e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

GYR BREED DETECTION

Manisha Bhat*1, Mahima*2

*1,2Department Of MCA, NMAM Institute Of Technology, Nitte (Deemed To Be University), Udupi, India.

DOI : https://www.doi.org/10.56726/IRJMETS40291

ABSTRACT

Gyr Breed Detection using machine learning is a study aimed at developing an automated system for accurately identifying the breed of Gyr cattle. The Gyr breed is highly valued for its adaptability, disease resistance, and milk production, but visually distinguishing Gyr cattle from other similar breeds can be challenging and time-consuming. This research proposes a machine learning approach to address this problem. The methodology involves creating a comprehensive dataset consisting of images of Gyr cattle as well as images of other closely related breeds. These images are preprocessed using techniques such as resizing and normalization to ensure consistency. Feature extraction techniques are then applied to capture discriminative characteristics of the Gyr breed. The results of this research demonstrate the potential of machine learning in accurately identifying Gyr cattle breeds. The proposed system has the potential to provide a reliable and efficient solution for breed identification, benefiting farmers, breeders, and researchers in their decision-making processes related to Gyr cattle management, breeding programs, and conservation efforts.

Keywords: Classification, Exploratory Data Analysis, Loan, Loan Approval, Machine Learning, Prediction, Python.

I. INTRODUCTION

Livestock production would be impossible without the animal identification. Precision animal management will benefit greatly from dairy cow identification. The Gyr Zebu is an important Indian breed of Zebu. It is been utilized to help native breeds like the Red Sindhi and the Sahiwal flourish. The western Indian state of Gujarat is largely credited as their place of origin. The Gyr cattle of India are a significant dairy cattle breed due to their exceptional milk production. They are well-known for their resilience and resistance to a wide range of tropical diseases and stress. Milk of the A2 variety produced by this cow is high in calcium, phosphorus, healthy fats, and potassium, all of which contribute to the normalization of blood pressure. Gyr cows produce an average of 1590 kilograms of milk every lactation, with a record of 3182 kilograms produced in India. Gyr cattle typically live between 12 and 15 years. To identify something is to give it a name or number already in use based on information about its unique physical characteristics. Cow tracking, as well as the monitoring and recording of a cow's physiological and behavioral features, are only two examples of the many uses for individual identification in the cattle industry. The Gyr cattle breed has been identified and detected using biometrics. The images used in the Gyr breed detection system are processed by a convolutional neural network (CNN) using deep learning. The suggested approach utilizes a convolutional neural network (CNN) technique to scan the image pixel by pixel, allowing for the identification of the Gyr breed. To get the feature out of the dataset, we used the previously trained model and learned weights. The Gyr breed was categorized using the ResNet-18 classification model. The primary use of the deep neural network subclass known as convolutional neural networks (CNNs) is in the field of image analysis. When compared to other neural network types used for image processing, CNN's key benefits are its translation invariance and its shared weights. Multi-hidden layers in a convolution network's architecture allow the network to conduct mathematical convolutions on its input. The input dimension is reduced by the pooling layers, while the convolutional layers consist of a set of filters of a specific height and width. Simply by inputting photos, this system can identify and detect Gyr cattle. Input images are used to determine whether or not they should be labeled as Gyr. New photos of Gyr cattle can be categorized using the trained model.

PROBLEM DEFINATION

Gyr cattle breed detection using Convolutional Neural Networks (CNNs) refers to the task of accurately identifying the breed of a Gyr cattle based on its visual appearance. This problem is challenging due to the

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

similar physical characteristics of different breeds, and the variability in appearance due to factors such as lighting conditions and posture. The goal of using a CNN for this problem is to develop an automatic, efficient, and accurate system for identifying Gyr cattle breeds based on their images.

This system can be useful in various applications such as animal breeding, genetics, and conservation. To solve this problem, the model must learn to recognize the unique features of each breed and make a prediction based on those features

II. LITERATURE SURVEY

Document [1] The proposed method in this research is applicable to real-world farming settings since it can handle photos with complicated backdrops. It is a useful resource for picking out individual cows against busy backgrounds in photographs.

Document [2] In this paper, we offer a method for automatically identifying beef cattle from video clips by combining the strengths of Convolutional Neural Networks (CNNs) and Long Short-Term Memory Networks (LSTMs).

In the Article [3] In this research, we present and assess a computer vision technique for automatically identifying the individual dairy cows. The tailhead image used as the ROI in Step 4 was shot on a farm where milk is produced.

Document [4] In this research, we show that recognizing each cow individually to optimize the performance of an automated milking and feeding system is possible using computer vision techniques.

Paper [5] The purpose of this research is to use Support Vector Machine (SVM) for recognizing the Pantaneira breed of cattle.

Document [6] This research argues that computer vision pipelines based on deep neural architectures are ideal for automating the detection and identification of Holstein Friesian cattle in settings important to agriculture.

According to the article [7] This research set out to find and fix some of the biggest problems with cattle's ability to be identified by themselves using biometrics. There have been early signs of success with biometric identification of cattle based on muzzle patterns.

Document [8] The purpose of this investigation was to use Support Vector Machine (SVM) and Random Forest (RF) to determine the breed of the cattle. For the purpose of identifying breeds, we considered the model with the highest accuracy.

Document [9] In this study, we offer a unique, non-invasive method for identifying cows without physical touch by fusing deep component features.

III. METHODOLOGY

By following this methodology, a robust and accurate machine learning model can be developed for Gyr breed detection, providing a valuable tool for breed identification and assisting stakeholders in effective Gyr cattle management, breeding programs, and conservation efforts.

The methodology involves creating a comprehensive dataset consisting of images of Gyr cattle as well as images of other closely related breeds. These images are preprocessed using techniques such as resizing and normalization to ensure consistency. Feature extraction techniques are then applied to capture discriminative characteristics of the Gyr breed. Machine learning algorithms, such as convolutional neural networks (CNNs) or support vector machines (SVMs), are trained on the dataset to learn the patterns and characteristics that differentiate Gyr cattle from other breeds.

By following this methodology, the aim is to develop a robust machine learning model that can accurately identify Gyr cattle breeds based on their distinct visual characteristics. Such a model can have significant implications for breeders, farmers, and researchers in managing and conserving the Gyr breed effectively.

Data Augmentation: Image augmentation is a technique used to artificially increase the size of a training dataset by creating modified versions of existing images. In the case of cattle images, augmentation can help to improve the robustness and accuracy of a machine learning model by 10 providing additional examples of various types of cattle breeds. This process can involve operations such as resized-crop, horizontal-flip, tensor and normalize the images, allowing the model to better generalize to new, unseen images. The ultimate goal of

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

augmentation is to prevent overfitting and improve the model's ability to generalize to real-world data, leading to better performance in a production setting. The cattle images were augmented using image augmentation techniques, resulting in an increased size of the training dataset. A total of 1040 images were produced through this process.

Data Collection and assembly: The images have been collected from different freely available livestock farming websites namely shutterstock, pinterest and many more. We have collected nearly 369 images.

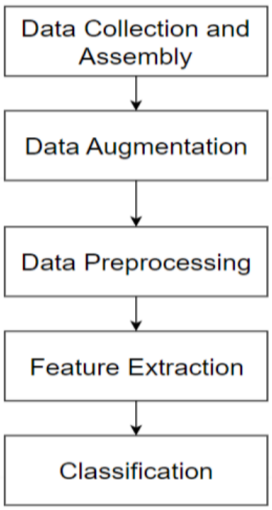

Figure 1: Proposed methodology

Data Pre-processing: Data pre-processing is a critical step in preparing a dataset for machine learning. For the cattle images, the pre-processing steps might include: ν Resizing the images to a consistent size to ensure that the model has a consistent input format. ν Splitting the dataset into training, validation, and testing sets to evaluate the model's performance and prevent overfitting.

Feature Extraction: CNN performs various convolutional and pooling operation for extracting the features from the images.

Classification: CNN will classify based on the features it extracted from convolutional and pooling operation. ResNet-18 classification model has been implemented for classifying the Gyr breed.

ResNet-18: A convolutional layer and eight residual units make up ResNet-18. The ResNet-18 network has this fundamental structure. The structure of a leftover construction block is depicted in the following figure. With the ReLU activation function, the vector sum of the input and the convolutional layer output can be directly output. When applied to deep neural networks, this technique can effectively solve the "vanishing gradient" or "exploding gradient" problem.

IV. RESULTS AND DISCUSSION

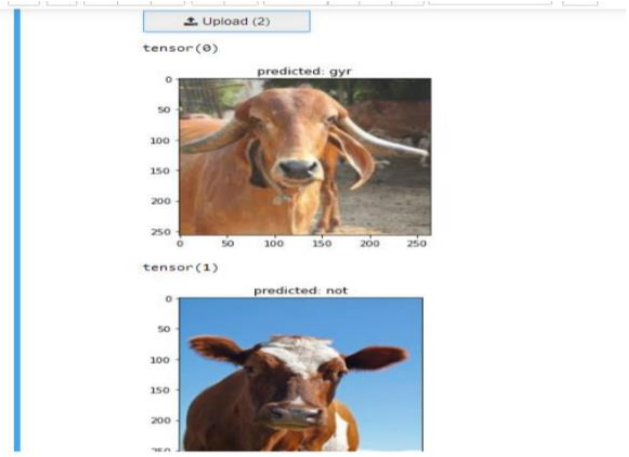

Figure 2: Prediction

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

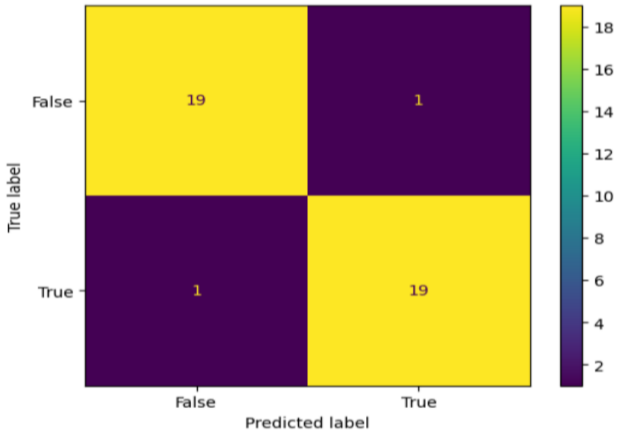

Figure 3: Confusion Matrix

V. CONCLUSION

Computer vision-based precision livestock management relies heavily on being able to identify individual cattle. Here, we propose a method for identifying cattle that makes use of a convolutional neural network (CNN) and the ResNet-18 classification model. To conduct the studies, we assembled a dataset consisting of 369 unique cow images. The proposed method achieved an accuracy of 89.87%, which is an improvement above both the conventional identification approach and the region-specific deep learning approach. The experimental results demonstrated the approach's viability for creating a farm-based automatic Gyr breed identification system, and they also demonstrated the identification approach's ability to deliver precise decision-making in precision livestock farming of Gyr cows.

VI. REFERENCES

[1] W Shen, H Hu, B Dai, X Wei, J Sun, L Jiang (2020) Individual identification of dairy cows based on convolutional neural networks.

[2] Yongliang Qiao, Daobilige Su , He Kong , Salah Sukkarieh , Sabrina Lomax, Cameron Clark (2019) Individual Cattle Identification Using a Deep Learning Based Framework.

[3] Wenyong Li, Zengtao Ji, Lin Wang c, Chuanheng Sun, Xinting Yang (2017) Automatic individual identification of Holstein dairy cows using tailhead images.

[4] Kaixuan Z, He D (2015) Recognition of individual dairy cattle based on convolutional neural networks. Trans Chin Soc Agric Eng (Trans CSAE) 31(5):181–187.

[5] X. Zhang et al. (2020) Cattle Breed Identification using SVM with Gray Level Co-Occurrence Matrix and Color Moment Features.

[6] Andrew, W., Greatwood, C., and Burghardt, T. (2017). Visual localization and individual identification of holstein friesian cattle via deep learning. In Proc. IEEE International Conference on Computer Vision (ICCV), Venice, Italy, 22–29

[7] Kumar, S., Singh, S.K., Singh, R., and Singh, A.K. (2017). Recognition of cattle using face images. In Animal Biometrics, 79–110. Springer.

[8] M.A. El-Shaer et al. (2014) A comparison of support vector machine and random forest algorithms for breed classification in cattle.

[9] X. Liu et al. (2018) Cattle breed classification using SVM with deep features extracted from digital image.