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Animal Disease Prediction Using ML

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Abstract - Animal disease prediction using machine learning is a growing field that aims to improve the health and welfare of animals. In recent years, machine learning algorithms have been increasingly used to develop predictive models for animal diseases. These models use various data sources, such as clinical, environmental, and demographic factors, to predict the likelihood of animals developing diseases.

***Key Words*:** Animal, disease, prediction, ML

INTRODUCTION

On Animal Farm, healthcare is really important. With effective therapy, health diseases can be recognized and prevented at an early stage. Subclinical ketosis (SCK) is a metabolic illness that affects dairy cows during early lactation and is characterized by an elevated concentration of ketone bodies in the absence of clinical indications of disease. A typically used threshold to outline subclinical ketosis is a β-hydroxybutyrate (BHB) awareness in the blood > 1.2 mmol/L. To discover subclinical ketosis in dairy cows, diverse hand-held gadgets are commercially available, and have been evaluated for use on farms.

The incidence of SCK in dairy cows is related to an accelerated chance of sequelae (e.g., medical ketosis, displaced abomasum, metritis), reduced milk yield, and impaired reproductive performance, affecting the economics of a dairy farm. A major risk factor for the incidence of ketosis is a body condition score (BCS) earlier than calving, an accelerated colostrum quantity at the beginning of milking, and a complicated parity.

These days, increasingly, agriculturists depend on advanced sensor innovations for persistent and robotized real-time observing of creature practices as well as their well-being status. The point of this thought was to anticipate the well-being status of dairy animals. The expectation is made employing an adaptable classification calculation combining time arrangement based speeding up information with other input, particularly plan to manage with conceivably diverse accessibility of information.

The livestock sector plays an important role in the socio-economic development of rural households. A large number of people in India, being less literate and unskilled, depend on agriculture for their livelihoods. Livestock is a source of subsidiary income for many families in India, especially the resource-poor, who maintain few heads of animals. One of the major obstacles to achieving the targeted growth rates in the sector is the prevalence and outbreaks of diseases. This livestock disease is a great threat to animal health as well as to humans who are in direct contact with animals and who consume the product of an animal that has been infected by a certain disease. Livestock animals usually distribute in remote areas with relatively poor conditions for disease diagnosis rapidly and accurately. It is necessary to detect the disease outcome in the livestock and take precautionary measures in order to avoid its spread among them.

There is a need for a system that helps to create awareness among livestock owners about the disease prevailing in the animal, takes the necessary precautions, and also makes the owner aware that disease can be the reason for the death of animals. In the existing system, the disease outbreak among the animals is predicted based on certain conditions and is also concerned with a specific animal and disease.

Animal owners are often unaware of whether the disease is mild or might prove fatal and whether precautions should be taken at the appropriate time. Our proposed system will predict livestock (cow, sheep, and goat) diseases based on the symptoms and also provide precautionary measures based on the disease predicted. It will also alert the livestock owner if the predicted disease causes sudden death.

PROBLEM STATEMENT

To develop a predictive model that can accurately identify the presence of various diseases in animals based on their symptoms, historical health data, and environmental factors. Animal diseases can have significant impacts on animal

welfare, human health, and the economy. Early detection and accurate diagnosis of animal diseases can help prevent the spread of infectious diseases, reduce animal mortality rates, and improve overall animal health. However, animal diseases can be complex and difficult to diagnose, and traditional diagnostic methods can be time-consuming and costly.

Machine learning can help address these challenges by analyzing large volumes of data to identify patterns and make predictions about the presence of diseases. The goal of this project is to develop and implement machine learning algorithms that can accurately predict the presence of various animal diseases based on available data. This can aid veterinarians and animal health professionals in making more informed decisions about disease management and prevention, ultimately leading to improved animal health outcomes and reduced economic losses in the animal industry.

LITERATURE REVIEW

The field of animal disease prediction has witnessed significant advancements in recent years, particularly with the integration of machine learning (ML) techniques. In the realm of ML-based animal disease prediction, a comprehensive literature survey is crucial to understand the existing methodologies, datasets, and evaluation metrics. This literature survey aims to explore the current state of research in ML-based animal disease prediction, with a focus on classification algorithms, data collection strategies, and performance evaluation methods.

In [1] Arifin, S., Kibria, Firoza, A. Amini & Yan H et al. “Dermatologist Disease Diagnosis using color-skin images”, they proposed a two-stage method to detect the disease based on color texture based identification and by using a classification to identify the name of the disease. The first stage has an accuracy of 95.99%, and the second stage has 94.016% accuracy.

In [2], Nawal Soliman ALKolifi ALEnezi. “A method of skin disease detection using Image Processing and machine learning” has proposed early detection method on image processing based on Convolutional neural network to feature extraction and then using color to identify the features.

In [3], Pravin S. Ambad and A. S. Shirsat et al. “An image analysis System to detect skin diseases” has proposed a system for early identification of skin problem using statistical analysis and ad boost classifier. Their research mainly focused on early identification of skin cancer symptoms based on statistical analysis with correlation algorithms.

In [4], Li-sheng Wei, Quan Gan, and Tao Ji et al. “Skin Disease recognition method based on image color and texture features” has proposed a model based on feature extraction of image using color texture and using segmentation and SVM on it to identify the disease.

In [5], R. Yasir, M. S. I. Nibir and N. Ahmed et al. “A skin disease detection system for financially unstable people in developing countries” has proposed a system for the detection of disease that could be implemented on mobile devices as well as computers using desktop applications based upon computer vision techniques.

In [6], R Sumithra, M. Suhilb and D. S. Guruc et al., “Segmentation and classification of skin lesion for disease diagnosis” have proposed a model for segmentation and classification of a skin disease using SVM and KNN algorithms.

In [7], Rahat Yasir, Md. Ashiqur Rahman, and Nova Ahmed et al., "Dermatological Disease Detection using Image Processing and Artificial Neural Networks," used various kinds of different image processing algorithms for feature extraction and feed forwarding using an artificial neural network for training and testing the model. The system works in two parts, in the first part, feature extraction has taken place based on the color texture, and in the second stage, the classifier identifies the possible disease.

In [8], Nidhai K, Al Abbadi, Nizar Saadi et al., "Psoriasis detection using skin color and texture features," proposed a model for the identification of psoriasis using color feature extraction and classification of the skin image.

In [9], Kumar, V., Kumar S., & Saboo, V. et al, "Dermatological disease detection using Image Processing and machine learning," proposed a model that uses computer vision and machine learning. The features of the image are extracted and algorithms are applied to it to detect six types of diseases with an accuracy of 95%.

In [10], Pollap D. et al., "An Intelligent for Monitoring Skin Disease," proposed a method of clustering images using Naive Bayes for classification. They have used SIFT method for the detection of key points in the image. After that, they used CNN and SVM for classification and segmentation. They have an accuracy of 84% and a precision of 82%.

SYSTEM DESIGN & IMPLEMENTATION

Flowchart:

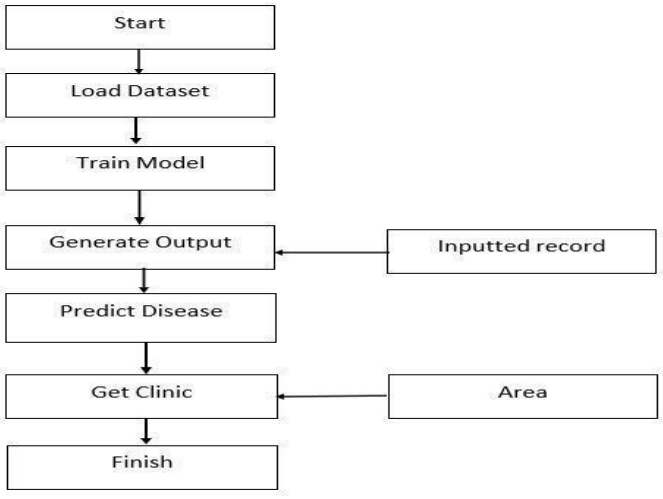

Fig.1 Flowchart

The first step in animal disease prediction as shown in Fig. 5.1 is to carefully observe and collect data on the clinical signs and symptoms exhibited by animals. This may involve conducting physical examinations, taking a history from the animal owner or caretaker, and gathering information about the animal's environment, diet, and behaviour. It's important to collect as much accurate and detailed data as possible to establish a comprehensive picture of the animal's condition.

Once the data is collected, the next step is to analyze the symptoms exhibited by the animal. This may involve categorizing the symptoms based on their severity, duration, and progression over time. Symptoms can include physical signs such as fever, coughing, sneezing, diarrhoea, vomiting, and changes in appetite or behaviour. Other symptoms may be subtler, such as changes in coat condition, gait, or posture. Symptom analysis may be performed by a veterinarian or other trained animal health professional, who will use their expertise and knowledge of animal diseases to identify patterns and clues.

Based on the symptoms observed, a list of potential diseases or conditions, known as a differential diagnosis, is generated. This list typically includes diseases or conditions that are most likely based on the symptoms exhibited by the animal. The veterinarian or animal health professional will use their knowledge of diseases, as well as any available diagnostic tests or resources, to narrow down the list and determine the most probable causes of the symptoms.

In many cases, diagnostic tests may be necessary to confirm or rule out the potential diseases or conditions identified in the differential diagnosis. These tests may include blood tests, faecal exams, radiographs, ultrasounds, other imaging studies, microbiological cultures, and molecular diagnostics. Diagnostic testing can provide important information to further refine the diagnosis and guide treatment decisions.

Once the diagnostic test results are available, the veterinarian or animal health professional will make a definitive diagnosis based on the symptoms, data collected, and test results. The diagnosis will help determine the appropriate treatment plan, which may include medications, surgeries, supportive care, and management practices. The prognosis for the animal, or the likely outcome of the disease, will also be discussed with the animal owner or caretaker.

After the diagnosis and treatment, the animal may require on-going monitoring and follow-up to assess the response to treatment and track the progress of the disease. This may involve repeat examinations, additional diagnostic tests, and adjustments to the treatment plan as needed.

Animal disease prediction based on symptoms alone may not always be accurate, as many diseases can present with similar symptoms. Therefore, a comprehensive approach that includes a thorough history, physical examination, diagnostic testing, and clinical judgement by a trained veterinary professional is essential for accurate disease prediction and management in animals.

Algorithms used for the Prediction:

The decision tree classifier algorithm is a popular machine learning algorithm used for classification tasks. It works by recursively partitioning the feature space into subsets based on the value of the features, using a series of binary decisions.

Here are the key details of the decision tree classifier algorithm:

• Building the tree: The decision tree classifier algorithm builds a tree by recursively splitting the data into subsets based on the feature that provides the most information gain, which is the measure of how much the classification entropy is reduced by the split. The algorithm continues this process until a stopping criterion is met, such as a minimum number of instances in a node or a maximum tree depth.

• Choosing the splitting criterion: There are several criteria for selecting the feature to split on, such as entropy, gini impurity, or classification error. These measures evaluate how well the feature separates the classes and aim to maximize the information gained from the split.

• Pruning the tree: The decision tree can suffer from over fitting, where it fits the training data too closely and performs poorly on new data. Pruning the tree can prevent over fitting by removing nodes that do not contribute significantly to the classification accuracy.

• Handling missing values: The decision tree classifier algorithm can handle missing values by assigning them to the most common class in the parent node, or by using surrogate splits that evaluate other features to make the split.

• Interpretability: One of the strengths of the decision tree classifier algorithm is its interpretability, as it creates a tree of simple if-then rules that are easy to understand and interpret by domain experts.

• Ensemble methods: Decision trees can be combined into an ensemble method such as Random Forest or Boosting to improve classification accuracy and robustness.

Overall, the decision tree classifier algorithm is a powerful and interpretable machine learning algorithm that can handle complex datasets with categorical and continuous features, missing values, and nonlinear relationships.

SCREENSHOTS

Login Panel

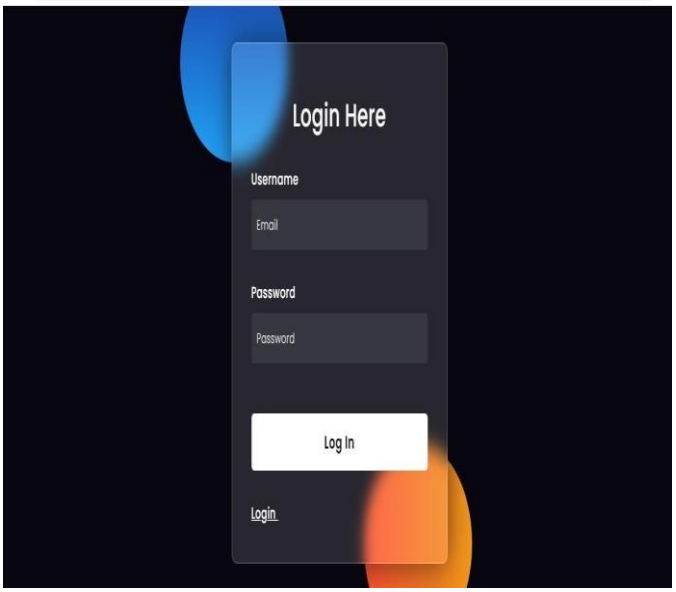

Fig.2 Login Panel

After Admin Login

Fig.3 Admin Dashboard

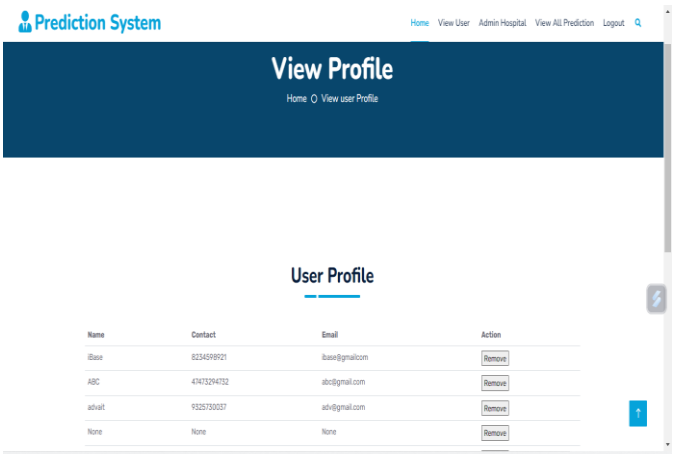

Fig.4 View User Panel

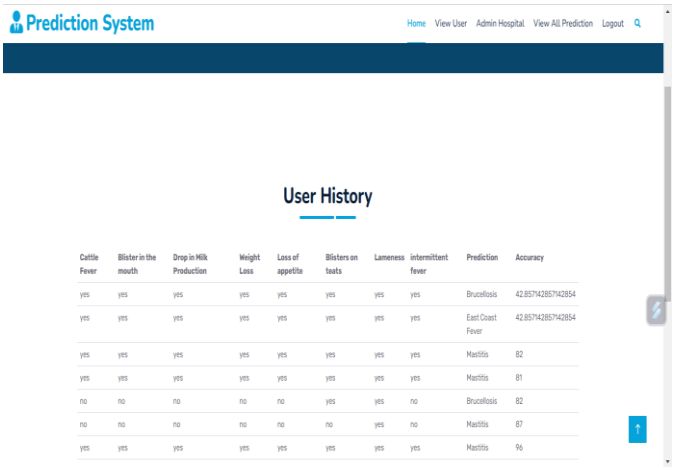

Fig.5 View Prediction

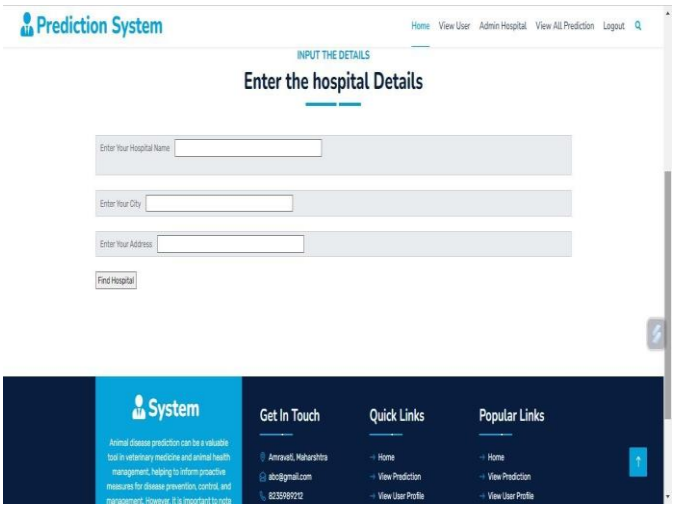

Fig.6 Add Hospital Panel

After User Login

Fig.7 User Homepage

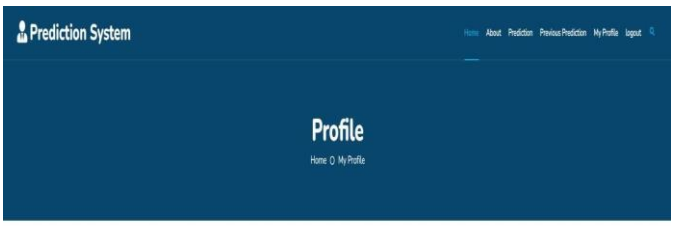

Fig.8 User Profile

Fig.9 Prediction Page

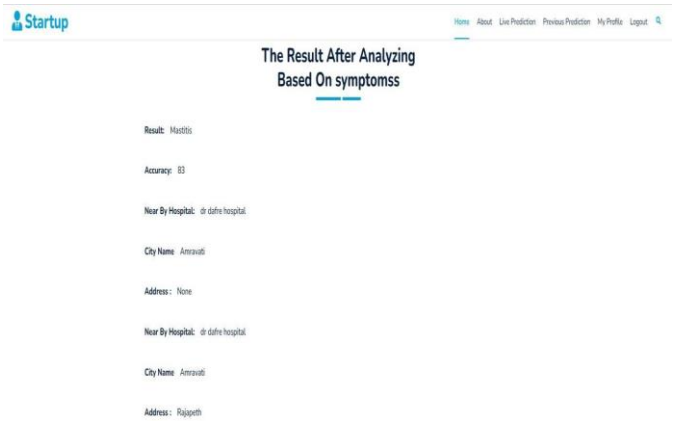

Fig.10 Result Page

After the diagnosis, the system will show the result based on the symptoms. The system is also showing the hospital list near your city.

FUTURE SCOPE

• **Integration of location-based GPS maps:** The integration of location-based GPS maps can be a valuable addition to animal disease prediction projects. By overlaying disease data onto geographic maps, researchers and stakeholders can visualize disease prevalence, identify disease hotspots, and assess spatial patterns of disease transmission.

• **Geospatial analysis and modelling:** In the future, animal disease prediction projects can leverage geospatial analysis techniques to identify spatial patterns and relationships between disease occurrences, environmental factors, and animal populations. Geographic information systems (GIS) can be used to integrate and analyze georeferenced data, including animal movement patterns, land use, climate data, and proximity to other disease reservoirs.

• **Geographically adaptive models:** Animal disease prediction projects can explore the development of geographically adaptive models that take into account regional variations in disease patterns and risk factors.

• **Mobile-based disease reporting and mapping:** Mobile-based applications can empower farmers, veterinarians, and citizen scientists to report and map disease occurrences in real time. By integrating GPS functionality into mobile apps, users can document disease outbreaks, upload geotagged images, and provide valuable data for disease surveillance and prediction These user-generated data can enhance the overall accuracy and timeliness of disease predictions.

CONCLUSION

The proposed system is able to detect skin diseases with promising results from machine learning techniques. It can be used to help people from all over the world and to do some productive work. The tools used are free to use and are available to the user, hence, the system can be deployed free of charge. The application developed is lightweight and can be used on machines with low system specifications. The analytical process started with data cleaning and processing, missing value analysis, exploratory analysis, and finally model building and evaluation. Finally, we predict the disease using a machine learning algorithm with different results. This brings some of the following insights about disease prediction: As the maximum types of datasets will be covered under this system, doctors may get to know about the disease exactly using ML algorithms, which helps the doctor in decision-making.

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