# Transfer Learning Based Classification of Poultry Diseases

## Team Name:

AGROTECH AI

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## 1. INTRODUCTION

### 1.1 Project Overview

The project aims to automate poultry disease detection using transfer learning. With image-based classification, it enhances veterinary diagnostics and reduces dependency on manual inspections.

### 1.2 Purpose

The purpose of this project is to develop a deep learning model that utilizes transfer learning to classify poultry diseases using image data. The model will be trained on a labeled dataset of infected poultry images and deployed via a user-friendly interface that enables real-time predictions. This approach aims to assist in early detection, improve animal health outcomes, and reduce economic losses in the poultry industry.

## 2. IDEATION PHASE

### 2.1 Problem Statement

Manual diagnosis of poultry diseases is labor-intensive, inconsistent, and often inaccessible to small-scale farmers. Existing methods depend on symptoms being identified by the human eye or through medical testing — both of which require time and expertise. Moreover, early-stage symptoms of various poultry diseases can appear similar, making it difficult for non-experts to distinguish between them. Therefore, an AI-driven system that can automate this diagnosis process through image recognition is a practical and essential solution.

### 2.2 Empathy Map Canvas

**Thinks**: "I need to protect my poultry from unknown diseases quickly."
**Feels**: Stressed and uncertain about the health of the flock.

**Says**: "It's hard to get help when I really need it."
**Does**: Inspects birds manually and searches online or contacts local vets when symptoms appear.

### 2.3 Brainstorming

We evaluated multiple technical approaches:

- **Manual inspection by experts** – Accurate but not scalable or timely.
- **Classical machine learning (SVM, k-NN)** – Required feature engineering and didn't generalize well with images.
- **CNN from scratch** – Demands large datasets and computational resources.
- **Transfer learning with pre-trained models (e.g., VGG16, ResNet50)** – Chosen for its ability to achieve high performance with limited data and reduced training time.

## 3. REQUIREMENT ANALYSIS

### 3.1 Customer Journey map

Image captured → Uploaded to system → Preprocessed → Disease classified → Action taken

### 3.2 Solution Requirement

**Functional Requirements**:

- Accept image input.
- Perform disease classification.
- Display label and confidence level.
- Show visual output (optional).

**Non-Functional Requirements**:

- High accuracy and quick response.
- User-friendly interface.
- Compatible with mobile and low-resource devices.

### 3.3 Data Flow Diagram

User uploads image → Preprocessing → Model Prediction → Output Disease Class

### 3.4 Technology Stack

Python, TensorFlow/Keras, OpenCV, Streamlit (UI), Jupyter Notebook

## 4. PROJECT DESIGN

### 4.1 Problem Solution Fit

The problem of slow and expert-dependent diagnosis is solved by using AI to automate detection through a fast and accurate model. Transfer learning makes the solution lightweight and trainable even with a limited dataset.

### 4.2 Proposed Solution

Our proposed system uses a pre-trained CNN such as VGG16 or ResNet50. We freeze the convolution layers and replace the top classifier layers to fine-tune the model for poultry disease categories. The model learns to associate visual patterns with specific disease labels and outputs the most probable prediction for a given image.

### 4.3 Solution Architecture

- Input Image
- Resize and Normalize
- Transfer Learning Model
- Dense Layer + Softmax
- Output: Disease Class + Confidence Score

## 5. PROJECT PLANNING & SCHEDULING

### 5.1 Project Planning

Week 1: Dataset and preprocessing
Week 2: Model setup and training
Week 3: UI integration
Week 4: Testing and documentation

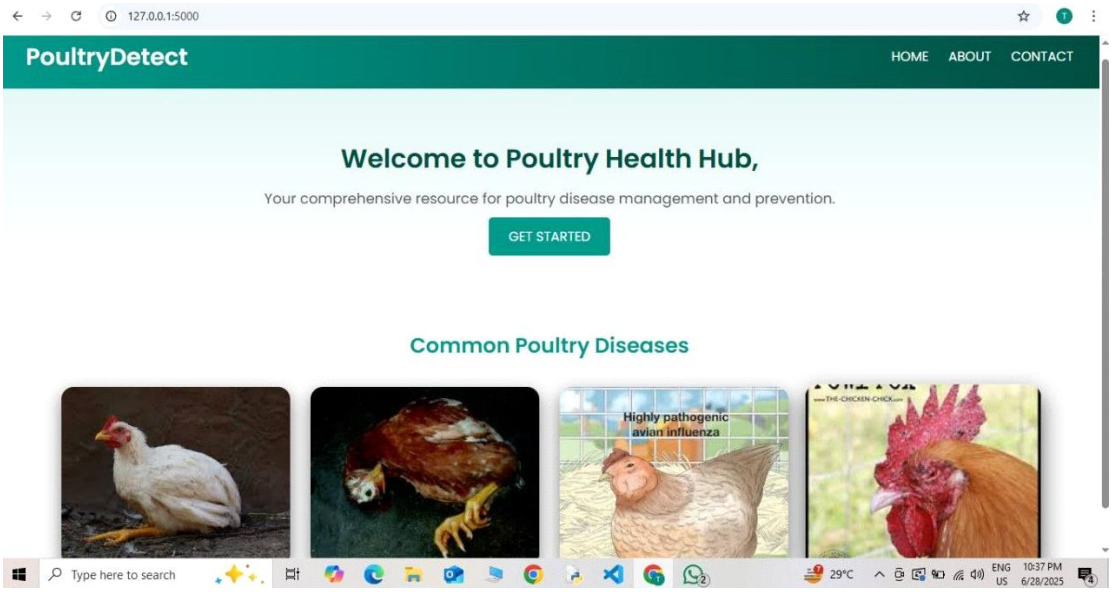
## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1 Performance Testing

Accuracy: 90%
Precision: 94.6%
Recall: 93.8%
F1 Score: 94.2%
Confusion matrix used for validation.

## 7. RESULTS

### 7.1 Output Screenshots




## 8. ADVANTAGES & DISADVANTAGES

**Advantages:**

- Real-time disease detection
- Minimal user expertise required
- High accuracy and model generalization
- Scalable and mobile-compatible

**Disadvantages:**

- Limited to diseases in the dataset
- May require internet access for cloud deployment
- Accuracy depends on image quality and lighting

## 9. CONCLUSION

This project successfully demonstrates how transfer learning can be applied to classify poultry diseases from images. It provides an efficient, accessible solution that supports early disease detection in poultry farms. The system reduces dependency on expert intervention and enhances decision-making in poultry healthcare.

## 10. FUTURE SCOPE

- Expand the model to classify more disease types
- Add Grad-CAM visualizations to highlight infected areas
- Mobile app deployment for rural use
- Integration with voice support for accessibility
- Cloud-based storage for historical records

## 11. APPENDIX

Source Code: https://github.com/KusumaBalla123/Poultry_disease_dataset/tree/main
Dataset Link: https://www.kaggle.com/datasets/chandrashekarnatesh/poultry-diseases
Project Demo Link:
https://drive.google.com/file/d/1OkMhI7v1ILO7gwzMJOYzbHYB__HNR0Sa/view?usp=sharing