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Symptoms Based Multiple Cattle Diseases Prediction and Treatment Recommendations Using ML

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Abstract: The analysis and processing of cattle disease data is increasingly important in modern veterinary medicine, especially with advances in big data and AI technologies. The integration of data analysis and mining techniques into animal husbandry enables the development of intelligent systems capable of diagnosing cattle diseases. This process begins with the collection of extensive electronic medical records from various sources, followed by thorough pre-processing to remove duplicates, remove stop words and segment words. Then use Eclat's algorithm to reveal correlations between specific diseases and their probabilities, which will lead to appropriate treatment decisions. Such a system allows for early treatment, minimizes loss of herders and promotes scientific progress in animal husbandry. As a real-time application, this concept could significantly help veterinarians manage cattle diseases more effectively. the system identifies connections between symptoms, disease types and treatment. The choice of the Eclat algorithm, known for its efficiency in pattern detection, enables fast processing of datasets. The implemented algorithm achieves approximately 96.5% accuracy, demonstrating its potential as a robust tool in veterinary medicine. The browser-based application is designed for cross-browser compatibility and accessibility for users in the medical field.

Keywords: Cattle Disease, Machine Learning, Data Science, Eclat Algorithm, Symptoms, Treatment.

I. INTRODUCTION

With the fast improvement of massive statistics and artificial intelligence, facts analysis and records mining are increasingly used in animal husbandry. This gadget collects a large quantity of livestock digital medical records from numerous assets and makes use of facts analysis and mining era to realize an intelligent farm animals disorder analysis gadget. The guide method of identifying and treating cattle diseases is just too complicated and time-ingesting, as well as costly. Those structures handiest collect facts, store it in a database, and retrieve it inside the future, but no extraction of beneficial information to help docs better manage farm animals' illnesses. Affiliation (or dating) might be the most familiar and easy facts technology approach. Here we perform a simple correlation between two or extra items, regularly of the identical type, to perceive styles. Symptom-based totally ailment prediction involves reading the clinical symptoms of farm animals to pick out capability sicknesses. Cattle illnesses often present with overlapping signs and symptoms, making it hard for farmers and veterinarians to diagnose them without advanced gear. The use of information from ancient instances and integrating contemporary technologies including gadget learning and artificial intelligence, we are able to expand structures that predict the chance of diverse illnesses based on observed signs. Once a sickness is predicted, providing timely and accurate treatment guidelines is crucial to mitigate its impact. Treatment techniques must be tailor-made to the precise sickness and ought to keep in mind elements consisting of the severity of the disease, the age and health popularity of the affected cattle, and the presence of any co-morbidities. Using a comprehensive database of veterinary understanding and remedy protocols, those systems can offer proof-primarily based guidelines to make sure the nice viable results.

The software of artificial intelligence to clinical diagnostics has been used abroad for many years and has fantastically mature cases along with the MYCIN expert machine. IBM Watson etc. But numerous diagnostic systems are utilized in China. The system first uses textual content type era to classify disease signs and symptoms. The key to the advent of an auxiliary diagnostic and remedy system is textual content class. The first-rate of the classification consequences at once impacts the device. The goal of this device is consequently to research the facts of a large amount of electronic medical facts and use a extra classical algorithm in gadget mastering to categorise the texts. Then use the association's statistics technological know-how set of rules to correlate farm animals diseases by livestock signs and symptoms and offer timely corresponding diagnostic and treatment tips.

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II. RELATED WORK

Wiwik Anggraeni et al. [1] proposed the development of a mobile intelligent system for the diagnosis of livestock diseases and the design of first aid measures. The core of the system uses a fuzzy neural network with a user interface designed as a mobile application for Android. Testing with real cattle medical data and expert validation showed 100% system validity and 96.37% average accuracy. This intelligent system solves the significant problem of cattle diseases, which lead to low productivity of animal husbandry. With a limited number of veterinarians available to cattle farmers, this system offers a vital support.

Kunja Bihari Swain et al. [2] provide an online cattle health monitoring facility to assist farmers struggling with poor cattle health and unable to access veterinary services. This device allows farmers to compare current cattle health parameters with standard references and helps them detect any deterioration in health status. As many farmers depend on dairy products and the health of their livestock for their livelihoods, this system is proving to be essential.

Francisco Gómez et al. [3] presented a characterization of cattle movement networks to mitigate foot-and-mouth disease (FMD) risks. By calculating different centrality measures for the livestock transport network, the study helps to understand animal movement dynamics and improve FMD surveillance and control.

Fatih, Kamil et al. [4] investigate the effect of digestive disorders such as rumen acidosis on milk production and fertility in cattle. They emphasize the importance of regular monitoring and recording of animal nutrition and daily behavior to identify such diseases that can significantly reduce the efficiency of the herd.

Widiasih et al. [5] focus on leptospirosis, a zoonotic disease prevalent in tropical regions. They developed a Loop-Mediated Isothermal Amplification (LAMP) method for early disease detection using cattle urine samples. This wearable device also helps in early disease detection, emergency response and disease monitoring before visual symptoms appear.

Enrico Casella et al. [6] discuss bovine respiratory disease (BRD), a major cause of antimicrobial use and calf mortality. The study reveals that BRD affects 15% of dairy calves and accounts for 22% of pre-weaning deaths, requiring additional antimicrobial treatment and affecting calf productivity.

Van Thuy Hoang et al. [7] developed a knowledge graph embedding model to improve animal disease diagnosis by analyzing electronic medical records (EMR). Their model learns different types of information and graph structures to provide unified representations, outperforming existing models in diagnostic tasks.

Pinaki S et al. [8] proposed LiveCare, an IoT-based framework for monitoring cow health in large farms. This system tracks daily behavioral changes and helps predict cow diseases, which are key to maintaining milk quality and quantity in dairy farms.

Mahdi Jampour et al. [9] use a fuzzy logic model to diagnose neurological diseases in animals and solve the problems posed by the proximity of clinical signs and diagnostic uncertainty. This approach emphasizes the use of computers to improve the accuracy and efficiency of disease diagnosis.

Carlos Campos Bracho (SA) et al. [10] highlight the economic impact of disease outbreaks in cattle feedlots as a result of intensive agricultural practices. They propose a sensor fusion system for early disease detection, improving the current reliance on behavioral observations and regular check-ups.

Daniel Andresen et al. [11] present an ingestible pill technology for cattle health assessment that offers a means of obtaining physiological data from the bovine reticulum. This technology uses magnetic induction to transmit the signal, suitable for tissue transfer.

Michael J et al. [12] discuss the importance of understanding disease dynamics within a herd to inform transboundary livestock disease control strategies. They emphasize the need for mathematical models to help policymakers prepare for and respond to disease outbreaks.

Yunhe Feng et al. [13] propose an IoT-based framework for modeling mastitis propagation and infection risk in dairy cows. By tracking the social behavior of cows with GPS devices, they create behavior charts to track and infer infection risks, improving early disease detection and control.

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Mr. V Gokul and co. [14] aims to make livestock infrastructure smarter with non-invasive wearable devices that monitor physiological and biological activities. These devices provide early disease detection, emergency solutions and other critical data available through cloud platforms for remote monitoring.

Lijing Niu et al. [15] use big data and artificial intelligence to develop an intelligent diagnostic system for cattle diseases. They use data analysis and mining technologies in electronic livestock medical records, improving the accuracy of disease diagnosis using advanced text pre-processing techniques.

III. PROPOSED SYSTEM

It is difficult to manage cattle disease symptoms and disease types in real time because animals cannot explain their problems or pain they are facing. In the medical sector, diseases are a challenging task when looking for signs of cattle disease. The main goal of the proposed system is to find symptoms of cattle disease and then predict the correlation between symptoms-disease-treatment. As in the current system, cattle disease is difficult to identify and it is also difficult to provide proper treatment. The proposed system uses data science techniques to identify cattle disease symptoms and predict patterns. The proposed system uses the data science technique "Eclat Algorithm" to find patterns. The system is planned to be built as a real-time application that is useful to doctors in treating livestock diseases. We use "Visual Studio" as the front-end technology and SQL server as the back-end technology because both technologies support multiple libraries and tools for working with real-time applications.

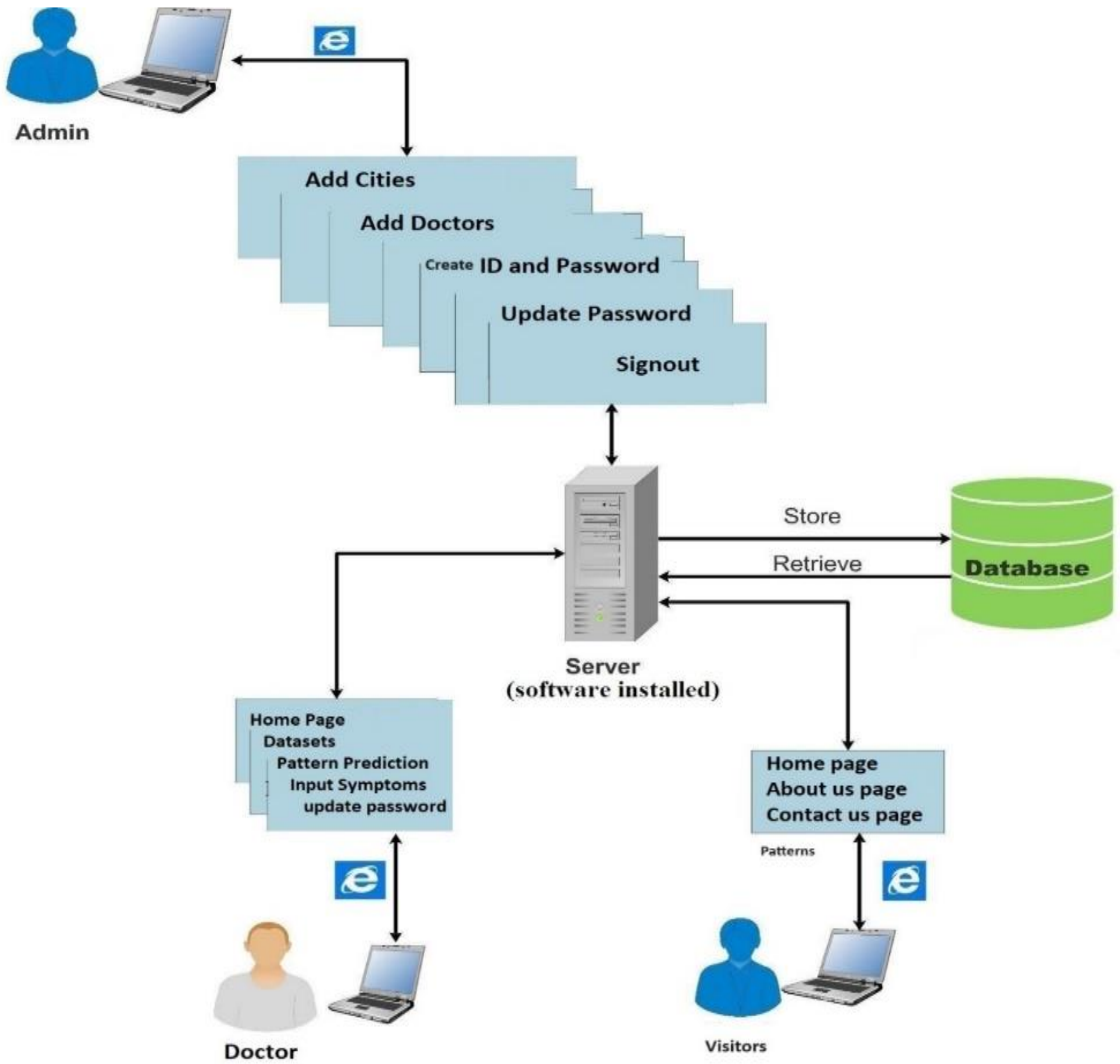

Fig 1 System Architecture

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IV. METHODOLOGY

- **Monitor/Collect Data:** This is the first step in data processing. Here we collect training datasets from various sources are www.kaagle.com, www.dataworld.com, www.data.gov.in, etc. The data is in text format. Data was collected from various sources and consolidated into one. Training data sets are stored using Excel sheets. The data, which includes cattle disease symptoms, disease types, and treatment details, is retrieved and fed into data science algorithms.

- **Clean:** Cattle datasets are cleaned here, where irrelevant data is removed and missing data is corrected using "binning" data pre-processing techniques. Some data science algorithms accept data in numeric and string formats, so we need to convert the data to numeric and string formats. We call this preparing the data and feeding it to the algorithm to build the model.

- **Training model:** Here the machine learning algorithms are applied to process the data and to build the model, once the model is built, we test the model to find out the accuracy and effectiveness of the algorithms.

- **Evaluate the model:** Here, the training data sets are split into training and testing to determine the accuracy of the algorithm, and the execution time is calculated to determine the efficiency.

- **Deployment:** Once the model is built and tested, we are ready to use and the system generates patterns related to cattle disease symptoms, disease types and treatment. Deployment refers to the use of an application.

Algorithm

The Eclat algorithm works

1. Get a list of offers for each item (database scan)
2. Tidlist of {a} is exactly the list of transactions containing {a}
3. Intersect the list of tidlists {a} with the lists of tidlists of all other items, resulting in tidlists {a,b}, {a,c}, {a,d},...= {a}-conditional database (if {a } removed)
4. Repeat from 1 on the {a}-conditional database
5. Repeat for all other items

V. RESULT AND DISCUSSION

The Eclat algorithm was used to process the cattle dataset, achieving an accuracy of 96.5%, with a repeat of 1.75% for incorrect patterns. As one of the most efficient algorithms for processing medical data sets, Eclat uses an array-based data structure, with memory usage dependent on the size of the data set (less for smaller data sets).

The algorithm requires only one scan and the execution time varies depending on the manufacturing process.

No of Instances (records)	**Execution Time (milli Secs)**
Around 2k	557
Around 1k	350
Around 500 records	250
100 records	125

Table 1 Result analysis time efficiency

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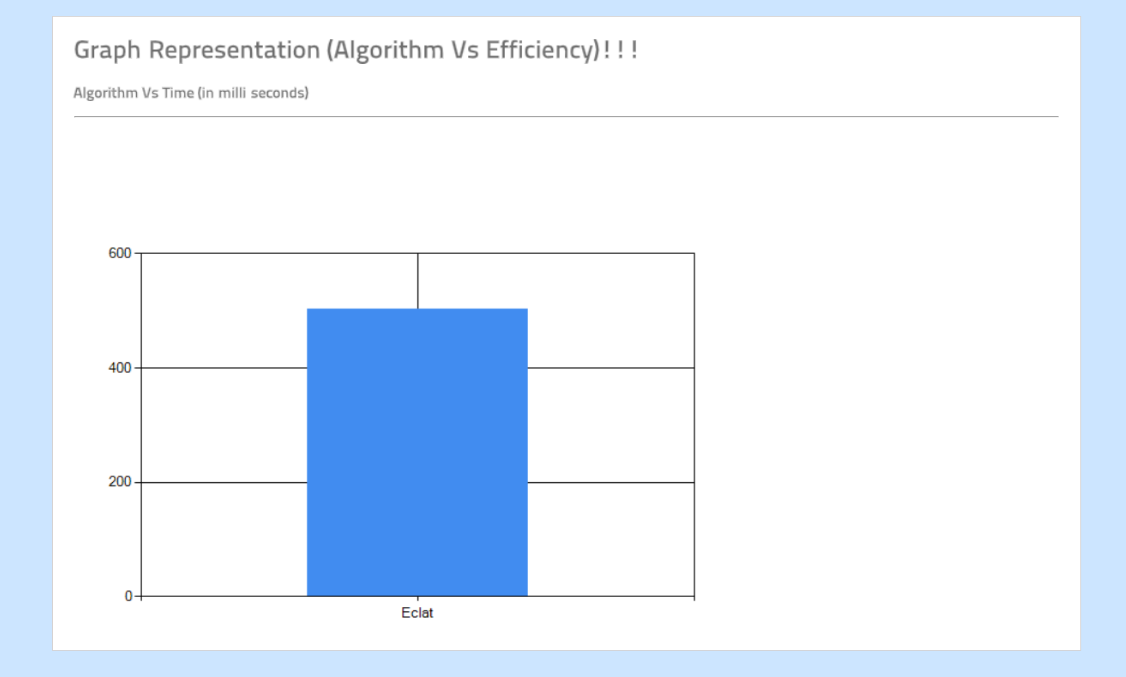

Fig 2 Graphical representation of algorithm v/s time efficiency

VI. CONCLUSION

Managing cattle disease symptoms and types in real-time poses significant challenges, as animals cannot communicate their discomfort or pain. Identifying symptoms in cattle is particularly difficult in the medical sector. To address this, we propose a system that detects cattle disease symptoms and predicts the correlation between symptoms, diseases, and treatments. This system is valuable for veterinarians, helping them identify and treat various cattle diseases more effectively. In our proposed system we uses the Eclat algorithm, a highly efficient tool for pattern discovery, to establish correlations between symptoms, disease types, and treatments.

The algorithm is known for its speed in processing datasets and identifying patterns, achieving approximately 96.5% accuracy in our implementation. Looking ahead, a broader range of training datasets can be collected and analyzed to discover additional patterns. Furthermore, more advanced algorithms can be employed to refine the connections between symptoms, disease types, and treatments, allowing for a comparison of their accuracy and effectiveness.

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