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LUMPY SKIN DISEASE DETECTION USING MACHINE LEARNING ALGORITHMS

Sanika Suresh Jadhav[*1]

[*1]UG Student, Department Of Information Technology,

B. K. Birla College(Autonomous), Kalyan, Thane, Maharashtra, India.

ABSTRACT

Lumpy skin disease is the common viral disease found in the cattle. Earlier there were several types of disease found in animals. Identification and diagnosis of such kind of disease is most important factor. Lumpy skin disease detection is done by the machine learning algorithms like Support Vector Machine(SVM),Decision Tree(DT). The disease often results in infertility, reduced milk, poor growth or sometimes death of the animal. LSD in cattle is caused by virus called Neethling. LSD is characterized by fever, large skin nodules, saliva.

Keywords: Lumpy Skin Disease(LSD), Support Vector Machine(SVM),Decision Tree(DT), Machine Learning Algorithms.

I. INTRODUCTION

The lumpy skin disease is the most viral disease in the cattle and water buffalo. Cattle for milk may be infected by the lumpy skin disease. This disease is generally found in India, Russia, and Egypt. The lumpy skin disease mostly covers a large part of the body. This disease was first identified by Egypt. Lumpy skin disease is caused by biting insects and also viral diseases. The virus is spread by the saliva, milk, nasal discharge and direct contact with the skin lesions or by the infected animals. There are two methods for the control of this disease. They are vaccinations and rewarding afflicted creatures. The purpose of this paper is to evaluate lumpy skin disease. In 1929, the first case of lumpy skin disease was found in Zambia. After that, it was gradually expanded, the Middle east, and Central Asia. In today's era, ML algorithms are highly available and valuable for data collection and visualization. Machine learning algorithms are powerful tools available for this type of disease detection. Earlier lumpy skin disease detection is crucial for the control and management of the disease. This research paper aims to find the various applications for the detection. This disease has significant economic and is highly contagious.

II. OBJECTIVE

The main objective of the paper is to detect LSD using machine-learning algorithms and to predict the accuracy level of accuracy. These algorithms help us to analyze and visualize the value of predicting data.

III. LITERATURE REVIEW

Lumpy skin disease[1] is highly increased in animal cases. Many researchers are working on the detection of LSD. It is important to highlight the challenges and future directions in this area and improvements in diagnostics. Review machine learning for disease prediction and detection and investigate emerging technologies for virus characterization. For predicting lumpy skin disease, use image processing techniques. Evaluate the accuracy and sensitivity of these methods.

- Ehsanallah Afshari Safavi[2] did research on assessing machine learning techniques in forecasting lumpy skin disease occurrences based on meteorological and geospatial features. He used regression, SVM, DT, Random Forest, AdaBoost and such types of machine learning algorithms for this research. scores the 97% accuracy.

- Toyal Mazi, Bollepally Rakesh from ACE Engineering College, did research in this area. For the purpose of diagnosing lumpy skin illnesses, transfer learning methods based on CNN is used.

- Some researchers use deep[5] Convolutional Neural Network to predict Lumpy skin and Normal Skin that are predicted from dataset which obtained result of 92.5% accuracy.

IV. METHODOLOGY

Using a machine learning algorithm[3] like Support Vector Machine (SVM).

Earlier, lumpy skin disease was a major problem for animals. Detecting this disease is an important factor in the animal. For this, we use a support vector machine algorithm.

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Support Vector Machine Algorithm (SVM)

This algorithm is used for classification and regression tasks. It offers binary and regression tasks or multi-class classification. SVM is versatile for regression tasks and classification and good for handling big data. It is good for bioinformatics, image classification and to handle complex data distributions.

"w" and "b" (bias) constraints ensure the data points are a lie and classified outside or on the margin. The goal of SVM is to find a weight vector and bias that are subject to constraints and maximize the margin between two classes.

For the given data: F(x)=w.x-b

"w"=weight factor

"f(x)"=output of decision function

"b"=bias term

"x"=feature vector of a data point

This algorithm aims to best separate data into different classes.

Implementation Steps:

Step 1: Data Collection: Collection of the data for binary and multi-class classification and, after that, process data for scaling and normalization.

Step 2: Choose kernel: Choose the kernel based on the nature of the data. Plan for the linear or non-linear kernel.

Step 3: Define and solve the optimization problem: First formulate the optimization problem and, after that, use optimization techniques to find bias(b) and weight vector(w) that maximize the margin.

Step 4:Identify support vectors: Determine the points closest to the margin and which points are support vectors

Step 5: Calculate and Classification: Formula for the computer decision function: f(x)=w.x-b

And for the classification of new data points:

If $f(x)>0$, classify as one class.

If $f(x)<0$, classify as other class.

Step 6: Evaluation and Visualization: Visualize the decision boundary depending on dimensionality of the data. Using appropriate evaluation metrics to assess a model's performance.

Step 7: Deployment: Deploy the SVM model in a system to predict new and unseen data and the application.

V. IMPLEMENTATION

Using Support Vector Machine (SVM) Algorithm:

Accuracy level of lumpy skin disease detection[4] using Support Vector Machine (SVM)

```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.1,stratify=y)
print(x_train.shape)
print(y_train.shape)
print(x_test.shape)
print(y_test.shape)
```

```
from sklearn.svm import SVC
# Building a Support Vector Machine on train data
svc_model = SVC(kernel='rbf',gamma=8)
svc_model.fit(x_train, y_train)
```

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```
Training confusion matrix
[[19337   250]
 [  460  1306]]
validation confusion matrix
[[2158   19]
 [  49  147]]
training accuracy = 96.67494028942069
testing accuracy = 97.13442899283608
```

Figure 1: Implementation

VI. RESULTS

The result show that the training confusion matrix and validation confusion matrix.

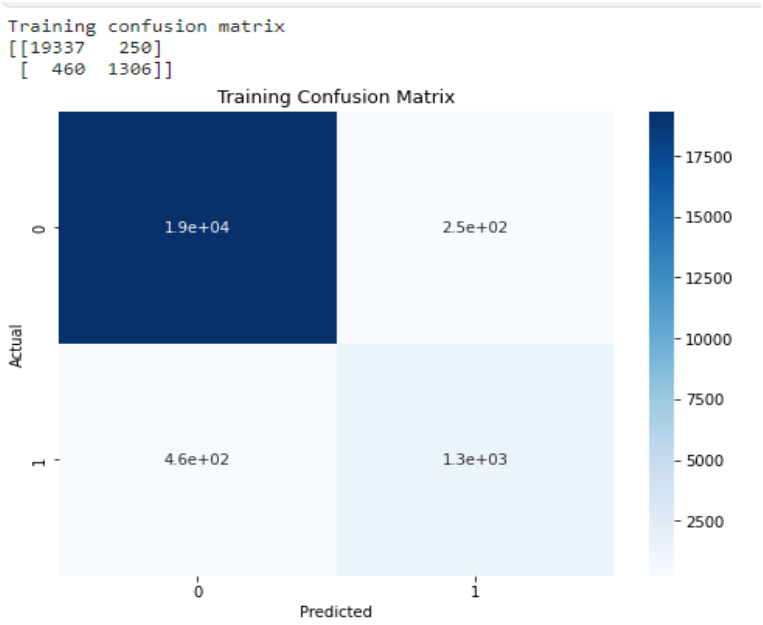

Figure 2: Training Confusion Matrix

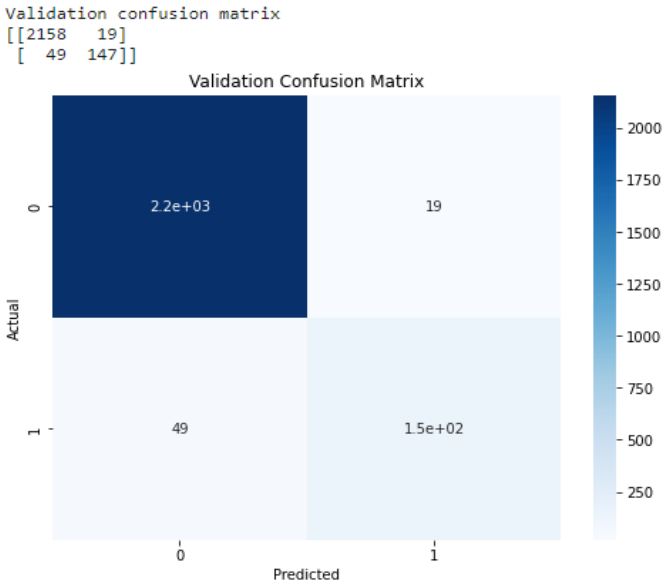

Figure 3: Validation Confusion Matrix

VII. CONCLUSION

Support Vector Machine (SVM) was used to predict the accuracy level. This algorithm technique is perfect for detecting the lumpy skin disease. The research work can help veterinary surgeons to find the animal disease

and not do more manual work. Using this algorithm, predicts the lumpy skin and normal skin from the dataset. This model can be used in different medical sciences to detect skin cancer in the animal sector.

This research study helps to distinguish between animals with lumpy skin disease and normal skin and the development of lumpy skin disorders utilizing machine learning approaches and image processing.

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