Manoj Kumar Reddy Mittapalli
GATE College, Tirupati,
Andhra Pradesh, India

Assessing livestock disease in animals using a machine learning algorithm

Manoj Kumar Reddy Mittapalli

Abstract
Now a days many farmers have adopted various means in the context of good farming practices to ensure the health of their livestock in good condition and healthy. Failure to ensure the health of livestock would cause to the death of animals and lead to decreased in productivity. Conventional methods by incorporating livestock data information on paper is a huge waste of time and not safe, therefore not effective for a good farming practiced. Hence, the electronic-based livestock management systems are needed to help farmers and livestock veterinary to share information for the purpose of early prevention of dangerous diseases from infected their livestock. In this project, the extensively use of Machine Learning algorithms for livestock health management in the preparation of animal dataset has created a fast and efficient method. In current practice, even though the Machine Learning systems in animal rearing is not a new approach, but this project has successfully demonstrated the effectiveness of Machine Learning technology comes to solve daily problems on farms.

Keywords: Animas, live stock veterinary, farming, machine learning, prediction

1. Introduction

Farmers always facing two main difficulties during the insertion of livestock health data which are consumption of too much time identify livestock traditional numbering tags and the propensity of common mistakes due to human carelessness when inserting data. Therefore, this research is purposely conducted to overcome those problems by using machine learning technology [1, 5].

Currently, Machine Learning has been a trendy and popular technology since it is budding and Cutting-edge [6]. Usually, the major parts of Machine Learning system are Dataset gathering, Data Cleaning, Train and test Splitting, Creating the model, fitting the data, testing it [5]. This technology has encouraged an enormous number of researches and extensively been developed. Indirectly, this will be inventing a lot of new applications and research fields in future. On the other hand, this sudden enthusiasm for Machine Learning will lead to apprehension especially regarding to security and protection of the individuals who work with data in daily life. Occasionally, Machine Learning also been applied to access control in various areas such as Clustering, Classification and Regression [7]. Despite the fact that the utilization of Machine Learning systems in animal rearing is not new, it is objectively to demonstrate how the utilization of it came to take care of every day issues in domesticated livestock farm. In developing countries, old method like signing out the paper-based flock book in order to take the livestock parameters has been used by majority of the farmers. Then, the process continues with the sex, breed and month of the livestock will be analyzed manually by the veterinary or the purchaser. Consequently, this will lead to inefficient work process. Thus, all of these technologies can be implemented in our daily life to enhance the comfort ability and productivity. In order to improve the quality of livestock and management, all livestock producers should apply these technologies [8]. Without missing the latest development, the farmers also can grab the opportunity to learn how to utilize the high technology in the future. Furthermore, by using the latest technology, the livestock records or manual flock book taking should be done in more systematic way. The development of livestock health system will help the farmers in managing the livestock health record effectively.

2. Related Works

2.1 Application of Artificial Intelligence for livestock disease prediction

Diseases have emerged as a major constraint to the sustainable growth of the national

Corresponding Author:
Manoj Kumar Reddy Mittapalli
GATE College, Tirupati,
Andhra Pradesh, India

economy. Several diseases have reduced the productivity of the livestock and have slowed the growth of the sector. Many diseases are linked to environmental deterioration and stress associated with farm intensification. According to the epidemiological triad, for a disease to occur it is the environment which helps the pathogen/vector to move towards the susceptible host. Thus based on the environmental parameters of the particular area early recognition of a serious or exotic animal disease can be done which is one of the most important factors influencing the chance of controlling the disease and reducing its economic and social impact on the whole country

2.2 Machine learning for syndrome surveillance using veterinary necropsy reports

The use of natural language data for animal population surveillance represents a valuable opportunity to gather information about potential disease outbreaks, emerging zoonotic diseases, or bioterrorism threats. In this study, we evaluate machine learning methods for conducting syndrome surveillance using free-text veterinary necropsy reports. We train a system to detect if a necropsy report from the Wisconsin Veterinary Diagnostic Laboratory contains evidence of gastrointestinal, respiratory, or urinary pathology. We evaluate the performance of several machine learning algorithms including deep learning with a long short-term memory network. Although no single algorithm was superior, random forest using feature vectors of TF-IDF statistics ranked among the top-performing models with F1 scores of 0.923 (gastrointestinal), 0.960 (respiratory), and 0.888 (urinary). This model was applied to over 33,000 necropsy reports and was used to describe temporal and spatial features of diseases within a 14-year period, exposing epidemiological trends and detecting a potential focus of gastrointestinal disease from a single submitting producer in the fall of 2016.

2.3 A Review of Machine Learning Applications in Veterinary Field

Machine learning is a sub-field of artificial intelligence that allows us to predict past behaviors and rules by learning from old data. In today's world, machine learning is used in any fields such as education, medicine, veterinary, banking, telecommunication, security and biomedical sciences. In human health, machine learning is generally preferred in the

assessment of diseases and associated risk factors, but there is a limited number of publications where this method is applied to veterinary medicine or whether it is appropriate and applicable. In this review, it has been noted that neural network, logistic regression, linear regression, multiple regression, principal component analysis and K-means methods are often used in peer-reviewed publications and machine learning applications in veterinary field upward momentum. Additionally, recent developments in the field of machine learning (deep learning, collective learning, voice recognition, emotional recognition, etc.) are still new in the field of veterinary medicine. In this review, the publications are examined under the topics of clustering, classification, regression, multivariate data analysis and image processing. This review provides basic information on machine learning and the increasing number of multidisciplinary publications on the field of computer sciences / engineering and veterinary.

3. Proposed System
Machine Learning is cutting edge and trending for different kinds of diverse application in the society where it can deal with tons of data, refined and revised algorithms, and available heavy processing power in terms of GPU.

3.1 Algorithm
3.1.1 Support Vector Machine Algorithm
Support Vector Machine or SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyper plane. SVM chooses the extreme points/vectors that help in creating the hyper plane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine.

4. Results and Discussions
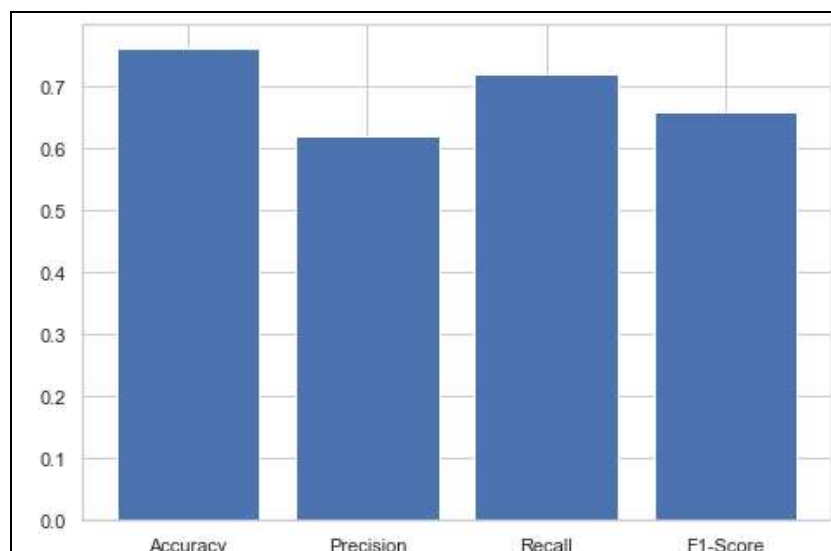### 4.1 Linear Regression Results

Fig 1: Linear Regression results

In Fig 1 we are discussing about the results and some matrices which calculated based on the training and testing outputs. By applying the linear regression algorithm, we are getting the result as above 75%. The Fig 1 displaying the comparison of the accuracy, precision, recall, and F1 score

mathematical issues especially for the linear regression algorithm.

4.2 SVM results
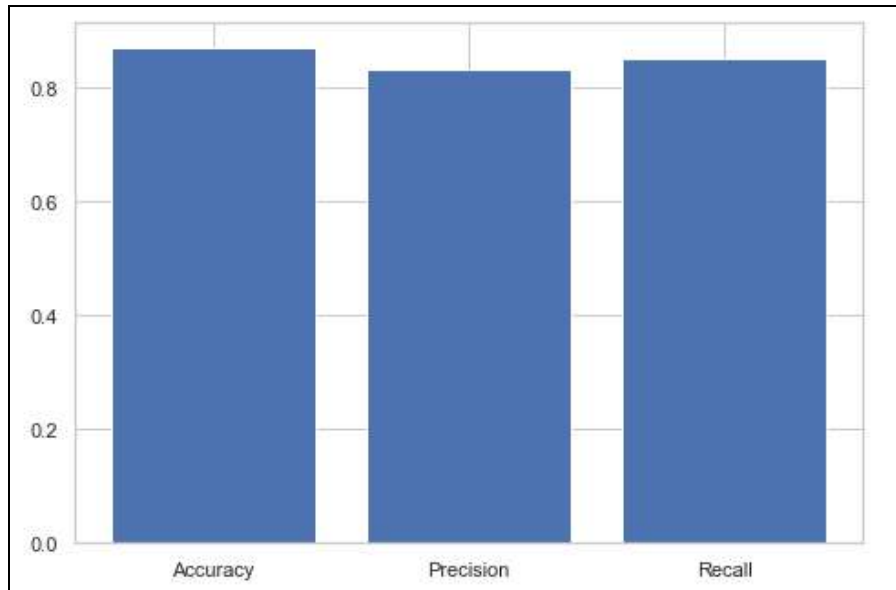

Fig 2: SVM Results

In Fig 2 discussing about the outcomes of the applied algorithm and some matrices related issues. By applying the Support vector machine on the sample given data set we are getting the result as above 85%. The above-mentioned Fig 2 describing the comparison of the accuracy, precision, recall mathematical issues based on the applied algorithm.

5. Conclusion
In this paper "Machine Learning Based Livestock's Disease Classification and Prediction System" has been presented to predict the health status of the livestock. All the design and embodiment of this livestock health care middleware and hardware is described. The device powered by Windows operating system provides some information of the animal profile, movement of livestock and medication taken by the livestock. This Project integrates several functions and features that make it different from others. In many products, finding of livestock health system will be based on dataset gathered from several popular data sources like Kaggle, UCI Data repository and Internet.

6. References
1. Witten IH, Frank E. Data Mining: "Practical Machine Learning Tools and Techniques. 2nd edn., Morgan Kaufmann Publishers.
2. Cheng CK, Lau EH, Ip DK, Yeung AS, Ho LM. Cowling, B.J. A profile of the online dissemination of national influenza surveillance data.
3. Balcan D, Colizza V, Gonçalves B, Hu H, Ramasco JJ, Vespignani A *et al*. Multiscale mobility networks and the spatial spreading of infectious diseases.
4. Colizza V, Barrat A, Barthelemy M, Valleron A, Vespignani A. Modeling the Worldwide Spread of Pandemic Influenza: Baseline Case and Containment Interventions.
5. Balcan D, Hu H, Goncalves B, Bajardi P, Poletto C, Ramasco JJ *et al*. Seasonal transmission potential and activity peaks of the new influenza A (H1N1): A Monte Carlo likelihood analysis based on human mobility.
6. Eubank S, Guclu H, Anil Kumar VS, Marathe MV, Srinivasan A, Toroczkai Z *et al*. Modelling disease outbreaks in realistic urban social networks.
7. Ferguson NM, Cummings DAT, Fraser C, Cajka JC, Cooley PC, Burke DS *et al*. Strategies for mitigating an influenza pandemic. Nature. 2006; 442-448. doi:10.1038/nature04795.
8. Epstein JM, Goedecke DM, Yu F, Morris RJ, Wagener DK, Bobashev GV *et al*. Controlling Pandemic Flu: The Value of International Air Travel Restrictions.
9. Ciofi degli Atti ML, Merler S, Rizzo C, Ajelli M, Massari M, Manfredi P *et al*. Measures for Pandemic Influenza in Italy: An Individual Based Model Considering Different Scenarios.
10. Zhang Y, Milinovich G, Xu Z, Bambrick H, Mengersen K, Tong S *et al*. Monitoring "Pertussis Infections Using Internet Search Queries.