A

Domain Specific Mini Project Report on

DEEP LEARNING METHOD TO IDENTIFY LUMPY SKIN DISEASE IN CATTELE

submitted in partial fulfillment of the requirements for the award of degree of

T.Y. B. Tech.

in

Computer Science & Engineering(AIML)

by

Miss. Ashlesha M. Burate
Miss.Devashri T. Giri
Miss. Deepali G. Nandavdekar
Miss.Sanika U. Patil
Miss.Vaishnavi T. Patil

Under the guidance of
Miss.Anjali Yadav

Department of CSE (Artificial Intelligence & Machine Learning)

BHARATI VIDYAPEETH'S COLLEGE OF ENGINEERING, KOLHAPUR

YEAR: 2023-24

CERTIFICATE

This is to certify that the project report entitled **"Deep Learning Method To Identify Lumpy Skin Disease In Cattels"** submitted by **Miss. Ashlesha Burate, Miss.Devashri Giri, Miss.Deepali Nandavdekar ,Miss.Sanika Patil , Miss.Vaishnavi Patil** for the partial fulfillment of the requirement for the award of degree of T. Y. B. Tech. in **Computer Science & Engineering(AIML)** to the **Shivaji University**.

This report is record of students' teamwork carried out by them under my supervision and guidance.

Date:

Place:

Guide	**HOD-CSE (AIML)**
Miss.Anjali Yadav	Mrs. S. M. Mulla
Ext. Examiner	**Principal**
	Dr. V. R. Ghorpade

Acknowledgement

It is our privilege to acknowledge with deep sense of gratitude to our project guide **Miss.Anjali Yadav** for her valuable suggestions and guidance throughout our course of study and project.

We express our gratitude to **Mrs. S. M. Mulla (HOD)** for their kind help and co-operation and special thanks to our **Principal Dr. V. R. Ghorpade** for giving us an opportunity to work on this topic.

We are highly obliged to the entire staff of the Computer Science &Engineering Department for their kind co-operation and help. We also take this opportunity to thank all our colleagues, who backed our interest by giving useful suggestions and all possible help.

Miss.Ashlesha Burate

Miss.Devashri Giri

Miss.Deepali Nandavdekar

Miss.Sanika Patil

Miss. Vaishnavi Patil

ABSTRACT:

Animal illness is now a widespread problem. sickness identification is essential because there are various sorts of sickness in creatures, and the opinion will be delivered in a timely manner. Cows with the Neethling infection develop lumpy skin complaints. The affection of these illnesses causes lasting harm to the cattle's skin. Reduced milk production, gravidity, poor growth, revocation, and, in severe cases, mortality, are the most common effects of the illness. We developed a deep learning-based architecture that can predict or detect disease. To discover the pathogen that causes lumpy skin problem, it is crucial to employ a deep literacy system. DenseNet121 is an efficient system for reading prints that is based on deep literacy. This study shows that convolutional neural networks are capable of predicting LSDV in animals using photos and images alone. Images were divided into the LSDV and Non-LSDV classes using the specified deep learning model. Because there is currently no LSDV vaccination that can treat rather than control the virus, early and accurate viral identification can be an implicit mechanism for identifying and stopping the spread of the infection.(For instance, by dividing the Animals).

INDEX:

1. INTRODUCTION :-

Lumpy Skin Disease is one of the serious animal skin disease and caused by lumpy skin disease virus. The Animal Lumpy Skin Disease is characterized by fever, enlarged lymph nodes, firm and circumscribed nodules in the skin and nodules are particularly noticeable in the hairless areas. Lumpy skin disease is currently endemic in most countries. It is animal viral diseases which cause several economic problems including significant milk yield loss, infertility, abortion, trade limitation and sometimes death in most African countries including Ethiopia [1]. Lumpy Skin Disease virus is transmitted from infected to non-infected animals through direct contact by mosquitoes, flies, and ticks. The disease can also be spread through contaminated feed, water, and equipment. The virus is not transmissible to humans

Lumpy Skin Disease is known as a major risk to cattle production and substantial impacts on livelihoods and food security especially for our country. Currently, detection of Lumpy Skin Disease in our country is assessed manually. However, manual evaluation takes significant amount of time and requires trained professional and experienced person. Therefore, technology is needed to prevent animal disease epidemics. Automated detection of Animal Lumpy Skin Disease has advantages over the manual technique. Detection of Lumpy Skin Disease in Cows is developed in our project.

Detection of Lumpy Skin Disease in Cows is developed in literature. But Animal Lumpy skin disease has different classification based on its severity. There is a need to further identify the different stages of Lumpy skin disease to know to what extent the animal is affected by lumpy skin disease. In this study, Lumpy skin disease detection model is constructed using Convolutional Neural Network (CNN) for feature extraction and SVM for classification. CNN is the state of the art for deep feature extraction, hence we used it for feature extraction. The model used to detect and classify animal Lumpy Skin Disease skin diseases into Severe, Mild and Normal.

This research scope is limited to the development of a predictive model for Animal Lumpy Skin Disease detection using image processing and machine learning. Moreover, the study is limited to build a prototype for Lumpy Skin Disease prediction based on severity stages and use classification Machine learning technique.

2.AN OVERVIEW OF EXSTISTING SYSTEM AND CHALLENGES IDENTIFIED:

2.1 Existing System

Machine learning (ML) plays a significant role in various aspects of managing lumpy skin disease (LSD) in cattle, primarily in disease detection, prediction, and control. Here's an overview of the existing ML system for LSD:

1. Disease Detection and Diagnosis:

ML algorithms are trained on datasets containing images of LSD-infected cattle to automatically detect characteristic skin lesions associated with the disease.

Computer vision techniques, such as convolutional neural networks (CNNs), are commonly used to analyze images captured by drones or cameras installed in livestock facilities.

ML models can also aid veterinarians in diagnosing LSD by analyzing clinical data, such as symptoms and lab test results, to provide accurate and timely diagnoses.

2. Epidemiological Surveillance:

ML algorithms analyze various data sources, including geographical and environmental factors, animal movement patterns, and historical disease records, to predict the spatial and temporal spread of LSD.

Predictive models based on ML techniques, such as Bayesian networks or recurrent neural networks (RNNs), can forecast disease outbreaks, helping authorities allocate resources for prevention and control efforts effectively.

3. Vaccine Development and Efficacy:

ML algorithms analyze genomic data of the Capri poxvirus responsible for LSD to identify potential vaccine candidates and predict their efficacy.

Computational models are used to simulate vaccine trials and predict immune responses in cattle populations, guiding the development and optimization of vaccination strategies.

4.

Vector Control:

ML models analyze environmental data, such as temperature, humidity, and land use, to predict the abundance and distribution of arthropod vectors involved in LSD transmission.

Based on these predictions, targeted vector control measures, such as insecticide application or habitat modification, can be implemented to reduce vector populations and disease transmission risk.

2.2 Challenges Identified:

Complexity of Models: The existing systems utilize a mix of ML algorithms and neural networks, which can be complex to implement and maintain. This complexity can lead to difficulties in understanding the model's behaviour and making necessary adjustments

Cost: Training and deploying AI models, especially neural networks like CNNs, can be resource-intensive. This can limit the accessibility of the technology, especially in regions with limited financial resources.

Mortal-Reliance: Depending heavily on automated systems for disease detection can be risky. False positives or negatives can have significant consequences, so human oversight and validation are crucial.

Inaccuracy: Despite advancements, AI models can still produce inaccurate results. For medical applications like disease detection, even a small error rate can be problematic.

Data Limitation: Availability of high-quality, diverse datasets is crucial for training robust AI models. Limited or biased datasets can lead to models that generalize poorly to new or unseen data.

Performance Metrics: Evaluating the performance of deep learning models requires suitable metrics. Without proper metrics, it's challenging to assess the model's effectiveness and compare it with other methods.

Geospatial and Meteorological Data Integration: Incorporating geospatial and meteorological data for LSD detection adds complexity. Ensuring accurate and timely data collection and integration is challenging.

Web-based Classification: While a web-based approach may offer accessibility, it also introduces challenges related to scalability, user experience, and security.

Preprocessing Techniques: Conventional preprocessing techniques used for CNN mining might not always be optimal for handling the specific characteristics of LSD image data.

3. PROBLEM STATEMENT:-

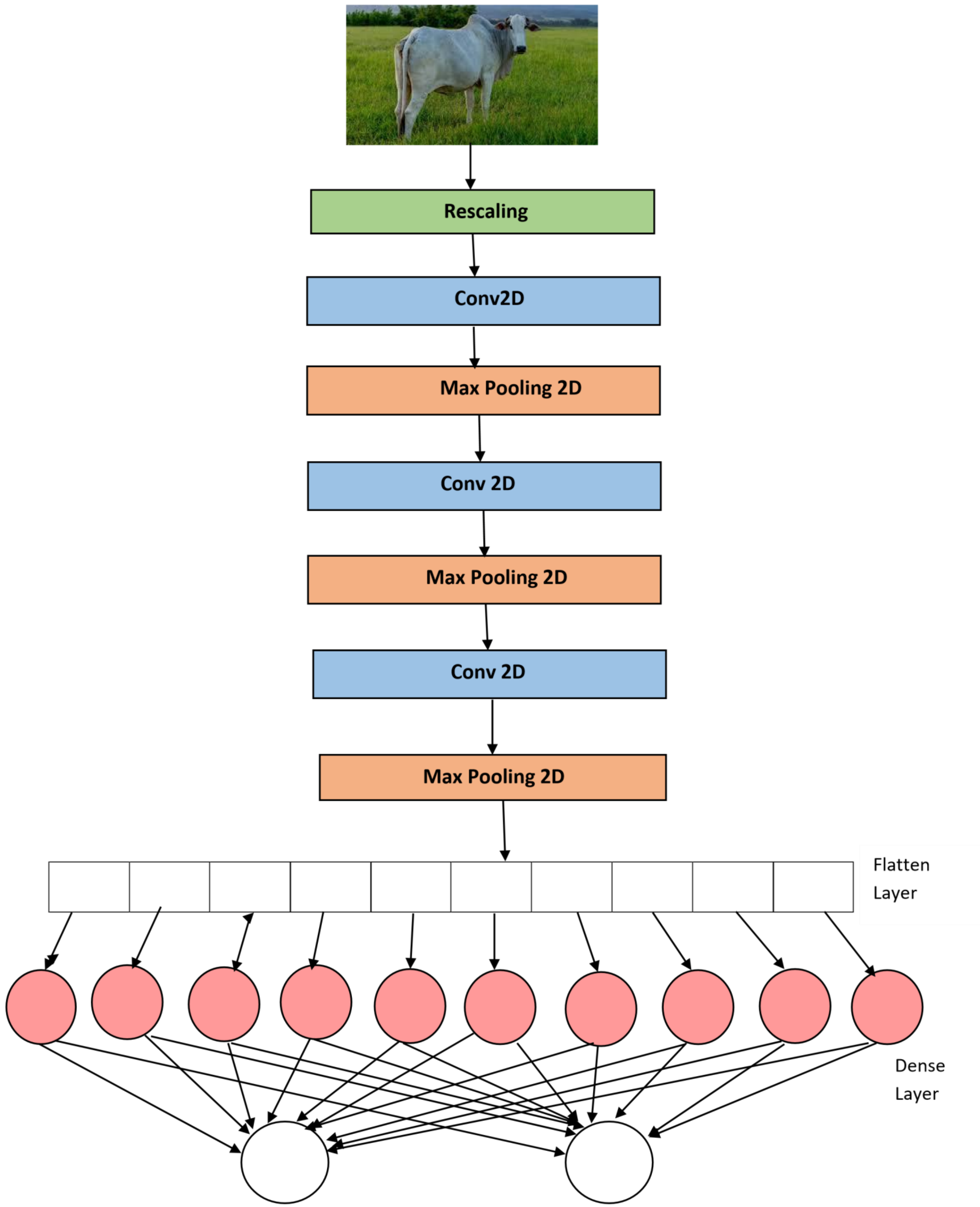
A Deep Learning Method To Identify Lumpy Skin Disease:

Currently, detection of Lumpy Skin Disease in our country is assessed manually. However, manual evaluation takes significant amount of time and requires trained professional and experienced person. This is especially evident during large scale inspection in the process of exporting. The animal health service delivery in Ethiopia has nowadays covers only 9% by veterinarians from the total 30% coverage [2]. Moreover, in our country there is no sufficient veterinarian and laboratories throughout the country. Therefore, technology is needed to prevent animal disease epidemics. Automated detection of Lumpy Skin Disease has advantages over the manual technique. The major advantage is it helps experts to describe visible attributes accurately. Hence, the use of automated image processing helps to eliminate the problems associated to detect Lumpy Skin Disease using manual evaluation. The speed of analysis is also much higher than any of the manual methods [3].

Currently, various researches have been done to automate detection of human skin disease by using machine learning and deep learning techniques. However, as to the researcher knowledge insufficient studies are conducted to detect animal skin disease using image processing and machine learning. Bezawit [4] applied image processing for classifying cattle skin disease using CNN model. Bezawit considered Lumpy skin disease, Ringworm and Wart skin diseases, in which Lumpy skin disease is taken as one class. Gaurav Rai, Naveen, Aquib Hussain, Amit Kumar, Rahul Nijhawan[1], A Deep Learning Approach to Detect Lumpy Skin Disease in Cows. But Animal Lumpy skin disease has different classification based on its stages. There is a need to further identify the different stages of Lumpy skin disease to know to what extent the animal is affected by lumpy skin disease. Because the effective control Lumpy skin disease in endemic and non-endemic areas requires rapid and accurate diagnostic methods to confirm a presumptive diagnosis [5]. It is therefore the aim of this study to apply image processing and machine learning for detecting the stages of lumpy skin disease in animals.

4.OUTLINE OF THE PROPOSED WORK :-

The proposed work aims to utilize convolutional neural networks (CNNs) for the detection of lumpy disease in cattle. Lumpy disease poses a significant threat to livestock health, necessitating early detection for effective management. By leveraging CNNs, which excel in image recognition tasks, the study seeks to improve the accuracy and efficiency of disease detection. Through a systematic review of existing literature, collection of lumpy disease images, and preprocessing techniques, the study will develop a robust CNN architecture tailored to the characteristics of lumpy disease images. Following model training and evaluation, including performance analysis and comparison with existing methods, the study will explore deployment possibilities in veterinary practice and outline potential avenues for future research. Ultimately, the research aims to contribute to the advancement of lumpy disease detection, thereby enhancing animal health and welfare.


Rescaling
Conv2D
Max Pooling 2D
Conv 2D
Max Pooling 2D
Conv 2D
Max Pooling 2D
Flatten
Layer
Dense
Layer

4. **REQUIREMENT ANALYSIS:**

5.1 S/W REQUIREMENT:

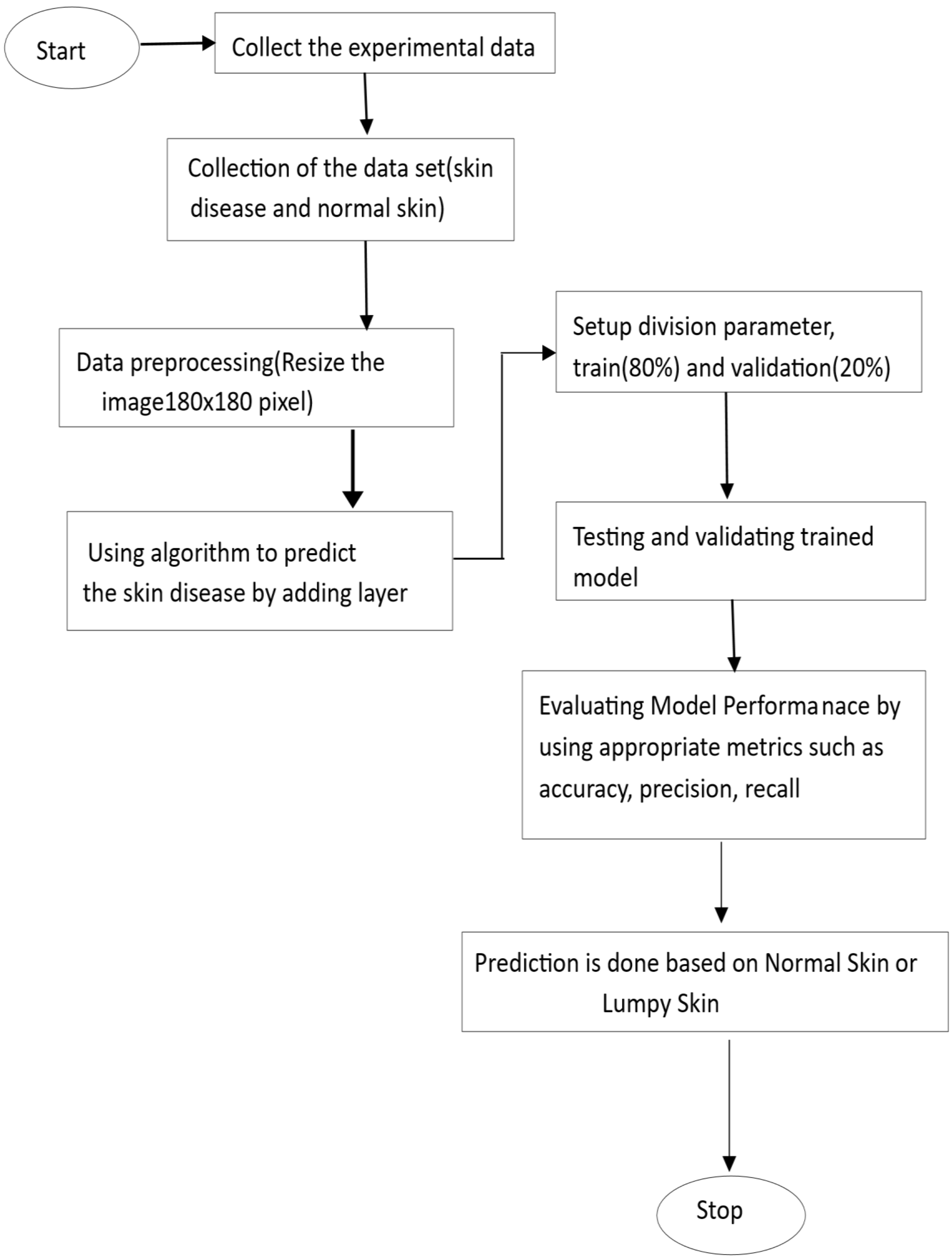
Windows Operating System 11

Jupyter Notebook

Lumpy Dataset

Python library

6. FLOW CHART


Start
Collect the experimental data
Collection of the data set(skin disease and normal skin)
Data preprocessing(Resize the image180x180 pixel)
Using algorithm to predict the skin disease by adding layer
Setup division parameter, train(80%) and validation(20%)
Testing and validating trained model
Evaluating Model Performanace by using appropriate metrics such as accuracy, precision, recall
Prediction is done based on Normal Skin or Lumpy Skin
Stop

7. USAGE OF LOGIC AND ALGORITHM:

1.Client -Side Application:

We use gradio package this package provide a simple interface for creating web-base demos for machine learning model. user can interact with interface by uploading image and receiving predict label in details.

2.Backend Services:

Develop the core logic and classification algorithm for predict Lumpy disease based on machine learning or deep learning model.

Create data and preprocess data of normal skin and lumpy skin in cattle.

We can use convilution neural network and classification algorithm for predict lumpy skin disease.

3.Database management:

Set up a dataset to store images of normal skin and lumpy skin.

8. IMPLEMENTATION

Data collection: Obtain a dataset of animal images with lumpy skin disease, categorized as normal, diseased. The dataset should be diverse and representative of different animal skins. It's important to ensure that the dataset is labeled correctly and contains a sufficient number of samples for each category.

Data pre-processing: Resize the images to a uniform size, such as 180x180 pixels, to ensure consistency. This step is important because the input images must have the same dimensions for the model to process them effectively. Normalize the pixel values to a range between 0 and 1 by dividing them by 255. This normalization step helps in better convergence during model training.

Model selection: A Convolutional Neural Network (CNN) is a type of Deep Learning neural network architecture commonly used in Computer Vision. Computer vision is a field of Artificial Intelligence that enables a computer to understand and interpret the image or visual data.

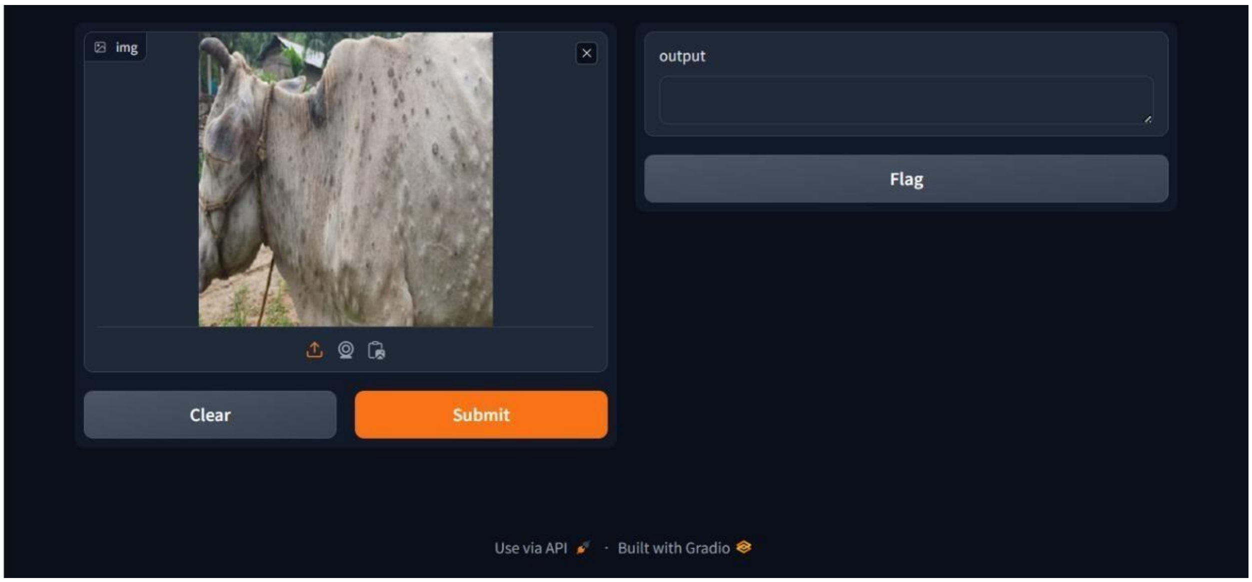
Model evaluation: Evaluate the performance of the trained model using appropriate metrics such as accuracy, precision, recall Split the dataset into training and testing sets to assess the model's ability to generalize to unseen data. Additionally, consider using techniques like Adam optimizer for a more robust optimization and activation like relu (Rectified Linear Unit) used for Neural network and for non-linearity of the network. SoftMax is used to represent probability of each class label.

Model deployment: Save the trained model along with its learned weights and architecture for future use. This allows the model to be deployed and utilized for inference tasks without the need for retraining.

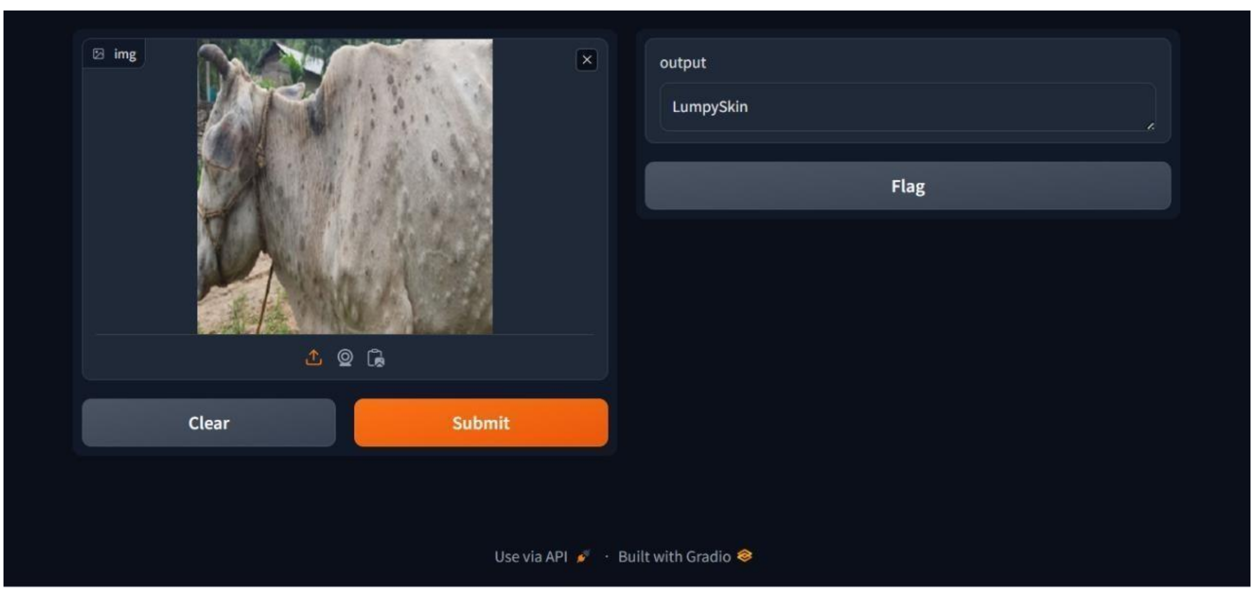
Inference: Using the trained model, classify new animal images with lumpy skin disease as normal and diseased. Preprocess the input image by resizing it to the required input size and normalizing the pixel values. Pass the pre-processed image through the trained model and obtain the predicted category or probabilities for each category.

9.RESULTS:

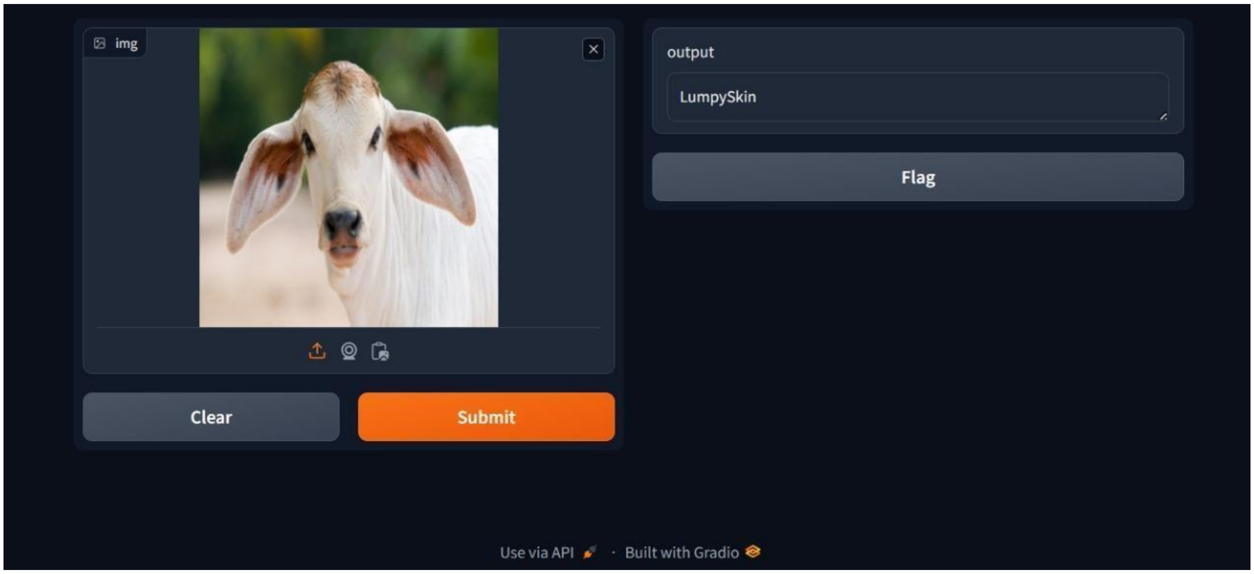
Input:



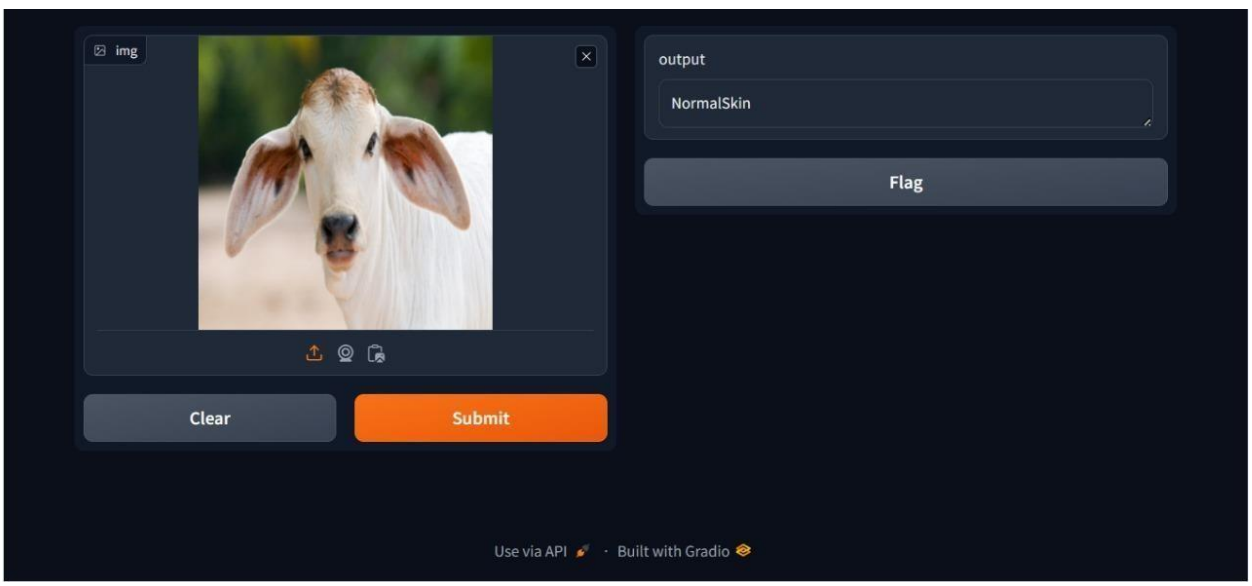
Output:



Input:



Output:



10.Conclusion:

There has been much study on the classification of skin conditions affecting humans but the categorization of skin disorder that affect animals has received less investigation. We created a system in this study to distinguish between animals with Lumpy skin disease and those whose normal skin is unaffected in order to identify and categories them . One contribution of this study is the development of lumpy skin disorder utilizing image processing and Machine Learning approaches . This technique has a high degree of accuracy in identifying Lumpy skin conditions . Recording a real time picture rate , which is strongly related to the number of infected instances ,might be useful given that improve the dependability of the suggest computational technique for testing could be advantageous.

11.References:

[1]Adetunji, O. J., Adeyanju, I. A. & Esan, A. O. (2023). Flood Areas Prediction in Nigeria using Artificial Neural Network. *2023 Int. Conf. Sci. Eng. Bus. Sustain. Dev. Goals*, 1–6, doi: 10.1109/SEB-SDG57117.2023.10124629.

[2]Cutler, A., Cutler, D. R. & Stevens, J. R. (2012). Ensemble Machine Learning. *Ensemble Mach. Learn.*, doi: 10.1007/978-1-4419-9326-7.

[3]Yile, A. O., Hongqi, L., Liping, Z., Sikandar, A. & Zhongguo, Y. (2019). The linear random forest algorithm and its advantages in machine learning assisted logging regression modeling, *J. Pet. Sci. Eng.*, 4(17), 776–789, doi: 10.1016/j.petrol.2018.11.067.

[4]Han, S., Kim, H. & Seop, Y. (2020). Double random forest. *Mach. Learn.*, no. July, pp. 1569–1586

[5]Saeed, S., Shaikh, A., M. Memon, M. A.& Naqvi, S. M. Impact of Data Mining Techniques to Analyze Health Care Data. *J. Med. Imaging Heal. Informatics*, 4(8), 682–690, doi: 10.1166/jmihi.2018.2385.

Expected schedule:

Period	Work to be completed
20 Jan - 25 Jan	Study of existing system predict lumpy skin
26 Jan - 05Feb	Literature review of Lumpy skin disease
05Feb - 10Feb	Identifying the problem statement and synopsis
11Feb - 15Feb	Create dataset for lumpy and preprocess the data
16Feb - 20 Feb	Analysis of different Algorithms
4March -10March	Develop the model and test

Roll no.	Names of the project group members	Mobile no.	Email ID	Signature
08	Ashlesha M. Burate	8459877343	ashleshaburate4@gmail.com	

13	Devashri T. Giri	7517343920	devashrigiri1@gmail.com	
38	Deepali G. Nandavdekar	9307825538	deepalinandavadekar@gamil.com	
48	Sanika U. Patil	8767950441	patilsanika410@gamil.com	
49	Vaishnavi T. Patil	7219800755	vaishpatil200@gmail.com	

Miss. Anjali Yadav

PROJECT GUIDE

Mrs. S. M. Mulla

H.O.D – CSE(AIML)