# CSE 7302 – University Project

## Review-2 Presentation

## Image based Animal Type Classification for cattle and buffaloes

| Student Details | |
|---|---|
| **Name** | **Roll No** |
| Harshitha. KJ | 20221CDV0026 |
| Susmitha.S | 20221CDV0038 |
| Greeshma | 20221CDV0040 |


**Under the Supervision:**

**Mr. Sahabzada Betab Badar**
**Assistant Professor**
**School of Computer Science and Engineering**
**Presidency University**


**Name of the Program:** **B. Tech Computer Science and Technology (Devops)**
**Name of the HoD:** **Dr. Pravinthraja S**
**Name of the Program Project Coordinator:** **Dr. H M Manjula**
**Name of the School Project Coordinators:** **Dr. Sampath A K , Dr. Geetha A**

# Content:

1. Introduction
2. Literature Survey
3. Research Gap
4. Proposed System Design
5. Tools & Technologies

# Introduction:

1. Livestock such as cattle and buffaloes play a vital role in agriculture, dairy production, and the rural economy.

2. Proper identification of animal type is important for farm management, breeding, health monitoring, and insurance.

3. With the growth of artificial intelligence, computer vision can be used to automatically identify animals from images.

4. Image-based classification helps in distinguishing between cattle and buffaloes based on their visual features.

5. This system uses digital images of animals as input for classification.

# Introduction Continued:

6. Machine learning and deep learning techniques analyze patterns such as shape, texture, horns, and body structure.

# Literature Review:

1. Recent research demonstrates that Convolutional Neural Network (CNN) based deep learning models are highly effective for livestock image classification, achieving good accuracy in identifying animal species such as cows, buffaloes, sheep, and goats.

2. Most existing studies primarily focus on animal type identification or breed classification using supervised learning techniques. These works mainly address classification accuracy but do not extend toward complete livestock management solutions.

3. Only a limited number of studies attempt health analysis using visual features, and even these are restricted to basic symptom detection without systematic validation or explainability.

# Literature Review Continued:

4. Additionally, many current livestock management systems rely on manual record keeping or RFID-based identification, which increases operational cost, requires physical tagging, and is prone to duplication, data inconsistency, and human error.

# Research Gap & Motivation:

**Identified Research Gaps**

1. Existing systems do not provide a unique and persistent digital identity for each livestock animal.
2. There is no effective duplicate or fraud detection mechanism, leading to multiple registrations and misuse of records.
3. Health analysis is either very limited or completely absent, especially in terms of visual health risk indicators.
4. Most models operate as black boxes, lacking Explainable AI (XAI) features to justify predictions and build user trust.
5. Current solutions are not end-to-end systems; they lack proper integration of AI models, user interface, and database management.

# Research Gap & Motivation Continued:

**Motivation**

1. The motivation of this work is to design and develop a complete AI-based smart livestock identification system that integrates deep learning, image processing, explainable AI, and database management to provide an accurate, transparent, and scalable solution for real-world livestock management.

# Proposed System Overview:

**AI-Based Smart Livestock Identification System**

1. The proposed system is an intelligent, image-based livestock identification platform that utilizes deep learning and computer vision techniques to automate livestock analysis and management**.**

**Key Features**

1. **Animal Type Identification:** Automatic classification of livestock as cow or buffalo.
2. **Breed Classification:** Identification of specific breeds using deep learning models.
3. **Digital Profile Creation:** Creation of a unique digital identity for each animal, including image and metadata.

# Proposed System Overview Continued:

4. **Duplicate Detection:** Prevention of multiple registrations using image feature similarity analysis.

5. **Visual Health Risk Analysis:** Detection of basic health risk indicators from visible features.

6. **Explainable AI:** Generation of heatmaps to visually explain AI decision-making.

**Approach**

1. The system follows an image-based automated analysis approach, where livestock images are processed through a CNN-based deep learning model to perform classification, analysis, and decision support with improved accuracy and transparency.

# System Architecture & Model Design:

**Workflow:**

1.Image Input

2.Image Preprocessing

3.CNN-based AI Model

4.Classification & Health Analysis

5.Duplicate Detection

6.Results with Explainable AI

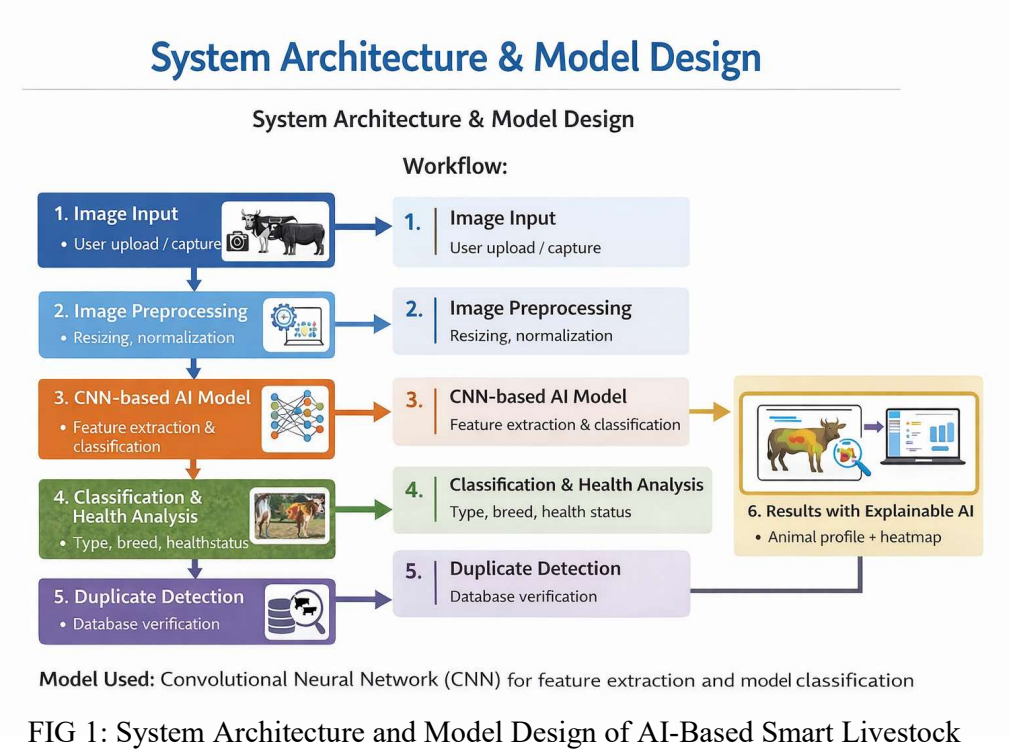



FIG 1: System Architecture and Model Design of AI-Based Smart Livestock Identification System

# System Architecture & Model Design Continued: :

**Model Used:**

1. Convolutional Neural Network (CNN) for feature extraction and classification.

# Tools & Technologies Used:

**AI & Image Processing:**

1. Python - Core programming language.
2. TensorFlow / PyTorch – Deep learning frameworks.
3. Convolutional Neural Networks (CNN) – Image feature extraction and classification.
4. OpenCV – Image preprocessing and enhancement.

**User Interface**

1. Flutter / ReactJS – User-friendly interface for image upload and result display.

# Tools & Technologies Used Continued:

**Database**

1. SQLite / PostgreSQL – Storage of animal images, profiles, and metadata.

**Visualization**

1. Heatmaps (Explainable AI) – Visual explanation of AI predictions.
2. Result Dashboards – Display of classification and health analysis outputs.

# Outcome & Conclusion:

**Outcome**

1. Comprehensive literature survey completed and research gaps clearly identified.
2. Limitations of existing livestock identification systems analyzed.
3. Proposed system architecture finalized based on identified gaps.
4. CNN-based AI model design validated for classification and feature extraction.
5. Health risk analysis and duplicate detection concepts finalized.
6. Explainable AI approach selected to improve transparency and trust.
7. Tools and technologies finalized for implementation phase.

# Outcome & Conclusion Continued:

**Conclusion**

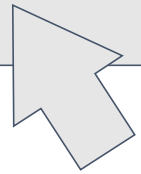
The proposed AI-based smart livestock identification system provides a scalable, reliable, and explainable solution to real-world livestock management challenges. By integrating deep learning, image processing, database management, and explainable AI, the system overcomes the limitations of traditional and existing automated approaches. The finalized design is technically feasible, academically strong, and suitable for practical deployment, making it well-aligned with the objectives of the project and ready for implementation in the next phase.

# Review Timeline:

| Review 1 | Review 2 | Review 3 | Review 4 | Final Review |
|---|---|---|---|---|
| Overview of the company and role and briefing the problem statement and workflow timeline. | Blueprint construction, architectural workflow with codebase. | Progress on executing blueprint and workflow with the help of code base. | Progress on executing blueprint and workflow with the help of code base and documenting in hardcopy and version control system. | Submission of report and final Presentation |
| **23/01/26** | **31/01/26** | **28/02/26** | **03/04/26** | **20/04/26** |

# Github Link:

**https://github.com/RohitJoHNSon03**



# Q&A

# Thank you!