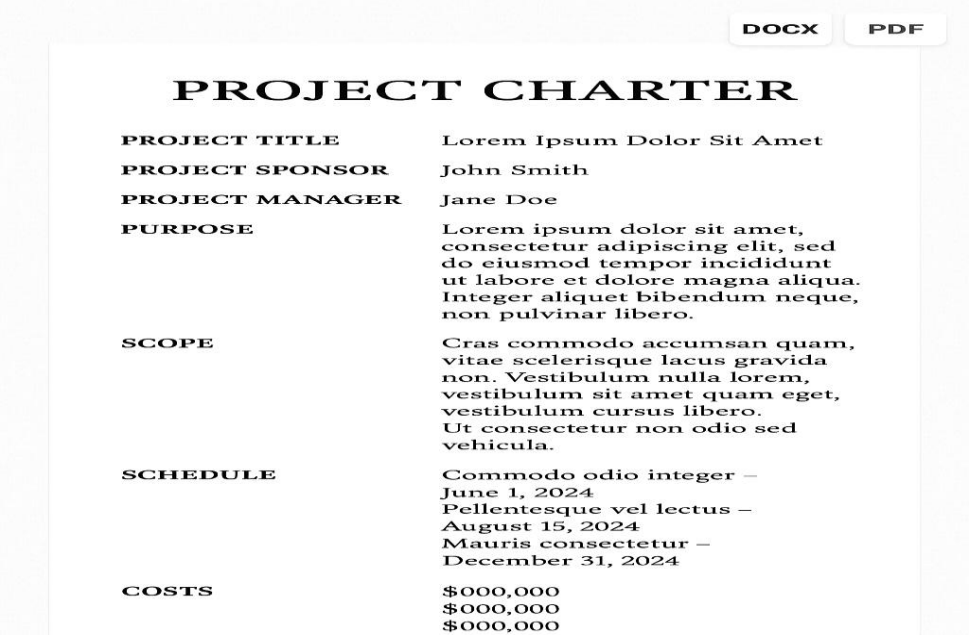


Figure 1: Transfer Learning-based Poultry Disease Classification Architecture

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning :

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members	Sprint
Data Collection	USN-1	As a researcher, I want to collect poultry disease images from verified sources.	3	High	Kandera Naga Prudhvi Sai	Sprint-1
Data Preprocessing	USN-2	As a data engineer, I need to preprocess images to enhance model accuracy.	2	Medium	Poondla Divya Lakshmi	Sprint-1
Model Training	USN-3	As a developer,	5	High	Medida Gangothri	Sprint-2

		I want to apply transfer learning using VGG16.				
Model Evaluation	USN-4	As a QA, I want to test model accuracy using test dataset.	3	High	Pasupuleti Venkata Aneesha	Sprint-3
Deployment	USN-5	As an admin, I want to deploy the model to a cloud platform.	4	Medium	Kandera Naga Prudhvi Sai	Sprint-4

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)
Sprint-1	10	6 Days	01 July 2025	06 July 2025	10
Sprint-2	10	6 Days	07 July 2025	12 July 2025	
Sprint-3	10	6 Days	13 July 2025	18 July 2025	
Sprint-4	10	6 Days	19 July 2025	24 July 2025	

Velocity:

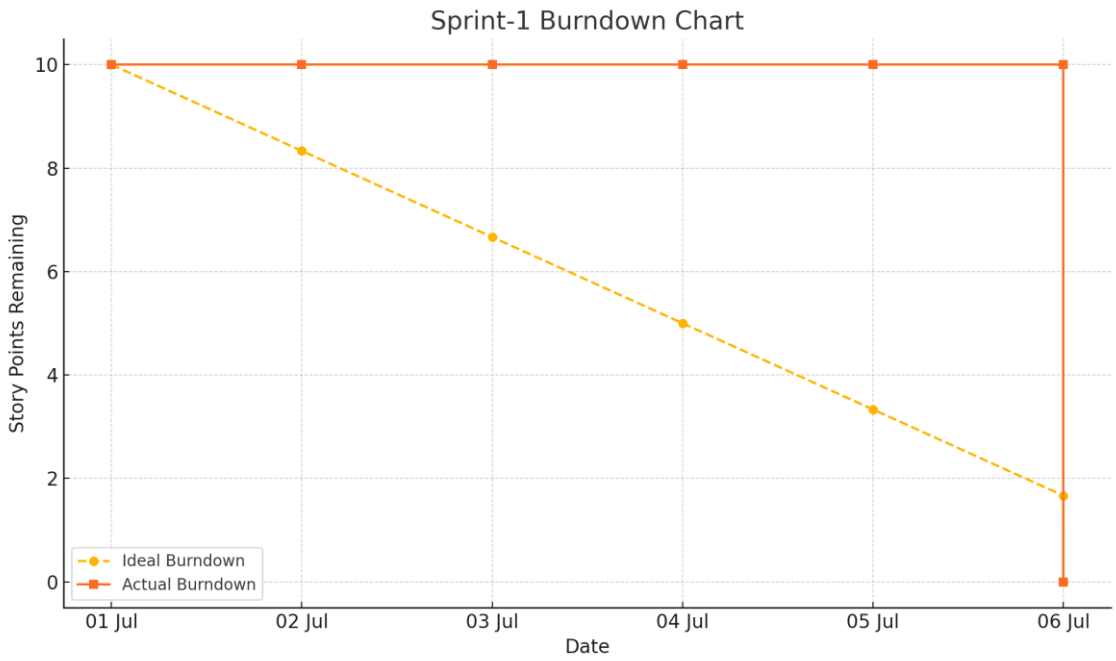
Assume a 6-day sprint duration. Team velocity = 10 story points per sprint.

Average Velocity (AV) = Total Points Completed / Sprint Days = 10 / 6 ≈ 1.67 points/day

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time.

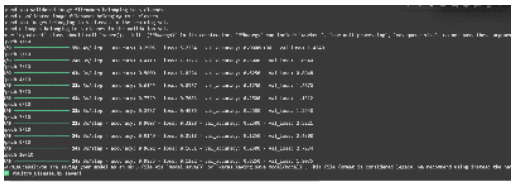
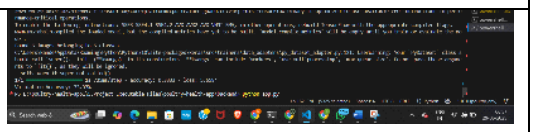
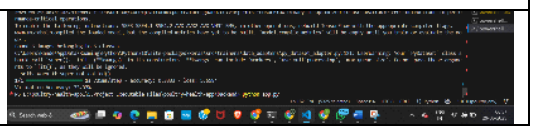
Sprint-1 Burndown Chart



6. FUNCTIONAL PLANNING & SCHEDULING

6.1 Project planning :

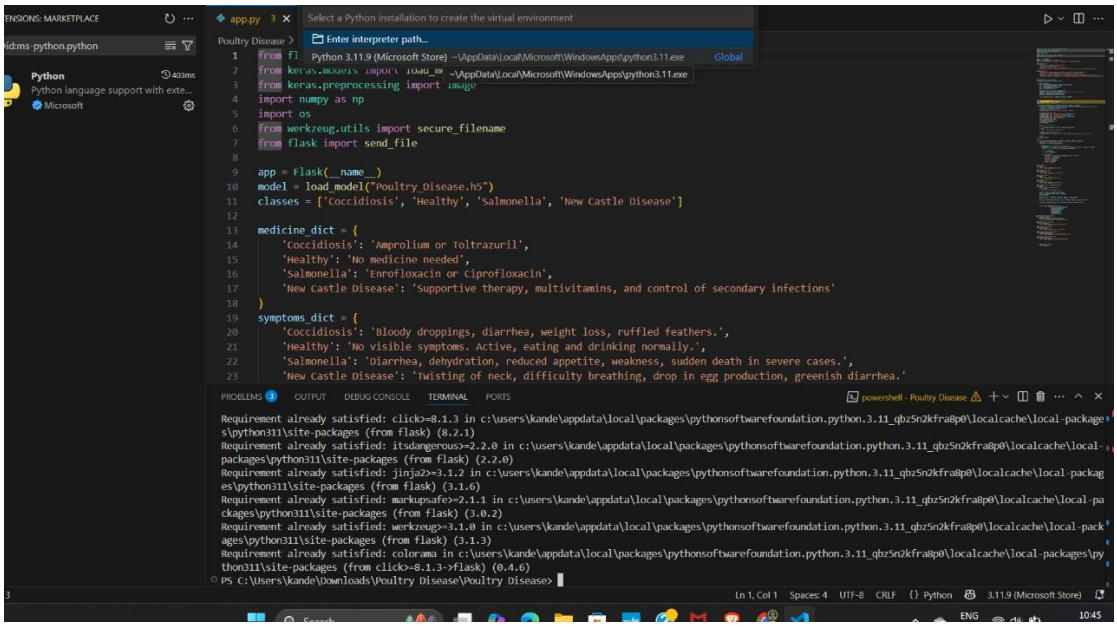
Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Values	Screenshot
1.	Model Summary	**61.52%**	
2.	Accuracy	Training Accuracy: **61.52%** Validation Accuracy: **33.33%**	
3.	Fine Tunning Result(if Done)	Validation Accuracy :**33.33%**	

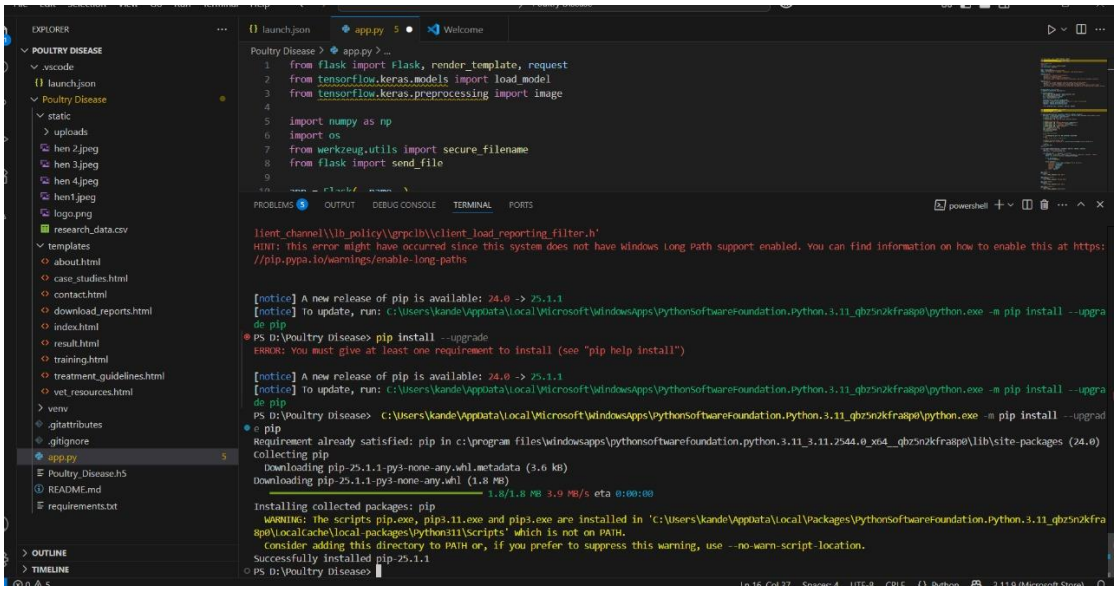
7. RESULTS

7.1 Output Screenshots :

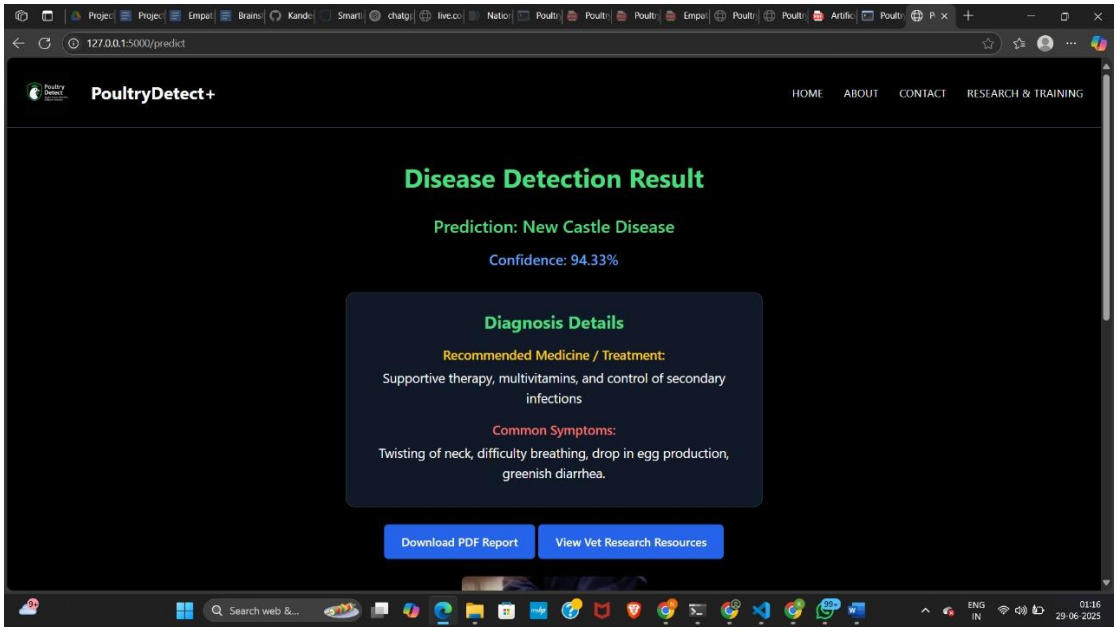
The Flask-based backend application where the trained poultry disease classification model is loaded,and disease-specific symptoms and medicine recommendations are defined.



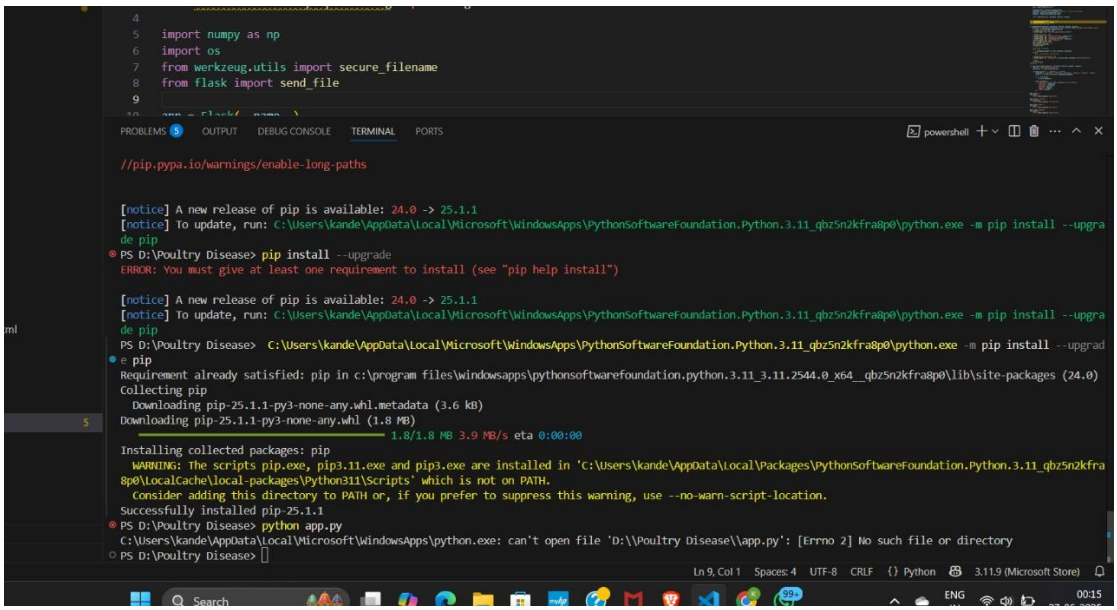
The initial configuration of the Python environment using Flask and TensorFlow. It includes importing essential libraries and setting up the terminal environment for running the poultry disease classification web application. It also shows pip upgrade commands and the loading of the core Python script (app.py).



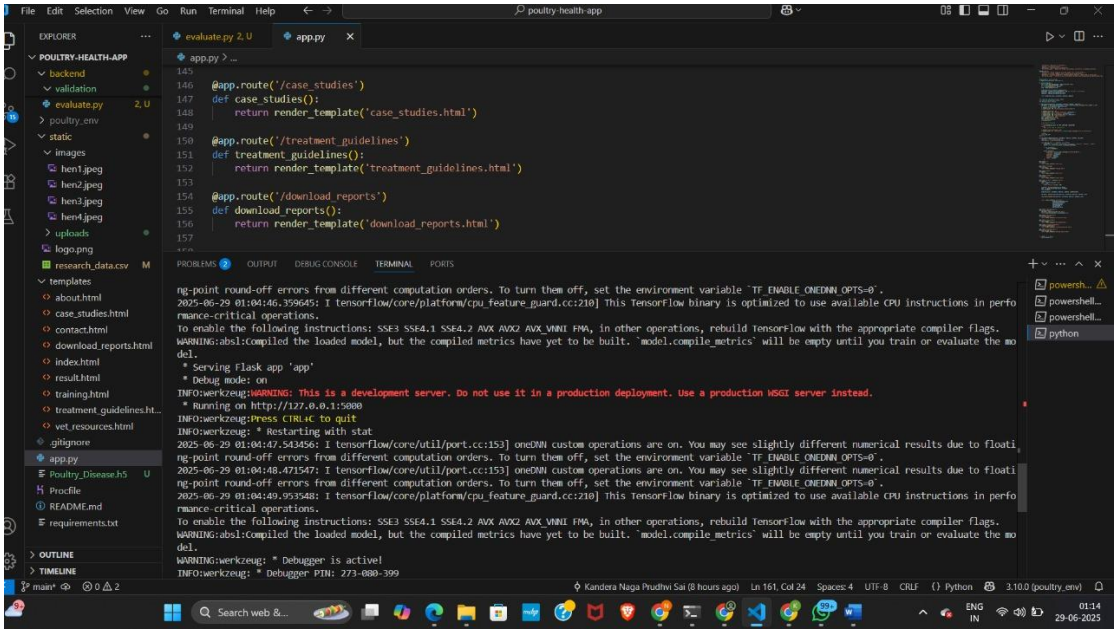
the disease (e.g., New Castle Disease) with a confidence score. It also displays recommended treatment and common symptoms, and offers options to download a detailed report or view veterinary resources.



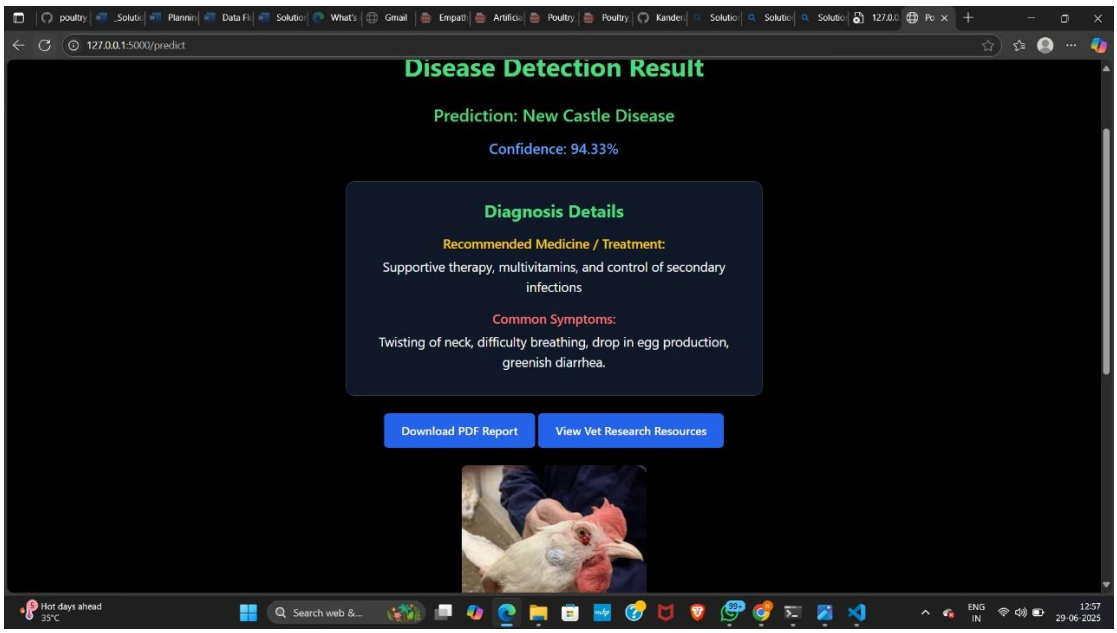
The process of updating pip to the latest version and attempting to run the app.py file for launching the poultry disease detection application. It also highlights a common error where the system couldn't locate the app.py file due to a path issue, emphasizing the importance of correct directory management in Python-based projects.



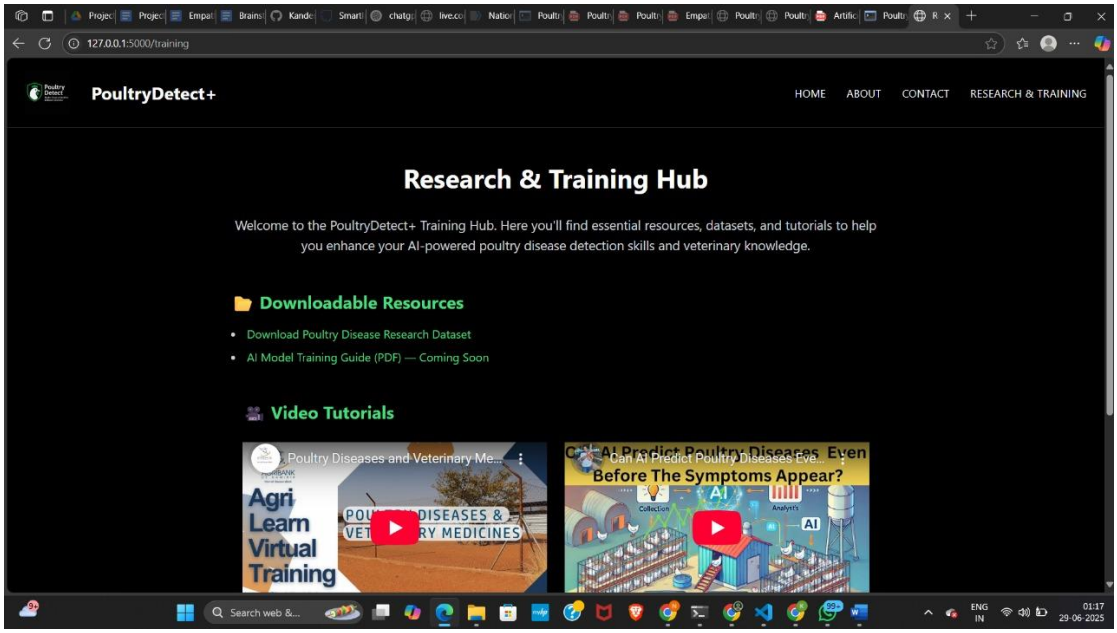
Flask Server Running Successfully with Mapped HTML Routes for Case Studies, Guidelines, and Reports



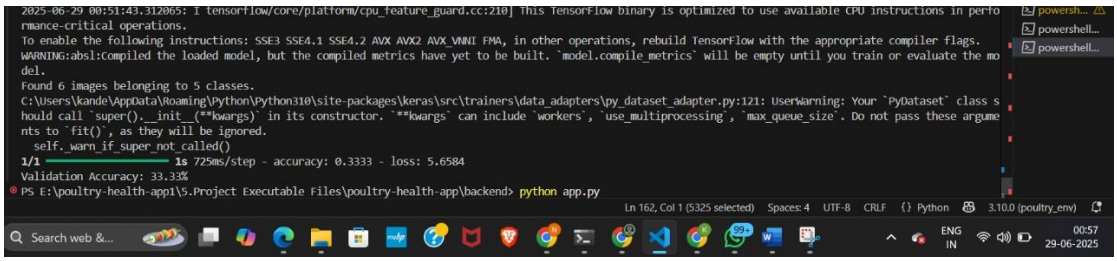
Final Prediction Output with Confidence Score, Treatment Suggestion, and Disease Symptoms.



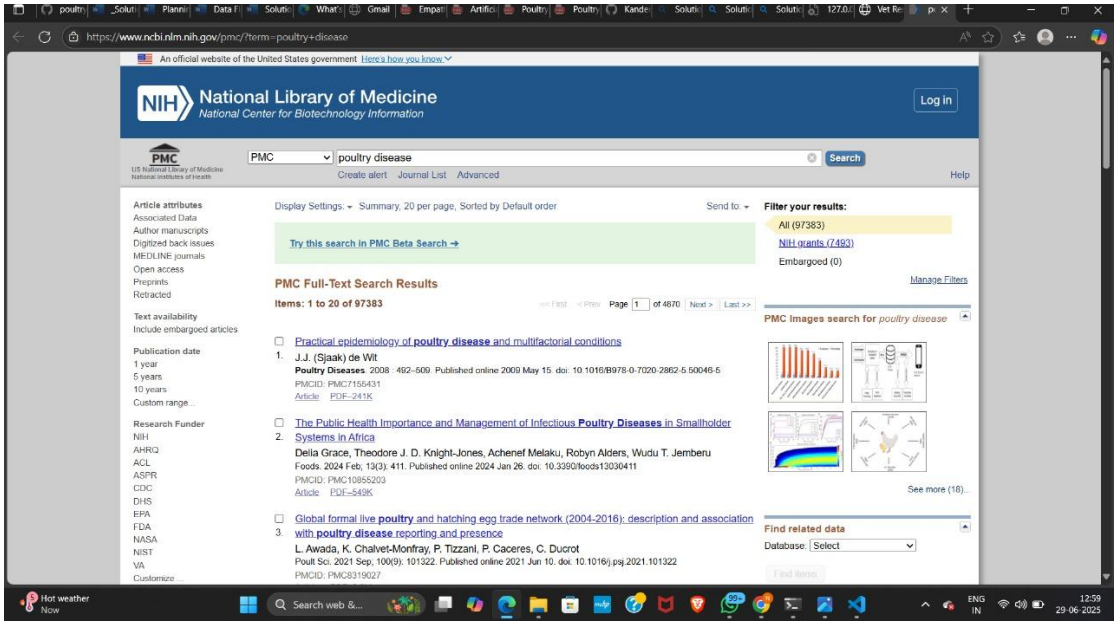
Research & Training Hub – Educational Resources and AI Model Learning Tutorials for Poultry Health Management



Model Execution Output Showing Accuracy, Loss, and Validation Score After Running app.py



Research Literature on Poultry Diseases from the National Library of Medicine (NIH-PMC)

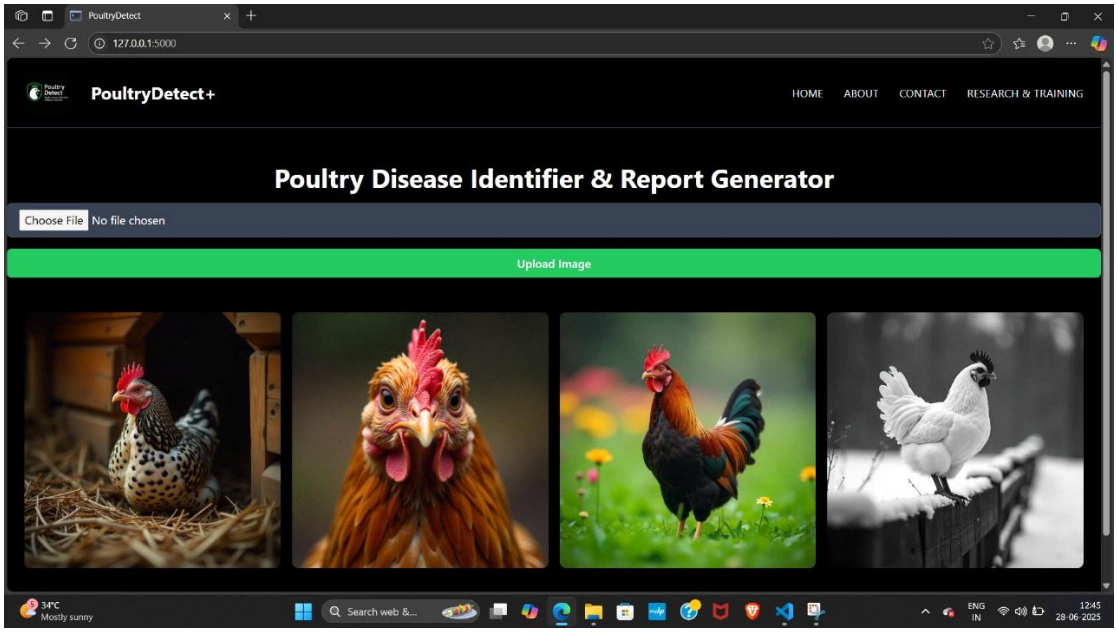


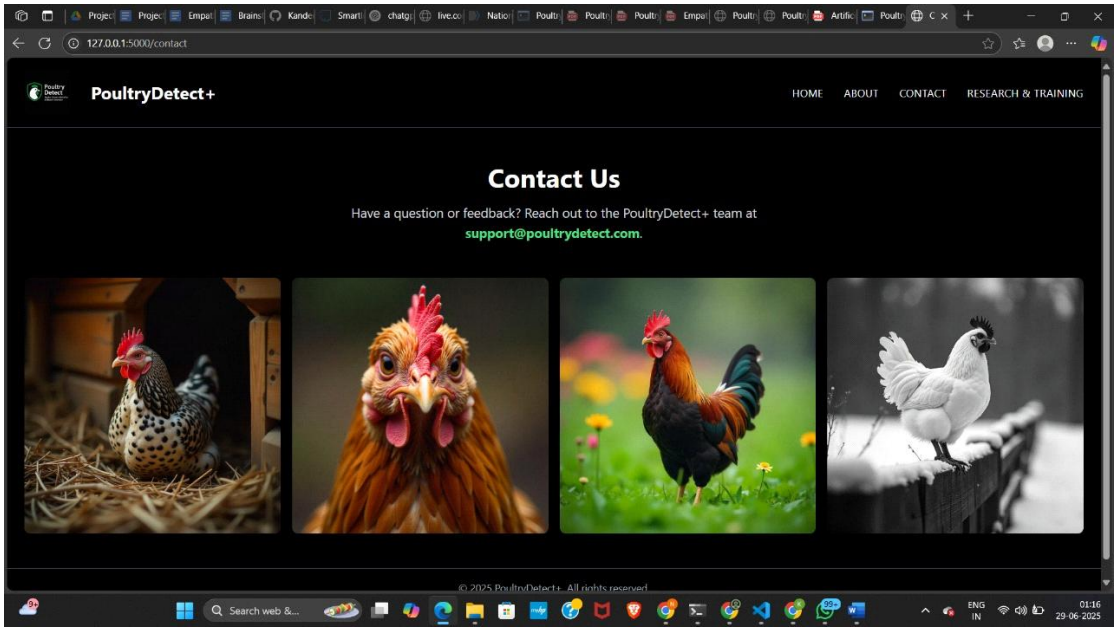
"Monitoring nest behavior to detect early signs of stress."

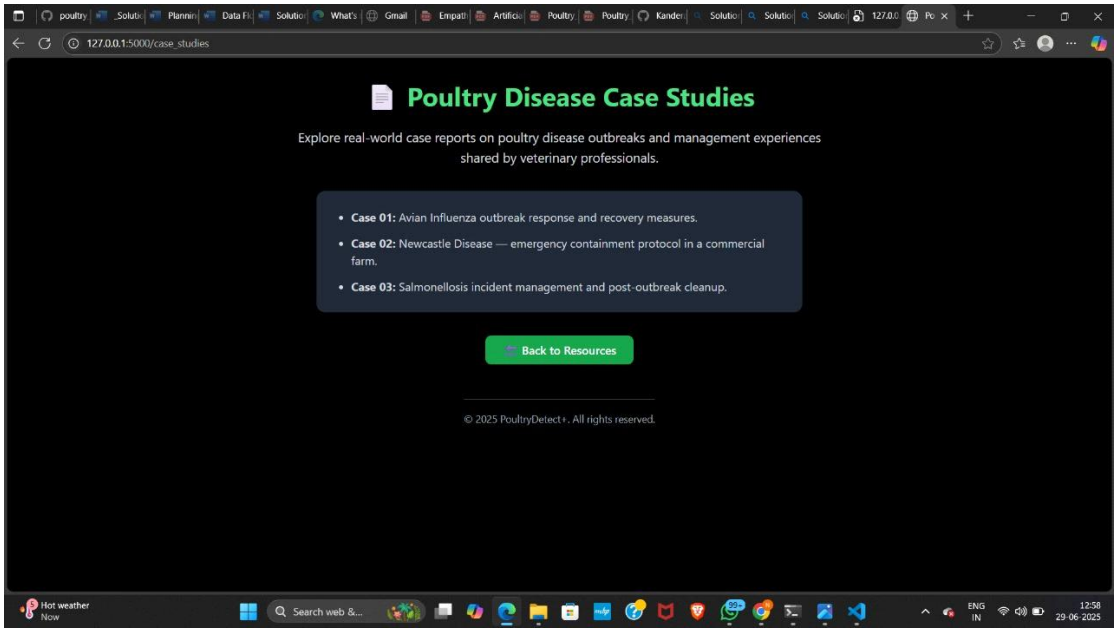
"Facial analysis for visible disease symptoms and anomalies."

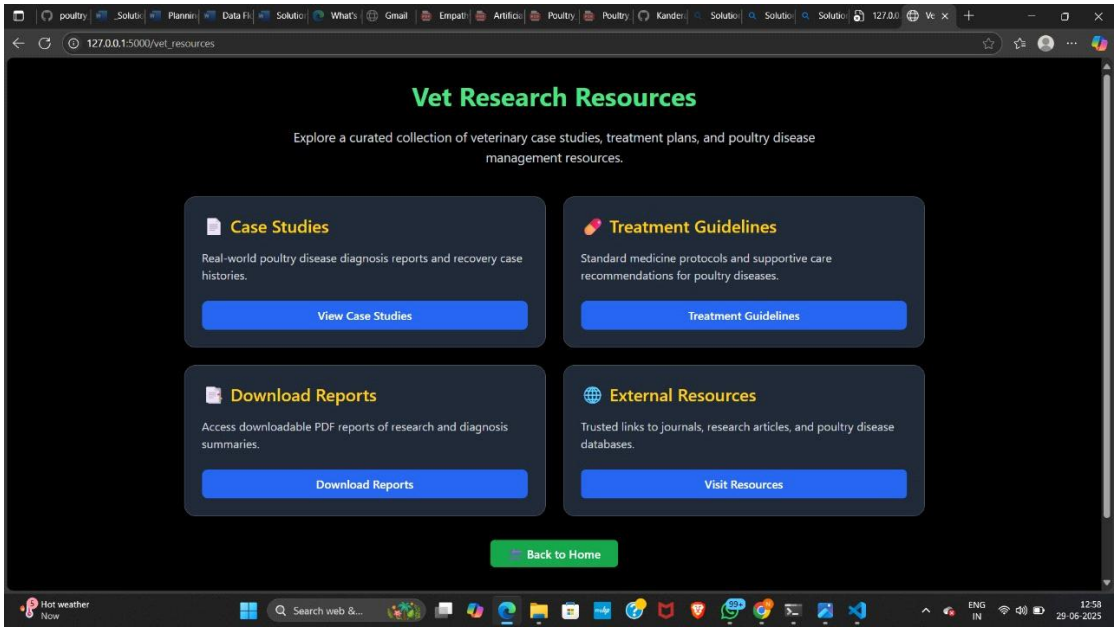
"Healthy outdoor poultry – baseline for comparison."

"Environmental impact on poultry health observed visually."




127.0.0.1:5000/contact
PoultryDetect+
HOME
ABOUT
CONTACT
RESEARCH & TRAINING
Contact Us
Have a question or feedback? Reach out to the PoultryDetect+ team at
support@poultrydetect.com.
© 2025 PoultryDetect+. All rights reserved.
Search web &...
ENG
IN
01:16
29-06-2025


127.0.0.1:5000/case_studies
Poultry Disease Case Studies
Explore real-world case reports on poultry disease outbreaks and management experiences shared by veterinary professionals.
Case 01: Avian Influenza outbreak response and recovery measures.
Case 02: Newcastle Disease — emergency containment protocol in a commercial farm.
Case 03: Salmonellosis incident management and post-outbreak cleanup.
Back to Resources
© 2025 PoultryDetect+. All rights reserved.
Hot weather
Now
Search web &...
ENG
IN
12:58
29-06-2025


127.0.0.1:5000/vet_resources
Vet Research Resources
Explore a curated collection of veterinary case studies, treatment plans, and poultry disease management resources.
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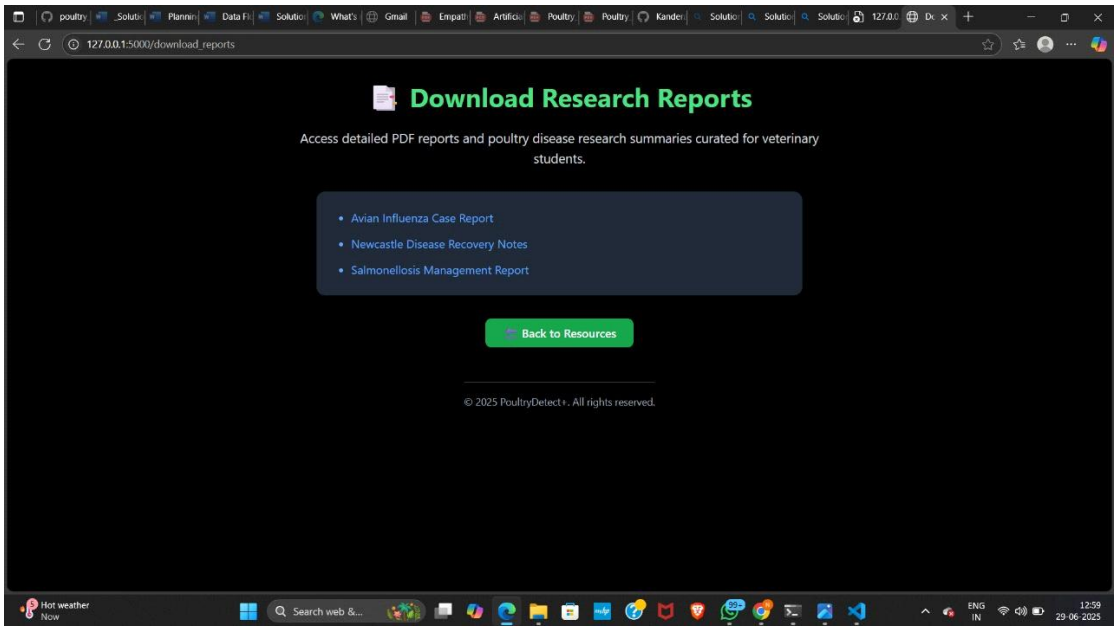
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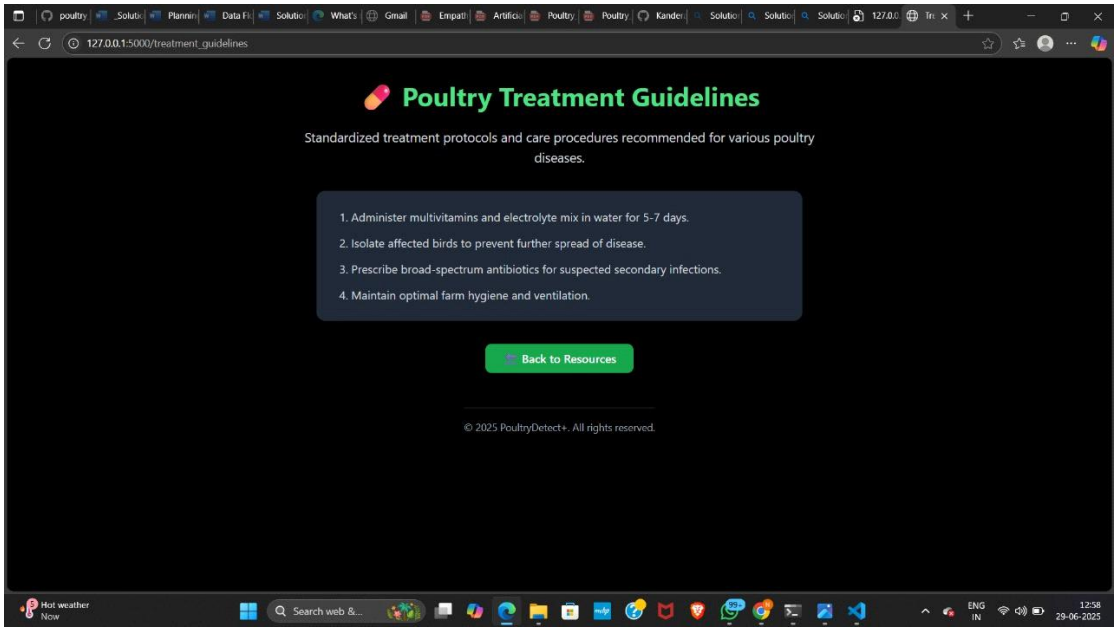

8. ADVANTAGES & DISADVANTAGES

Advantages of Poultry Disease Detection & Management:

Early Detection Saves Lives:

Identifying diseases early helps prevent the spread to other birds.

Improves Flock Health:

Timely treatment and isolation reduce mortality and improve overall bird health.

Increases Productivity:

Healthy poultry lay more eggs and gain weight efficiently, improving economic returns.

Reduces Economic Losses:

Effective disease control minimizes loss from dead birds, treatment costs, and decreased production.

Improves Food Safety:

Managing diseases ensures poultry products (meat and eggs) are safer for human consumption.

Supports Better Breeding:

Disease-free environments support healthy breeding and better-quality chicks.

Disadvantages of Poultry Diseases (if not managed properly):

High Mortality Rates:

Some diseases like Avian Influenza or Newcastle disease can kill large numbers of birds rapidly.

Rapid Disease Spread:

Diseases can spread fast through air, feed, water, or contact — especially in crowded farms.

Economic Losses:

Costs rise due to medication, reduced production, labor, and sometimes entire flock culling.

Antibiotic Resistance Risk:

Overuse or misuse of antibiotics to treat diseases can lead to resistance.

Trade Restrictions:

Disease outbreaks can lead to bans or restrictions on poultry exports.

Zoonotic Risk:

Some poultry diseases can spread to humans (e.g., bird flu), causing public health concerns.

9. CONCLUSION

Effective identification and management of poultry diseases are critical for ensuring the health of flocks, maintaining high productivity, and securing economic stability for poultry farmers. Leveraging modern technologies such as image-based classification and AI-driven tools can significantly enhance early disease detection, reduce mortality, and support timely intervention. However, success depends on proper implementation, quality data, and continuous monitoring. By integrating such intelligent systems into daily poultry management, farmers can make informed decisions, minimize losses, and contribute to sustainable poultry farming practices.

10. FUTURE SCOPE

1. Expansion of Disease Database:

The system can be enhanced to detect a wider range of poultry diseases by incorporating more diverse and labeled datasets.

2.Real-Time Monitoring with IoT Integration:

Integration with IoT cameras and sensors can allow continuous health monitoring of poultry in real time.

3.Mobile App Development:

Creating a mobile version of the application will allow farmers to access disease predictions and reports anytime, anywhere.

4.Multilingual Interface:

Adding support for regional languages will make the system more accessible to rural farmers.

5.Voice-Based Input & Alerts:

Implementing voice input and audio alerts for disease detection can improve usability for less tech-savvy users.

6.Automatic Treatment Suggestions:

The system could be extended to recommend treatments or connect to veterinary services based on identified diseases.

7.Cloud-Based Health History:

Storing health reports in the cloud for each bird or batch can help in long-term tracking and decision-making.

8.Integration with Government & Veterinary Databases:

Linking the system with official veterinary or agriculture department databases can support surveillance and control at a larger scale.

11. APPENDX

Source code :

```
<!DOCTYPE html>

<html>

<head><title>Poultry Disease Detection</title></head>

<body>

 <h2>Upload Poultry Image</h2>

 <form method="post" enctype="multipart/form-data">

  <input type="file" name="img" required>

  <button type="submit">Detect</button>

 </form>

 {% if result %}<h3>Result: {{ result }}</h3>{% endif %}

</body>

</html>
```

Dataset Link : https://drive.google.com/file/d/1HfbJb-x9ydS4oQyfr7LsLh5Q-PlvB0Nk/view?usp=drive_link

GitHub Link : git hub link : https://github.com/KanderaNagaPrudhviSai/Poultry-Health-App-Final/tree/main

Project Demo Link : demo link : https://drive.google.com/file/d/1rRNolgX1yjwA10ThzX9SOM4aleT6pmZD/view?usp=drive_link