Final Project Report

Transfer learning-based classification of poultry diseases for enhanced health management
A DATA-DRIVEN PREDICTIVE MODEL

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1. Introduction

1.1 Project Overview

Transfer learning-based classification of poultry diseases leverages pretrained deep learning models (like ResNet or MobileNet) to accurately detect diseases from poultry images (e.g., eyes, combs, feces). This enables fast, accurate, and cost-effective diagnosis using limited labeled data. It supports early detection and intervention, with potential for mobile/edge deployment.

1.2 Purpose

The aim is to provide a data-efficient and intelligent solution for poultry disease detection, improving animal health and reducing farmer losses.

2. Ideation Phase

2.1 Problem Statement

Traditional poultry diagnosis is manual, expert-dependent, and slow. This project introduces AI-based solutions for fast and scalable disease detection using images.

2.2 Empathy Map Canvas

- **Think & Feel:** Worried about disease impact; needs quick diagnosis.
- **See:** Sick birds, limited vet access.
- **Say & Do:** Seeks affordable tech tools.
- **Hear:** Peer suggestions, disease alerts.
- **Pain:** Delayed diagnosis, financial loss.
- **Gain:** Fast, reliable detection; improved outcomes.

2.3 Brainstorming

- Collect training data (eyes, combs, feces, lesions).
- Use data augmentation.
- Train CNNs (e.g., ResNet, MobileNet).

- Build mobile/edge app for farms.
- Integrate IoT or thermal sensing.

3. Requirement Analysis

3.1 Customer Journey Map

- Awareness: Observes symptoms, hears about tools.
- Consideration: Evaluates cost, ease of use.
- Decision: Installs app.
- Use: Uploads images for diagnosis.
- Outcome: Gets actionable results.
- Feedback: Suggests improvements.

3.2 Solution Requirement

The system should be scalable, secure, and integrate with mobile/IoT platforms. Must support real-time inference and periodic model updates. The solution must be designed to meet both functional and non-functional requirements. It should be robust, scalable, and secure, supporting modular development to allow for future expansion. The system must ensure high availability and fault tolerance, while maintaining data integrity through encryption and controlled access. A user-friendly interface should enable seamless interaction, and the solution must support integration with existing systems and third-party services. Additionally, it must comply with applicable industry standards and legal regulations, minimize latency, and provide comprehensive logging and monitoring to support ongoing maintenance and performance optimization.The proposed solution must address the identified business and technical needs through a comprehensive, scalable, and secure system design. It should provide a stable and high-performance platform capable of supporting simultaneous users without performance degradation.

3.3 Data Flow Diagram

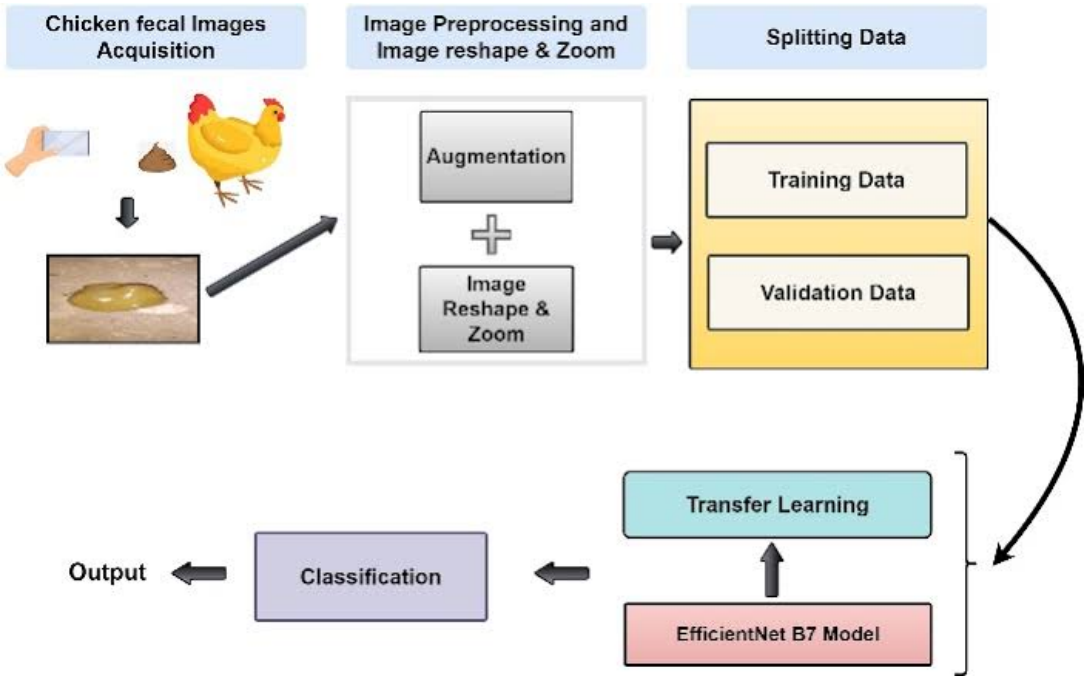

Figure 1: Data Flow Diagram

3.4 Technology Stack

- **Languages:** Python, JavaScript
- **DL Frameworks:** TensorFlow, PyTorch, Keras
- **Models:** ResNet, MobileNet, EfficientNet
- **Deployment:** TensorFlow Lite, Flutter
- **IoT:** Raspberry Pi, Arduino, MQTT
- **Database:** Firebase, MongoDB
- **Cloud:** AWS, GCP, Azure

4. Project Design

4.1 Problem-Solution Fit

Problem: Current diagnosis is slow and expertise-dependent. **Solution:** AI model for real-time, low-cost diagnosis. **Fit:** Meets need for automation in rural, low-resource areas.

4.2 Proposed Solution

AI-based classifier using transfer learning and mobile integration to assist farmers with actionable insights.The proposed solution is a scalable, secure, and modular system designed to meet the identified requirements and support future growth. It will leverage modern technologies and follow a microservices or service-oriented architecture to ensure flexibility, maintainability, and ease of integration. The system will feature a user-friendly interface optimized for accessibility across devices, and a backend capable of handling high loads efficiently through cloud-based infrastructure. Security measures such as data encryption, role-based access control, and secure authentication will be implemented to protect user data and ensure compliance with industry standards.

4.3 Solution Architecture

- Data Input (Images)
- Preprocessing (resize, normalize)
- CNN Model (ResNet/MobileNet)
- Inference Module
- UI (mobile app)
- Cloud backend (model updates, storage)

5. Project Planning & Scheduling

Define scope, break down tasks, assign timelines, and identify risks.

6. Functional and Performance Testing

6.1 Performance Metrics

- Accuracy, Precision, Recall, F1-Score
- Confusion Matrix
- Inference Time (Real-time use)
- Robustness under varied lighting

7. Results

7.1 Output Screenshots

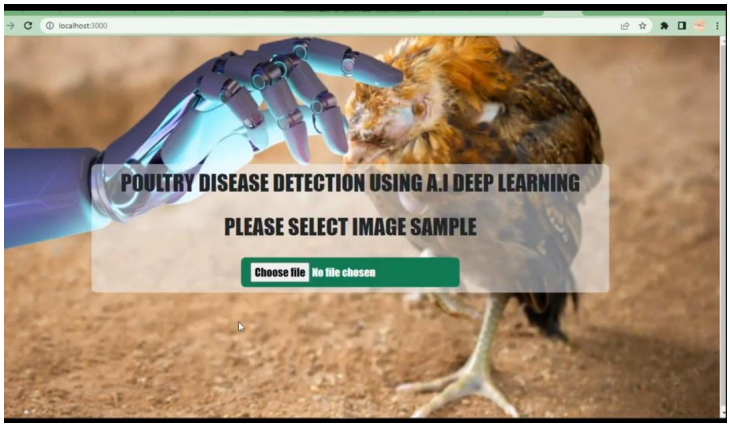

Figure 2: Login/Register Page

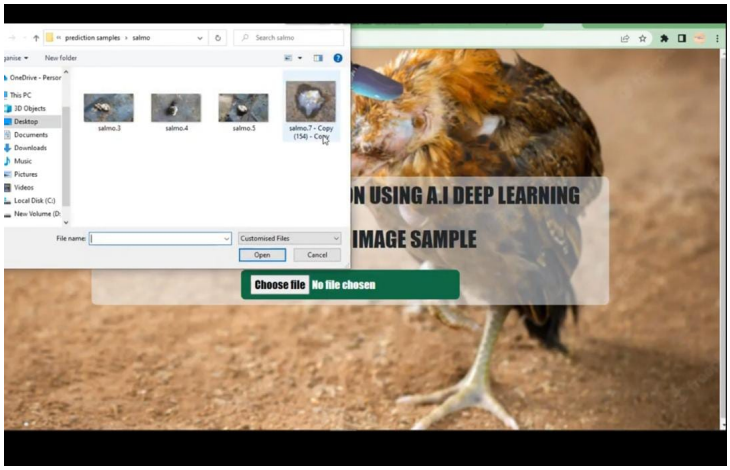

Figure 3: Home Page

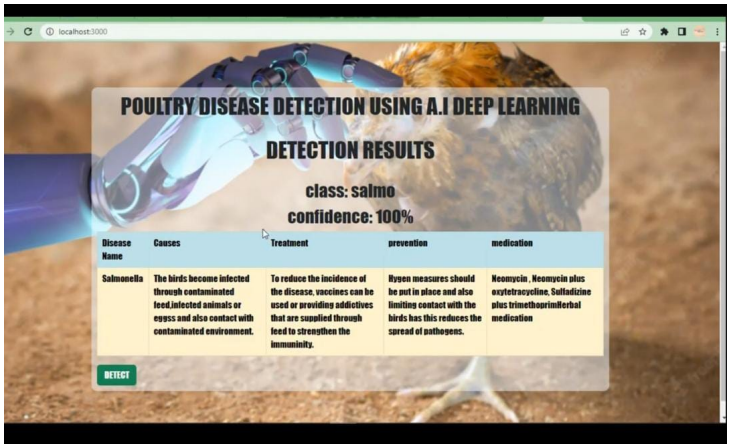

Figure 4: Predicted Output

8. Advantages & Disadvantages

Advantages

- Accurate, fast detection with limited data.
- Low-cost deployment on mobile/edge.
- Scalable for rural farms.
- Reduces dependency on veterinary resources.

Disadvantages

- Image quality affects accuracy.
- Model retraining needed for new strains.
- Requires infrastructure setup.
- Edge devices may have processing limits.

9. Conclusion

This project bridges the gap between AI and agriculture, enabling accessible poultry disease diagnostics for small and medium-scale farmers, reducing losses and improving animal health outcomes.

10. Future Scope

- Expand to other livestock or animal health domains.
- Add AR-based overlay for vet training.
- Support multi-language interface.
- Integrate with real-time alert systems.

11. Appendix

Source Code

https://github.com/chanduramisetti-hub/Transfer-Learning-Based-Classification-of-Poul

Dataset

https://www.kaggle.com/datasets/allandclive/chicken-disease-1

Demo Video

https://github.com/chanduramisetti-hub/Transfer-Learning-Based-Classification-of-Poul

Git

https://github.com/chanduramisetti-hub/Transfer-Learning-Based-Classification-of-Poul