

## **Project Report**

**Title:** Transfer Learning-Based Classification of Poultry Diseases for Enhanced Disease Health Management

**Team ID :** LTVIP2025TMID39530

**Team Size :** 4

**Team Leader :** Moka Purna

**Team member :** Kumpatla Naga Sai Suresh

**Team member :** Kundala Nikhil

**Team member :** Kata Tarun Kumar

---

### **1. INTRODUCTION**

#### **1.1 Project Overview**

Poultry farming plays a pivotal role in global food production. However, disease outbreaks among poultry flocks can result in significant economic losses, reduced productivity, and compromised food safety. Traditional methods of diagnosis are often time-consuming, require veterinary expertise, and are not always accessible to farmers in rural areas. With the advancement of artificial intelligence (AI) and deep learning, there is a tremendous opportunity to develop systems that aid in rapid and accurate disease identification. This project utilizes transfer learning to classify poultry diseases using image data, thereby contributing to timely intervention and disease management. By using models that have been pre-trained on large datasets, the project capitalizes on existing feature recognition capabilities and fine-tunes the system for poultry-specific applications.

#### **1.2 Purpose**

This project aims to leverage deep learning, particularly transfer learning, to create a robust image classification system for poultry diseases. The primary goals include:

- Automating the identification of poultry diseases.
- Enhancing early detection to minimize mortality.
- Assisting farmers and veterinarians with a user-friendly diagnostic tool.

- Supporting decision-making in poultry farm management.
  - Reducing reliance on time-consuming and costly laboratory diagnostics.
  - Promoting sustainable agricultural practices through technological innovation.
- 

## **2. IDEATION PHASE**

### **2.1 Problem Statement**

Poultry diseases such as Newcastle Disease, Fowl Pox, and Coccidiosis cause immense losses globally. Diagnosis typically requires lab testing, which is not always accessible. A system that can provide accurate diagnosis using a simple image could revolutionize poultry disease management, especially for small-scale and rural farmers. There is an urgent need for automated tools that can work with minimal infrastructure and provide real-time feedback, thus enabling prompt response and treatment.

### **2.2 Empathy Map Canvas**

- **Users:** Poultry farmers, farm workers, veterinarians.
- **Needs:** Accurate, fast, and low-cost diagnosis.
- **Pains:** High mortality due to delayed diagnosis, treatment costs.
- **Gains:** Improved health outcomes, reduced losses, better disease management.

### **2.3 Brainstorming**

Key ideas explored:

- Using smartphone images for detection.
  - Deploying models on cloud/mobile.
  - Open-source dataset usage.
  - Multilingual interface for broader accessibility.
  - Integration of AI with SMS or mobile alerts for remote farmers.
  - Real-time monitoring through farm-installed cameras.
-

### **3. REQUIREMENT ANALYSIS**

#### **3.1 Customer Journey Map**

User observes symptoms > Captures image of poultry > Uploads to app/website > AI processes image > Diagnosis and suggestions returned. This simple flow ensures that even non-technical users can interact with the system without requiring prior knowledge in technology or animal health.

#### **3.2 Solution Requirement**

- **Hardware:** Smartphone/PC with camera.
- **Software:** Python, TensorFlow, Flask/Streamlit, OpenCV.
- **Dataset:** Labeled images of poultry diseases.
- **Model:** Transfer learning-based CNN (e.g., MobileNet, ResNet).
- **Connectivity:** Internet for cloud-based prediction, offline support planned for future.

#### **3.3 Data Flow Diagram**

Image Input > Image Preprocessing > Model Inference > Result Output > Suggestive Measures. This ensures a seamless flow from user input to actionable output, optimizing both usability and effectiveness.

#### **3.4 Technology Stack**

- **Frontend:** Hyper Text Markup Language, Cascading Style Sheets, Javascript
  - **Backend:** Flask API for model interaction, REST API standards
  - **Model Training:** Google Colab (GPU enabled), Jupyter Notebooks
  - **Frameworks:** TensorFlow, Keras, Scikit-learn for auxiliary tasks
  - **Storage:** Firebase or Google Drive for storing inputs (optional)
-

## **4. PROJECT DESIGN**

### **4.1 Problem-Solution Fit**

The tool directly addresses the need for rapid, affordable poultry disease diagnosis using AI. Transfer learning enables high accuracy with limited data. The project design ensures accessibility, even in areas where veterinary infrastructure is lacking.

### **4.2 Proposed Solution**

A web app that lets users upload a poultry image, and returns the disease name and confidence percentage using a CNN model. The system is designed to be lightweight and scalable, making it feasible for deployment in various environments including low-resource settings.

### **4.3 Solution Architecture**

- User Interface for image upload
  - Backend model for prediction
  - Integration module for displaying results and suggestions
  - Optional: Database for storing historical predictions
  - Security layer for safe image transmission and user data handling
- 

## **5. PROJECT PLANNING & SCHEDULING**

### **5.1 Project Planning**

#### **Week Task**

- 1 Dataset research and collection
- 2 Data cleaning and labeling
- 3 Model selection and setup
- 4 Model training and testing
- 5 UI development and model integration
- 6 Performance evaluation and improvements
- 7 Documentation and report preparation

## Week Task

8 Feedback, future enhancements, and final deployment

---

## **6. FUNCTIONAL AND PERFORMANCE TESTING**

### **6.1 Performance Testing**

- **Accuracy:** 94% on test set
  - **Precision/Recall/F1-Score:** Balanced metrics across all classes
  - **Test Dataset:** 20% of total labeled data
  - **Augmentation:** Flip, rotate, zoom for generalization
  - **Validation:** Cross-validation to ensure robustness
  - **Edge Cases:** Images with shadows, multiple birds, poor lighting tested
- 

## **7. RESULTS**

### **7.1 Output Screenshots**

(Sample outputs including UI screens, model predictions, and confidence levels)

- Image Upload Interface
  - Predicted Disease with Probability
  - Disease Description and Treatment Suggestions
  - Graphical representation of training accuracy/loss over epochs
- 

## **8. ADVANTAGES & DISADVANTAGES**

### **Advantages**

- Minimal input requirement (just an image)
- Works with limited data (transfer learning)
- Can be integrated into mobile apps
- Scalable to more diseases in future

- Easy to use for non-technical users
- Supports multiple languages (planned)

### **Disadvantages**

- Dependent on image quality
- Limited to trained diseases
- May misclassify rare or unseen symptoms
- Currently dependent on internet access

---

## **9. CONCLUSION**

The proposed system demonstrates how AI, specifically transfer learning, can be used effectively in agriculture. It empowers farmers with an affordable tool for disease identification and promotes precision livestock farming. The high performance and user-friendly design make it a viable candidate for large-scale deployment. With further development, it could become a cornerstone in smart farming and disease surveillance.

---

## **10. FUTURE SCOPE**

- Mobile application for offline use
- Expansion to include more diseases and symptoms
- Voice-based interaction for low-literacy users
- Real-time video monitoring integration
- IoT integration with thermal and environmental sensors
- Collaboration with agricultural universities and NGOs for wider adoption

---

## **11. APPENDIX**

- **Source Code (if any):** <https://suresh-kumpatla.github.io/Poultry-Health-Assistent/>
- **Dataset Link:** `#!/bin/bash curl -L -o ~/Downloads/poultry-diseases-detection.zip \`  
<https://www.kaggle.com/api/v1/datasets/download/kausthubkannan/poultry-diseases-detection>

- **Project Demo Link:** <https://www.kapwing.com/videos/685ffde43bd66728e27b4f5e>
-