



Image Based Breed Recognition System for Indian Cattle and Buffaloes

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KEYWORDS

ABSTRACT

Livestock management plays a crucial role in the agricultural economy, especially in developing countries where cattle and buffalo farming are major sources of livelihood. Traditional methods of breed identification rely on manual inspection by experts, which can be time-consuming, subjective, and expensive. This paper proposes an automated image-based animal type classification system using deep learning techniques to identify cattle and buffalo breeds. The system utilizes convolutional neural network architectures such as EfficientNet, ResNet, and Inception-ResNet to extract visual features from animal images. Additionally, computer vision techniques are used to analyze physical characteristics and estimate body measurements. The proposed system enables farmers and veterinarians to capture livestock images and obtain real-time breed classification and quality assessment through a user-friendly interface. Experimental results demonstrate high classification accuracy, improving livestock management, breeding decisions, and productivity in the agricultural sector.

Objectives:

The main objectives of the proposed system are:

- To develop an automated system for identifying cattle and buffalo types using image processing.
- To reduce dependency on manual breed identification by veterinary experts.
- To improve livestock management using deep learning techniques.

- To provide accurate classification of animals based on visual features.
- To assist farmers in making better breeding and livestock management decisions.

Methodology:

The proposed system follows several stages to classify cattle and buffalo types from images.

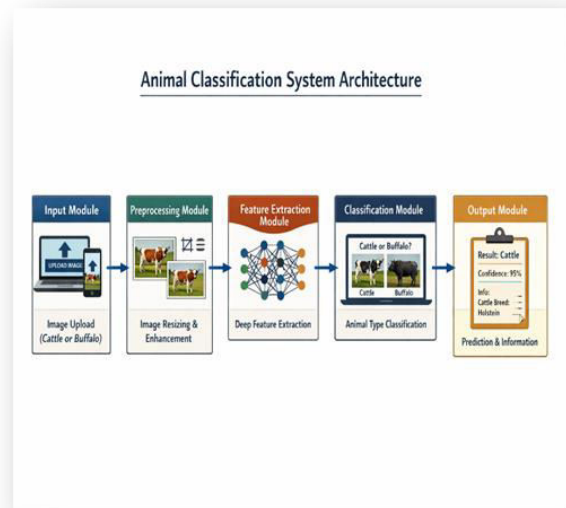
1. Data Collection: A dataset containing images of different cattle and buffalo types is collected from agricultural datasets and online sources.

2. Data Preprocessing: The images are resized, normalized, and cleaned to remove noise and improve quality.

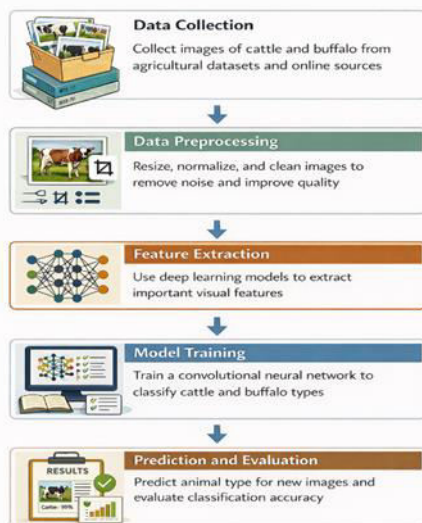
3. Feature Extraction: Deep learning models such as EfficientNet, ResNet, and Inception-ResNet are used to extract important visual features from the images.

4. Model Training: The extracted features are used to train a convolutional neural network model to classify animal types.

5. Prediction and Evaluation: The trained model predicts the type of animal from new input images and evaluates the accuracy of the classification.



Methodology



System Design:

The system architecture consists of several components that work together to perform animal classification.

- ⊗ Input Module: Users upload an image of cattle or buffalo through a web or mobile interface.
- ⊗ Preprocessing Module: The uploaded image is resized and processed for better feature extraction.
- ⊗ Feature Extraction Module: Deep learning models extract important visual features from the image.
- ⊗ Classification Module: The trained model classifies the animal type based on extracted features.
- ⊗ Output Module: The system displays the predicted animal type along with additional information.

Key Features:

- ⊗ Automated breed identification using deep learning.
- ⊗ High accuracy image classification system.
- ⊗ User-friendly interface for farmers and veterinarians.
- ⊗ Fast and real-time animal recognition.
- ⊗ Reduces manual effort and human errors.
- ⊗ Supports precision livestock farming.

Results:

The proposed model was trained and tested on a dataset of cattle and buffalo images. The ensemble deep learning model combining EfficientNet, ResNet, and Inception-ResNet achieved high performance in classification tasks. Experimental evaluation shows that the system can accurately identify animal types with an accuracy of approximately 98%. The system successfully demonstrates the effectiveness of deep learning techniques in livestock identification and management.

Conclusion:

This research presents an image-based animal type classification system for cattle and buffaloes using deep learning techniques. The proposed system provides an efficient and automated solution for livestock identification, reducing reliance on manual methods. With high classification accuracy and a user-friendly interface, the system can support farmers and veterinarians in making better livestock management decisions. Future work may focus on expanding the dataset, improving model performance, and integrating additional features such as disease detection and health monitoring.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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