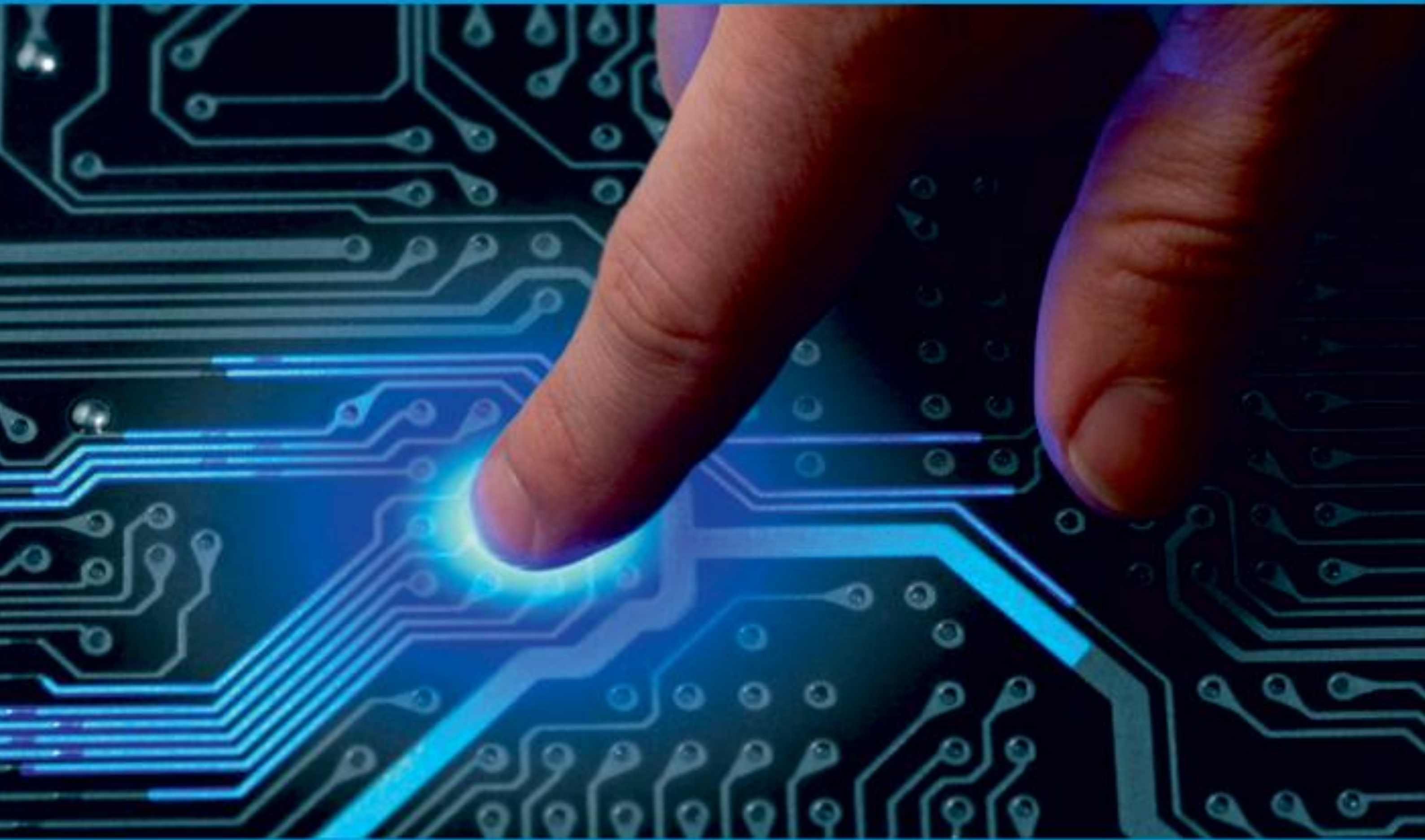
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 7, July 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering
| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | A Monthly Peer Reviewed & Referred Journal |
|| Volume 12, Issue 7, July 2024 ||
| DOI: 10.15680/IJIRCCE.2024.1207095|

Lumpy Disease Prediction using CNN

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ABSTRACT: The traditional methods for diagnosing lumpy skin disease (LSD) in cattle rely heavily on visual inspection and manual assessment by veterinarians. These methods, although effective, are time consuming and prone to human error, leading to potential delays in disease management. In this paper, we propose an advanced system that leverages deep learning techniques for automated detection of lumpy skin disease in cattle. Specifically, we employ a Convolutional Neural Network (CNN) model for image-based detection of LSD lesions on cattle skin. The system processes high-resolution images, extracting features that signify the presence of the disease. By implementing DenseNet121 for image classification and using robust preprocessing techniques, our proposed system aims to provide a more accurate, efficient, and reliable method for early detection and management of lumpy skin disease, thereby enhancing animal health and farm productivity.

I. INTRODUCTION

Lumpy skin disease (LSD) poses a significant hazard to livestock, particularly cattle, causing substantial economic losses and health issues. The development of technology seems to trigger new methodologies for doing this challenge more effectively, particularly in the area of machine learning. In an era where expeditious and accurate disease detection can make a substantial difference, the use of convolutional neural networks (CNNs) presents a promising solution. Often, detecting irregular skin disease involves examining various symptoms and lesions on the cattle's skin, it can get complex and labour-intensive. Traditional methods require extensive manual inspection and expert evaluations, which might not always be feasible, particularly in remote areas. This is where CNNs come into action. Our system for irregular skin disease prediction utilizes the power of CNNs to analyse images of cattle and identify the presence of disease symptoms with high accuracy. By training a deep learning model on a large dataset of images, the system learns to recognize patterns and features associated with irregular skin disease. This automated approach streamlines the diagnostic process, making it quicker and more efficient. The CNN model, trained on scrupulously labelled images, this way, it is able to classify and detect diseases, hence giving insightful information about the health status of the cattle. This not only aides in early diagnosis but also helps in monitoring and managing the spread of the disease. In the next chapters, we will go into the details of how the dataset is prepared, the architecture of the CNN model used, and the results for our prediction system. Through this sophisticated technological approach, we seek to enhance the efficacy of irregular skin disease management and contribute to improved livestock health.

II. OBJECTIVES

Disease Detection: Develop a cnn model capable of accurately detecting lumpy skin disease in cattle's based on images of affected animals' skin.

- Early Diagnosis: Enable early this will aid in the diagnosis of LSD in cattle for prompt treatment and also avoid further spread. within the livestock population.
- Automated Screening: Create an automated screening tool that can efficiently analyse large volumes of cattle images to identify potential cases of LSD, reducing the need for manual inspection and saving time for producers and veterinarians.
- Classification of Disease Severity: Implement a classification system within the CNN model to categorize detected cases of LSD into different severity levels, such as mild, moderate, and severe, degree of skin lesions as captured in the images. Accuracy and Reliability: Make sure that the CNN model obtains high accuracy and reliability in detecting and classifying LSD cases, minimizing false positives and false negative to provide trustworthy results for decision-making.
- User-Friendly Interface: Develop a user-friendly interface for farmers and veterinarians to interact with the CNN model, allowing them to readily submit images of cattle for disease prediction and obtain clear and intelligible outputs indicating the likelihood and severity of LSD infection.

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- Integration with Veterinary Practice: Facilitate the integration of the CNN-based LSD prediction tool into routine veterinary practices, enabling veterinarians to incorporate it as part of their diagnostic toolkit for monitoring and managing cattle health.
- Scalability and Adaptability: Design the CNN model to be scalable and adaptable to accommodate variations in cattle varieties, environmental conditions, and image quality, ensuring its effectiveness across various agricultural contexts and geographical regions

III. LITERATURE SURVEY

The report examines the body of knowledge regarding employee monitoring systems. Relevant studies on the following are analyzed:

- CASE STUDY OF LUMPY SKIN DISEASE IN CATTLE OF CHITWAN, NEPAL ([1])
- Segmentation and Classification of Skin Lesions for Disease Diagnosis ([2])
- Development of a Model for the Prediction of Lumpy Skin Diseases using Machine Learning Techniques [3]
- A Comparative Analysis of Lumpy Skin Disease Prediction Through Machine Learning Approaches ([4])
- Lumpy Skin Disease: Review of Literature ([5])
- A Survey on Deep Learning Method to Identify Lumpy Skin Disease in Cows ([6])
- Application of Artificial Intelligence Algorithm in Image Processing for Cattle Disease Diagnosis ([7])
- Epizootiology of Lumpy Skin Disease Outbreak in Cattle in Middle of Egypt ([8])

The survey draws attention to the shortcomings of the current systems with regard to thorough activity tracking and productivity evaluation. It also recognizes that employee monitoring may have unfavourable effects on motivation and efficiency.

IV. METHODOLOGY

The study uses field data collection, clinical examinations, and epidemiological analyses to investigate LSD outbreaks. Researchers document clinical signs, lesion distributions, and disease spread patterns. They identify risk factors, such as environmental conditions and cattle movements, contributing to LSD spread. Data is analyzed to understand LSD's impact on cattle health and productivity.

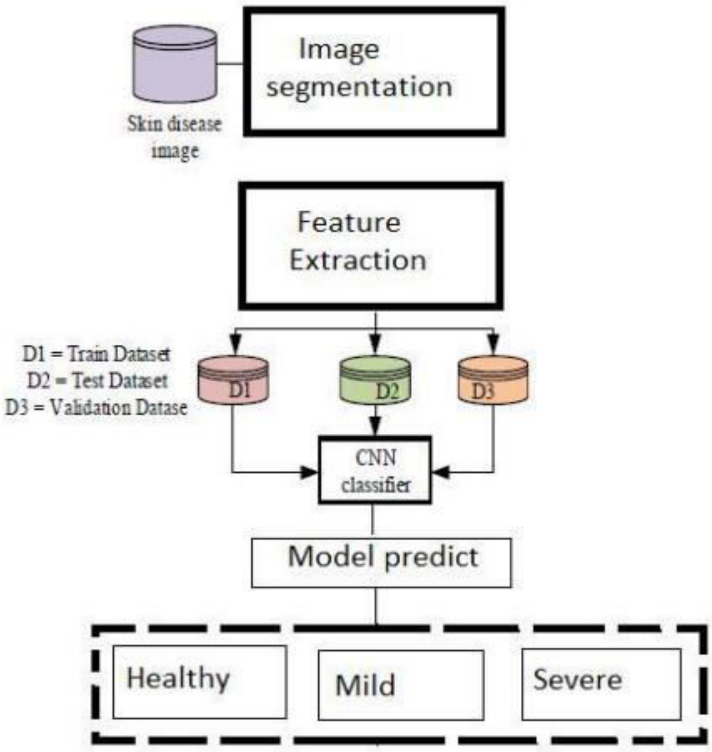

Figure 6.2.1 Architecture Diagram

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V. TOOLS AND TECHNOLOGIES REQUIRED

Hardware Requirements:
•OPERATING SYSTEM: Windows 7 and above
•PROCESSOR (CPU): Intel i3+
•MEMORY (RAM): 4GB and above
•STORAGE: 20GB secondary storage
Software Requirements:
•LANGUAGE: Python
•IDE: Any IDE to run Python scripts
•USER INTERFACE: StreamLit library

VI. RESULT

∟ **Lumpy Skin Disease Detection:** The CNN model achieved a 75% accuracy, indicating proficiency in recognizing symptoms but needing improvement to reduce missed cases.
∟ **Normal Skin Identification:** The model exhibited an 87% accuracy, effectively distinguishing healthy cows from diseased ones, minimizing false positives.
∟ **Moderate Symptoms Detection:** The model's 30% accuracy for moderate symptoms highlights challenges in detecting subtle signs, necessitating sensitivity improvements.

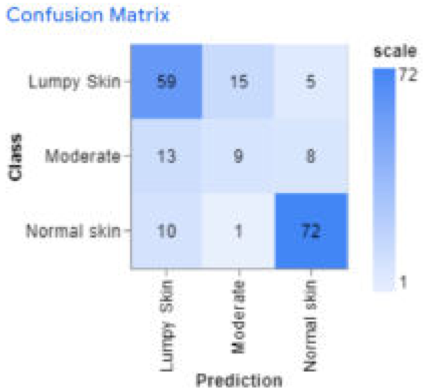

Figure 9.1 Confusion Matrix

VII. CONCLUSION

In my project, I used deep learning to predict cow lumpy skin disease by training and testing CNNs over a dataset of images compiled by me. The model showed variable performance under different conditions: 75% accuracy in lumpy skin disease, 87% in normal skin, and 30% in those showing moderate symptoms. The results showed that the model was good at picking clear-cut cases but had problems in the middle stages of the illness, where early detection is necessary. Augmentation techniques can be used to further improve this model in terms of variability within the training data, and transfer learning means fine-tuning a pre-trained model on my dataset. Another expansion of the dataset, including more images with cows showing moderate symptoms, would make the model more accurate and robust. State-of-the-art techniques, however, such as ensemble learning, would be most beneficial. Regular validation using new data will help ensure that the model works on any real-world scenarios. In the future, I want to extend the project by other common livestock diseases and prepare an easyto-use application for farmers and veterinarians. I am positive that this tool will increase the health management of livestock by providing means of early detection and possible treatment options. My project clearly demonstrated the potential of deep learning techniques applied to challenges in agriculture and has underlined that there is a need for further continuous research and development in this area.

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