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A Survey on Deep Learning Method to Identify Lumpy Skin Disease in Cows

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Abstract: *Animal illness is a prevalent problem nowadays. Animals can suffer from many different diseases, so it's important to identify them as soon as possible so that a prompt diagnosis can be made. In cows, the Neethling virus produces lumpy skin disease. The affliction of these illnesses results in long-term harm to the cattle's skin. Abortion, poor development, decreased milk supply, infertility, and, in severe cases, death are all typical effects of the illness. We developed a machine learning architecture that can predict or detect illness. The main goal is to exercise a deep learning method to identify the virus that causes lumpy skin condition. An efficient method for recognizing photos is based on deep learning and is known as DenseNet-121. The effectiveness of utilizing convolutional neural networks is confirmed by this study, it can estimate LSDV in animals based on images/pictures. The provided deep learning model was used to categorize images into two classes: LSDV and Non-LSDV. Early and accurate viral identification can be a potential method for detecting and halting the spread of the infection because there is currently no LSDV vaccination that can treat rather than control the infection. (e.g. by separating the Animals).*

Keywords: Lumpy Skin Disease, Deep Learning, Convolutional Neural Network (CNN), Artificial Neural Network (ANN), DenseNet-121, Image Processing, Classifiers, Extraction, Animals

I. INTRODUCTION

Cattle are vulnerable to the virus (LSDV) that causes lumpy skin disease. It is spread by ticks and other critters that feed on blood, including flies, mosquitoes, and ticks. Animals that have never been exposed to the virus before might get fever, nodules on the skin, and even die from it. Immunizations and the killing of affected animals are two strategies for control. This study's goal was to evaluate how well various machine learning algorithms might predict the spread of the condition known as Lumpy Skin Disease. There have been several presentations of CNN-based approaches for diagnosing lumpy skin disorders. Medical image datasets, unlike other picture datasets, require a small number of training samples. The primary purpose of employing densenet-121 is to tackle the problem of Disappearing gradients, improve feature reuse, and minimize parameter consumption, all of which are advantageous while training deep learning mode.

II. LITERATURE SURVEY

A virus known as Neethling is the cause of lumpy skin disease in cows. Large skin lumps that cover the whole body, fever, nasal discharge, dispersed lymph nodes, and lachrymation are all characteristics of the illness. Africa, Russia, Egypt, Oman, and India are the continents account for the bulk of instances with lumpy skin condition.

It was first spotted in Egypt. Less frequently, the virus can be disseminated by straight contact with skin lesions, saliva, nasal ejection, milk, or sperm from infected animals. Unfortunately, lumpy skin diseases cannot yet be cured with any particular antiviral drugs. Taking care of cows is the only viable therapy. Additionally, we can consider treating skin lesions with wound care. Antibiotic usage and the use of sprays to stop subsequent skin infections and pneumonia.

Lumpy Skin Disease causes huge financial losses. The value of the dead cattle and any accompanying losses, such as reduced milk production and yield reduction in ill animals, are considered direct losses. The indirect losses are exacerbated by movement constraints. Between July and September 23, 2022, almost 97,000 cattle perished in India as a result of an epidemic of lumpy skin disease. Cattle in 15 Indian states were infected in three months, beginning with outbreaks in Gujarat and Rajasthan.

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India has 192.5 million cattle as per the most recent livestock census. On September 21, Rajasthan accounted for more than 65% of the 18,50,000 cases. According to reports, there were almost 50,000 fatalities. Gujarat reported a decrease in milk collection of almost 100,000 litres per day in many areas. The amount of milk collected each day fell by 500,000 to 600,000 litres by September. In a few areas of Rajasthan, collection has ended completely.

It has been discovered that densenet-121 is useful for medical imaging-based disease diagnosis. Thanks to the quick development of artificial intelligence, several picture recognition methods have been presented for a wide range of different requirements in the field of medical informatics. The use of machine learning (ML) in the diagnosis and prognosis of several illnesses has recently grown in favour's. By using shorter connections across layers, the densenet design aims to deepen deep learning networks while simultaneously improving their capacity for training. DenseNet is a CNN in which every layer is linked to every layer below it. In order to maximize information flow between network levels, this is done.

III. RELATED WORK AND RESULTS

Years	Authors	Study	Proposed method	Outcome
2018	Li-sheng, Quan, & Tao	Skin Disease Recognition Method using Image Colour and Texture Features	SVM for classification and GLCM for feature mining.	Herpes, dermatitis, and psoriasis are evaluated results that are 85%, 90%, and 95% accurate.
2022	Ehsanallah.A.S.	Assessing ML techniques in forecasting LSDV existence based on meteorological and geospatial.	ML(SVM, Decision tree, adaBoost, bagging) and Artificial neural network (multilayer perceptron).	ANN algorithm indicated 97% accuracy score, while other algorithms such as SVM, logistic regression, adaboost indicated lower than ANN.
2019	Samuel. A , AA. Philip, Derrick. Y, Nancy.C, N, and I.K Nti	A web-based skin disease diagnosis using Conventional neural network	Conventional pre-processing techniques were employed for CNN mining using the tensor flow framework and classified with a web-based approach.	Acne vulgaris, atopic dermatitis, and scabies had disease detection accuracy of 88%, 85%, and 84.7%, respectively.
2022	Bezawit Lake, F. Getahun, F.T.Teshome	Application of AI in image processing for cattle disease diagnosis.	The classified model is a CNN with 3 convolutional layers and 2 fully linked layers.	The proposed method achieved a 94.6% accuracy rate. There are three main categories warts, ringworm, and lumpy skin disease. The lumpy skin ailment pictures are divided into three categories based on how terrible the situation is: normal, moderate, and severe.
2019	Kartik Thakral, Rahul Nijhawan, Lucky Agarwal, Dimpy Varshni, and Ankush Mittal	Using CNN-based Feature Extraction to Detect Pneumonia	Machine Learning (DenseNet-169) for Extraction Which is Classified with SVM for Better Results.	The chosen method gives result 4.67% higher than any pretrained CNN models and classifiers.

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2020	Rahul Nijhawan, Naveen, Amit Kumar, Gaurav Rai, and Aquib Hussain	A deep learning approach to detect lumpy skin disease in cows.	VGG-16 , VGG-19 and Inception-v3 for extraction and kNN, SVM, NB, ANN and LR for Classification.	The Author Proposed method got about 92.5% accuracy from the chosen dataset.

IV. CONCLUSION

There has been a lot of research on the categorization of human skin diseases, but there have been few studies on the classification of skin diseases in animals. In this work, we created a technique to identify and categorise animal lumpy skin disease as normal, mild, and severe. One contribution of this study is the production of lumpy skin illnesses utilising image processing and machine learning methods. With a high degree of accuracy, this method can identify lumpy skin condition. In light of the fact that increasing the reliability of the recommended computational approach for testing could be beneficial, recording a real-time picture rate, which is closely tied to the number of infected instances, could be of value.

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