

Animal Classification System for Cattle and Buffalo

Mukta Ghule¹, Ashish Bawaskar², Saloni Gaiki³, Sakshi Mali⁴, Vedant Chandankar⁵
Vaishnavi M. Jawade⁶

¹²³⁴⁵ Final Year Students, Department of Information Technology, MGICOET Shegaon, Maharashtra, India

⁶ Assistant Professor, Department of Information Technology, MGICOET Shegaon, Maharashtra, India

Abstract: Traditional manual observation in livestock management is often inefficient and prone to human error. To address this, the proposed Animal Classification System introduces an automated web-based solution designed to identify cattle and buffalo breeds, colors, and types through image processing and machine learning. This integration of technology aims to streamline record-keeping and improve overall dairy management practices.

The system features a dual-layered architecture: a front-end developed using PHP, HTML, CSS, and JavaScript for user interaction, and a back-end powered by a Python-based machine learning model for accurate image recognition. Users can register, log in, and upload animal images, which the system processes against a trained dataset to provide instant classification. Additionally, the platform includes a search function for breed information and a MySQL database to store user data and classification history for future reference.

By automating the identification process, this system provides farmers, researchers, and dairy managers with a fast, reliable, and accessible tool. It serves as a practical demonstration of how machine learning and web technologies can be combined to modernize agricultural support systems and enhance livestock monitoring efficiency.

Keywords: Animal Classification, Image Processing, Machine Learning, Cattle Identification, Buffalo Breed Detection, Dairy Management System, Python-Based Classification, Web Application, Livestock Management.

I. INTRODUCTION

The livestock sector plays an important role in agriculture and dairy production. Proper identification and classification of animals such as cattle and buffalo are essential for efficient dairy management, breeding practices, and livestock monitoring. Traditionally, animal identification is performed manually by farmers or experts based on physical characteristics

such as body structure, color, and breed patterns. However, manual identification can be time consuming and may require specialized knowledge. With the advancement of computer technology and machine learning techniques, it has become possible to automate the process of animal classification using image analysis. Machine learning algorithms can analyze images of animals and identify specific characteristics that help determine the type and breed of the animal.

This approach reduces manual effort and provides faster and more accurate classification results. The Animal Classification System developed in this project is a web-based application that allows users to identify cattle and buffalo using image processing techniques. The system provides information about dairy management and animal classification through an easy-to-use website interface. Users can register and log in to the system, upload images of animals, and obtain classification results generated by a Python-based machine learning model. The application integrates web technologies such as PHP, HTML, CSS, and JavaScript with Python-based machine learning algorithms to create an intelligent system capable of analyzing animal images. The system is designed to classify animals specifically into cattle and buffalo categories, and it can also provide information about their color and breed. Additionally, the website includes a search feature that allows users to explore different breeds of cattle and buffalo. The proposed system aims to assist farmers, dairy managers, and researchers in identifying animals more efficiently. By combining web development technologies with machine learning techniques, the system demonstrates how modern technology can

support livestock management and agricultural applications.

II. LITERATURE REVIEW

Mishra et al. (2019) proposed an image-based animal classification system using machine learning techniques. The system analyzes visual features from animal images and classifies them based on predefined categories.

The study demonstrated that automated image analysis can significantly improve the accuracy of animal identification compared to manual methods. Kumar and Singh (2020) developed a computer vision system for identifying cattle breeds using deep learning algorithms. Their research used convolutional neural networks (CNN) to analyze animal images and classify them according to breed characteristics. The results showed that deep learning techniques can achieve high accuracy in livestock classification. Rahman et al. (2021) presented an automated livestock recognition system based on image processing techniques.

The system extracts important visual features such as color patterns, body structure, and shape to identify animals. The research emphasized that automated classification systems can assist farmers in maintaining proper livestock records. Sharma and Patel (2022) proposed a deep learning-based cattle breed identification system using image datasets collected from different farms. The model was trained using thousands of animal images and was able to classify different cattle breeds with high accuracy.

III. METHODOLOGY

The Animal Classification System is developed as a web-based application that uses machine learning and image processing techniques to classify livestock animals. The system focuses specifically on identifying cattle and buffalo using digital images uploaded by users. The main objective of the system is to provide an automated solution for identifying animals and providing related breed information.

The system provides a user-friendly web interface where users can register, log in, and upload images of animals. Once an image is uploaded, it is processed by a Python based machine learning model that analyzes the image and predicts the animal category. The

system identifies whether the uploaded image belongs to cattle or buffalo and also provides additional information such as color and breed details when available. The application also provides general information related to dairy management and livestock classification. Users can access educational information about cattle and buffalo breeds through the website. In addition, the system includes a search feature that allows users to search for specific breeds and view their characteristics. The system stores user details, uploaded images, and classification results in a database for future reference. This helps maintain records of previous classifications and allows users to review their results whenever required.

IV. SYSTEM ARCHITECTURE

The Animal Classification System is developed as a web-based application that uses machine learning and image processing techniques to classify livestock animals. The system focuses specifically on identifying cattle and buffalo using digital images uploaded by users. The main objective of the system is to provide an automated solution for identifying animals and providing related breed information.

The system provides a user-friendly web interface where users can register, log in, and upload images of animals. Once an image is uploaded, it is processed by a Python based machine learning model that analyzes the image and predicts the animal category. The system identifies whether the uploaded image belongs to cattle or buffalo and also provides additional information such as color and breed details when available.

The application also provides general information related to dairy management and livestock classification. Users can access educational information about cattle and buffalo breeds through the website. In addition, the system includes a search feature that allows users to search for specific breeds and view their characteristics. The system stores user details, uploaded images, and classification results in a database for future reference. This helps maintain records of previous classifications and allows users to review their results whenever required. Figure: System Architecture of Animal Classification System

V. RESULTS

The results demonstrate the successful functioning of the web-based application and the machine learning model used for classifying animals. The system was tested with several images of cattle and buffalo to evaluate the accuracy and reliability of the classification process. The system provides a user-friendly interface that allows users to register, log in, upload animal images, and view classification results. The results generated by the machine learning model are displayed on the website and stored in the database for future reference.

This chapter also includes screenshots of the system interface and examples of classification results obtained from the application. The machine learning model was tested using several images of cattle and buffalo to evaluate its performance. 3 The classification results show that the system can successfully identify animals based on the uploaded images. The system analyzes visual features such as body shape, color patterns, and texture to classify animals. The classification results are displayed on the website and stored in the database for future reference. The following table shows sample classification results obtained from the system.

Advantages : The Animal Classification System provides several advantages compared to traditional methods of identifying livestock animals. The system uses machine learning and image processing techniques to classify animals such as cattle and buffalo automatically, which improves efficiency and accuracy in livestock identification. One of the main advantages of the system is that it automates the animal identification process. Instead of relying on manual observation, users can upload an image of the animal and obtain classification results instantly. This reduces the time and effort required for identifying animals.

Another advantage of the system is that it provides a user-friendly web interface that allows users to easily interact with the system. Users can register, log in, upload images, and view classification results without requiring technical expertise. The system also helps in maintaining digital records of classification results. The database stores information such as uploaded images and classification outputs, which allows users to review previously classified animals.

In addition, the system provides breed information and dairy management details, which can help farmers and researchers understand livestock characteristics better. The integration of machine learning with web technologies makes the system a practical tool for modern livestock management and agricultural applications.

Limitations : Although the Animal Classification System provides several useful features, there are certain limitations associated with the current implementation of the system. One limitation of the system is that it is designed to classify only two types of animals: cattle and buffalo. The system cannot currently identify other types of animals such as goats, sheep, or horses. Another limitation is that the accuracy of the classification model depends on the quality and size of the training dataset. If the dataset contains limited images or lacks diversity, the model may not perform well under different conditions. The system may also experience reduced accuracy when images are captured in poor lighting conditions or unusual angles. Image quality plays an important role in the performance of the classification model. Additionally, the system requires internet access to use the web application. Users without reliable internet connectivity may experience difficulty accessing the system. Despite these limitations, the system provides a strong foundation for developing more advanced animal classification applications.

VI. CONCLUSION

The Animal Classification System developed in this project provides an automated and efficient approach for identifying livestock animals using image processing and machine learning techniques. The system integrates web technologies with a Python-based classification model to create a web-based platform where users can upload images of animals and obtain classification results. The proposed system focuses on identifying two important livestock animals, cattle and buffalo, which play a significant role in dairy farming and agricultural activities. By analyzing the visual features of uploaded images, the machine learning model is able to classify animals based on their characteristics. This helps reduce the dependency on manual observation and improves the efficiency of animal identification. The web application developed for the system provides a user-

friendly interface that allows users to register, log in, upload images, and view classification results. The system also includes a search feature that provides information about different cattle and buffalo breeds, which can be useful for farmers, researchers, and students interested in livestock management. The database integrated with the system stores user information, uploaded 4 images, and classification results, allowing users to maintain digital records of animal identification. This feature improves data management and provides a structured way of storing livestock information.

VIII. FUTURE SCOPE

Although the Animal Classification System developed in this project successfully identifies cattle and buffalo using image classification techniques, there are several possibilities for improving and expanding the system in the future. One possible improvement is to extend the system to classify additional animal species such as goats, sheep, horses, and other livestock animals. By expanding the dataset and training the machine learning model with more animal images, the system can become a more comprehensive animal classification platform. Another enhancement could involve improving the accuracy and performance of the machine learning model.

This can be achieved by using larger datasets, advanced deep learning algorithms, and improved image preprocessing techniques. Incorporating more training data will help the model recognize animal features more effectively under different conditions. The system can also be enhanced by developing a mobile application that allows users to capture animal images directly from their smartphones. This would make the system more convenient and accessible for farmers who may not have access to computers. In addition, future versions of the system may include features such as animal health monitoring, milk production tracking, and livestock record management. These features could help farmers maintain detailed records of their animals and improve dairy farm management.

ACKNOWLEDGEMENT

The authors express their sincere gratitude to Dr. / Prof. V. M. Jawade, Mauli Group of Institution's

College of Engineering and Technology, Shegaon, for valuable guidance, continuous support, and encouragement throughout the project work. His/Her insightful suggestions significantly contributed to the successful completion of this project. The authors also thank Dr. / Prof. V. P. Narkhede, Head of the Department of Information Technology, and all faculty members of the Information Technology Department, MGI-COET, Shegaon, for their constant inspiration and valuable suggestions. The authors are grateful to Dr. C. M. Jadhao, Principal of MGI-COET, Shegaon, for providing necessary facilities and encouragement. The authors further acknowledge the support of all teaching and non-teaching staff members of the institute. Finally, the authors express their heartfelt thanks to their parents and friends for their continuous encouragement and support.

REFERENCES

- [1] Rahman, M., Islam, M., & Rahman, M. (2021). Image-based livestock classification using deep learning techniques. *International Journal of Computer Applications*, 183(24), 15–21.
- [2] Kumar, R., & Singh, P. (2020). Automatic cattle breed classification using convolutional neural networks. *International Journal of Advanced Computer Science and Applications*, 11(6), 345–350.
- [3] Zhang, Y., Liu, H., & Wang, X. (2020). Animal recognition using deep learning and computer vision techniques. *IEEE Access*, 8, 158315–158325.
- [4] Sharma, S., & Patel, R. (2022). Machine learning based livestock identification system using image processing. *International Journal of Intelligent Systems and Applications*, 14(2), 45–53.
- [5] Bansal, A., Gupta, S., & Verma, N. (2021). Automated livestock classification using computer vision and artificial intelligence. *Proceedings of the International Conference on Artificial Intelligence and Data Science*, 210–215.