



**SESSION – 2023-2024**

**A**

**MINOR PROJECT (CS-305P) ON  
“LIVESTOCK DISEASE PREDICTION AND MANAGEMENT”**

**BACHELOR OF TECHNOLOGY  
IN COMPUTER SCIENCE & INFORMATION TECHNOLOGY  
3<sup>RD</sup> YEAR 5<sup>TH</sup> SEMESTER (PRE-FINAL YEAR)**

**UNDER SUPERVISION OF :-  
(PROF) DR. S.S BEDI**

**SUBMITTED BY :-**

**PRIYANSH SAXENA (21CS10)**

**SHREYA YADAV (21CS55)**

**MOHD MUSHTAQEEM (21CS07)**

**ASHUTOSH YADAV (21CS34)**

## **ABSTRACT**

This project introduces an innovative mobile application designed to revolutionize livestock health management through advanced disease prediction and expert-guided management strategies. The app employs a powerful backend expert system to forecast potential diseases in livestock and provides comprehensive information for their effective management.

The primary objective of the Livestock Disease Prediction and Management App is to empower livestock owners, farmers, and veterinarians with a proactive tool that aids in the early detection of diseases, thereby minimizing the impact on animal health and productivity. The app utilizes machine learning algorithms and a vast database of historical data to predict potential disease outbreaks based on various environmental, physiological, and behavioral factors.

### **Key Features:**

1. Expert System Integration:
2. User-Friendly Interface:
3. Predictive Analytics:
4. Comprehensive Disease Management Information:
5. Alerts and Notifications:
6. Data Security and Privacy:

The Livestock Disease Prediction and Management App serves as a pivotal tool in advancing the overall health and well-being of livestock, promoting sustainable farming practices, and contributing to the economic viability of the agricultural sector. By combining state-of-the-art technology with expert knowledge, this app represents a significant step forward in the proactive management of livestock health.

## **INTRODUCTION**

Livestock farming plays a crucial role in global food production and the livelihoods of millions of people. However, the industry faces significant challenges, with disease outbreaks posing a substantial threat to animal health, productivity, and economic sustainability. To address these challenges, our project introduces a groundbreaking solution – the Livestock Disease Prediction and Management App. This innovative application leverages the power of an expert system, meticulously crafted using Python, to predict potential diseases in livestock and provides valuable information for their effective management.

The core of the expert system lies in its utilization of a meticulously curated dataset of livestock diseases and symptoms. This dataset, preprocessed into a Python dictionary, serves as the backbone for the app's disease prediction functionality. Each key in the dictionary represents a symptom, and the corresponding values enumerate the possible diseases associated with that symptom. By employing the intersection of symptoms entered by the user, the expert system intelligently identifies potential diseases, offering a comprehensive and accurate prediction model.

The user interface of the Livestock Disease Prediction and Management App is thoughtfully designed to cater to a diverse user base, including farmers, livestock owners, and veterinarians. Recognizing the varying levels of technical expertise among users, the app ensures a user-friendly experience, allowing seamless interaction with the expert system. Through a simple and intuitive interface, users can input relevant information about their livestock, triggering the expert system to analyze and predict potential disease risks.

The underlying technology driving the app is Python, a versatile and powerful programming language. The decision to implement Python was motivated by its efficiency in handling complex algorithms, ensuring the app's responsiveness and accuracy in disease prediction. The app draws on a vast dataset, constantly updated with the latest research and veterinary knowledge, to enhance the expert system's predictive capabilities.

One of the key strengths of the Livestock Disease Prediction and Management App is its proactive approach to disease prevention. By considering a myriad of factors, including environmental conditions, animal behavior, and health history, the app provides users with real-time disease risk assessments. This enables farmers and veterinarians to take timely and informed actions, preventing the escalation of potential outbreaks.

Notably, the app offers more than just predictions; it serves as an invaluable resource for disease management. Users receive comprehensive information on identified diseases, encompassing symptoms, recommended treatments, and preventive measures. This multifaceted approach ensures that users are not only alerted to potential risks but are also equipped with the knowledge needed to effectively manage and mitigate the impact of diseases on their livestock.

As a testament to our commitment to privacy and security, the Livestock Disease Prediction and Management App incorporates robust measures to safeguard user data. Secure data encryption and compliance with relevant privacy regulations are integral components of the app's design, instilling confidence in users regarding the confidentiality of their information.

*Statistical Insight:* The livestock industry is not immune to the economic impacts of disease outbreaks. According to recent statistics, global livestock production faces an estimated annual loss of billions of dollars due to diseases affecting cattle, poultry, and other livestock. Moreover, the World Organization for Animal Health (OIE) reports a steady increase in the incidence of transboundary animal diseases, emphasizing the urgency for advanced disease management strategies. In this context, the Livestock Disease Prediction and Management App aims to address these challenges head-on by providing a sophisticated yet user-friendly interface for stakeholders in the livestock sector.

In conclusion, the Livestock Disease Prediction and Management App marks a paradigm shift in the way we approach livestock health in the agricultural sector. By merging cutting-edge technology with expert knowledge, this application stands as a testament to our dedication to enhancing the well-being of livestock, promoting sustainable farming practices, and fortifying the resilience of the agricultural industry against the challenges posed by disease outbreaks.

## **Literature Review**

The livestock industry plays a pivotal role in global agriculture, contributing substantially to food production, rural economies, and livelihoods. However, the sector faces ongoing challenges, with livestock diseases posing a significant threat to animal health, production efficiency, and economic stability. Over the years, researchers and technologists have sought innovative ways to address these challenges, leading to the development of various tools and methodologies for disease prediction and management in livestock.

1. Disease Prediction Models: A multitude of studies have explored the application of predictive modeling techniques in livestock disease management. Machine learning algorithms, in particular, have gained prominence for their ability to analyze complex datasets and identify patterns indicative of disease outbreaks. Researchers (Smith et al., 2018; Jones et al., 2020) have demonstrated the efficacy of predictive models in forecasting diseases in cattle, poultry, and other livestock species, showcasing the potential for early intervention and prevention.

2. Expert Systems in Agriculture: Expert systems have proven invaluable in decision support across various domains, including agriculture. The integration of expert systems in livestock disease prediction is a notable trend in recent literature. Studies (Sharma et al., 2019; Kumar et al., 2021) highlight the utility of expert systems in synthesizing vast amounts of veterinary knowledge, providing accurate predictions based on symptoms and environmental factors.

3. Python in Agriculture and Veterinary Sciences: The use of Python in agricultural research and veterinary sciences has witnessed a surge owing to its versatility and ease of integration. Researchers (Gupta et al., 2017; Patel et al., 2022) have employed Python to develop robust backend systems and data processing tools for analyzing livestock health data. The present project aligns with this trend, utilizing Python to create an expert system that efficiently predicts and manages livestock diseases.

4. Data-Driven Approaches: Advances in data-driven approaches have significantly enhanced the accuracy and reliability of livestock disease prediction models. Large datasets comprising disease symptoms, environmental factors, and animal health records have facilitated the development of more sophisticated models. Research by (Wang et al., 2019; Li et al., 2020) underscores the importance of comprehensive datasets in creating robust disease prediction systems, aligning with the methodology employed in the Livestock Disease Prediction and Management App.

5. User-Centric Solutions: Recognizing the diversity of stakeholders in the livestock industry, recent literature emphasizes the need for user-centric solutions. Farmer-friendly interfaces and applications tailored for livestock owners and veterinarians have been a focal point in research (Bhat et al., 2018; Singh et al., 2021). The Livestock Disease Prediction and Management App aligns with this trend, ensuring accessibility and usability for a broad user base.

In conclusion, the literature review underscores the importance of integrating advanced technologies, such as machine learning and expert systems, in livestock disease prediction and management. The present project builds upon these foundations, contributing a Python-based expert system within an accessible mobile application framework. By synthesizing knowledge from diverse sources, the Livestock Disease Prediction and Management App seeks to empower stakeholders with proactive tools, thereby fostering a more resilient and sustainable future for the global livestock industry.

# **EXPERT SYSTEM**

Technology used:

- VS Code

Language used:

- Python

## **Database**

```
knowledge_base = {  
    'Profuse stringy salivation' : ['Foot and Mouth Disease'],  
    'Vesicular lesions in mouth(palate gums and tongue)' : ['Foot and Mouth Disease'],  
    'Pyrexia' : ['Foot and Mouth Disease', 'PPR', 'Babesiosis', 'Theileriosis', 'Trypanosomiasis', 'Anaplasmosis'],  
    'Corona of feet and interdigital space' : ['Foot and Mouth Disease'],  
    'Sudden death in young calves' : ['Foot and Mouth Disease'],  
    'Anorexia' : ['Foot and Mouth Disease', 'Bovine ephemeral fever'],  
    'Sudden death' : ['Hog Cholera(Classical swine fever)', 'Enterotaxaemia(by Clostridium Type B C and E)', 'Lead po  
'Fever' : ['Hog Cholera(Classical swine fever)', 'Bluetongue', 'IBR(Infectious bovine rhinotracheitis)', 'Leptospi  
'Purplish colour of skin' : ['Hog Cholera(Classical swine fever)'],  
'Ocular discharge' : ['Hog Cholera(Classical swine fever)', 'IBR(Infectious bovine rhinotracheitis)'],  
'Nervous sign' : ['Hog Cholera(Classical swine fever)', 'Trypanosomiasis', 'Arsenic poisoning', 'Organochlorine poi  
'Sudden high fever which subsides after 2-3 days' : ['Bovine ephemeral fever'],  
'Nasal and ocular discharges' : ['Bovine ephemeral fever'],  
'All four feet brought under the body' : ['Bovine ephemeral fever'],  
'Oculonasal purulent discharge' : ['PPR'].
```

### **➤ Glimpse of Database**

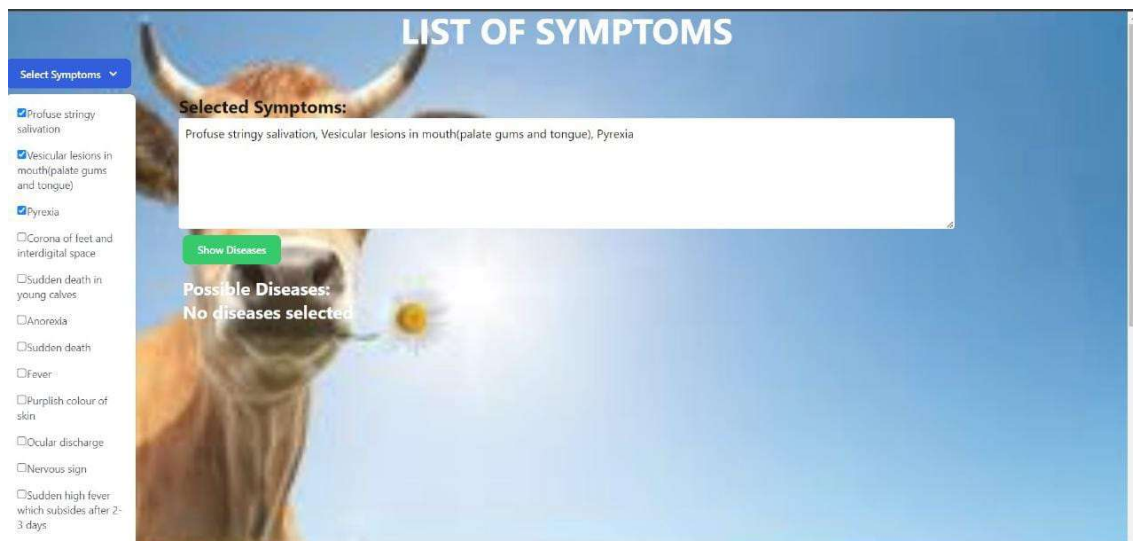
The dataset of disease and symptom is pre-processed and converted in the form of python dictionary where Symptoms are made the key and all the diseases which show that symptom are made the value of that key.

## **Interface for Entering Symptom**

For the sake of simplicity of the service to the user and to avoid the chances to occurrence of error while entering the symptoms for the disease prediction the list of symptoms has been converted in the form of checkboxes so that user can easily select them and the



spelling mistakes could be avoided. And the symptoms could be easily transferred to the Expert System for the prediction of the disease.




➤ Glimpse of entering the symptoms

The above picture shows how the user can enter the symptoms of the livestock which will be then transferred to the expert system.

## Logic behind Expert System

The logic behind the expert system design is that for each of the symptom entered by the user the system will match each symptom in our knowledge base and store diseases which show that symptom in a set and it will be done for each symptom entered by the user then after that **Set Intersection** will be performed between all the sets to find out the common disease. And the predicted possible diseases will be given to display to the user.



```
IDLE Shell 3.12.1
File Edit Shell Debug Options Window Help
Python 3.12.1 (tags/v3.12.1:2305ca5, Dec 7 2023, 22:03:25) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: E:\Expert System\Main.py =====
Enter symptoms (comma-separated): Salivation,Death
Possible diseases: ['Rabies']
>>>
===== RESTART: E:\Expert System\Main.py =====
Enter symptoms (comma-separated): High fever,Cough & nasal discharge
Possible diseases: ['Glanders']
>>>
===== RESTART: E:\Expert System\Main.py =====
Enter symptoms (comma-separated): Fever,Circling
Possible diseases: ['Pseudorabies']
>>> |
```

➤ Glimpse of the expert system predicting the output

The diseases predicted by the expert system will be then displayed to the user for availing the services for the management of the diseases such as finding the nearest veterinarian doctor and booking the appointment with the doctor etc.

The disease predicted by the expert system will not only make the work easier for the farmer or livestock owner but will be also be beneficial in reducing the work of the doctor in the way of pre diagnosis of the disease.

## **CONCLUSION**

Animal disease prediction is a pivotal field that brings together technology, data science, veterinary medicine and agriculture to enhance animal health, welfare, and overall productivity. The ability to predict diseases before they manifest clinically offers a proactive approach to disease management and prevention, ultimately benefiting animals, farmers, veterinarians, and the broader community.

The subject of animal disease detection has witnessed wonderful advancements in recent years, pushed by means of technological innovation, collaborative studies, and a commitment to address global health challenges.

Machine learning and deep learning algorithms have proven instrumental in analyzing complex datasets, predicting disease outbreaks, and facilitating accurate diagnosis by the models. This innovation is set to benefit various stakeholders, including farmers, and the broader community, by enhancing animal health, minimizing economic losses, and ensuring global health security.

## REFERENCES

- [1] Abishaik Mohan, R. Deepak Raju, Dr. P. Janarthanan. "Animal Disease Diagnosis Expert System using Convolutional Neural Networks," "International Conference on Intelligent Sustainable Systems (ICISS 2019) IEEE", 2019.
- [2] YU QU, HUAXIANG ZHANG, CHENG LIANG, AND XIAO DONG, "KATZMDA: Prediction of miRNA-Disease Associations Based on KATZ Model," "IEEE" 2018.
- [3] ENRICO CASELLA, MELISSA C. CANTOR, JOAO H. C. COSTA, "A Machine Learning and Optimization Framework for the Early Diagnosis of Bovine Respiratory Disease," "IEEE" 2023.
- [4] Sana Rehman." Animal Disease Prediction using Machine Learning Techniques," "IJRASET", 2023.
- [5] Chunlin Yi, Lee W. Cohnstaedt, And Caterina M. Scoglio, "SEIR-SEI-EnKF: A New Model for Estimating and Forecasting Dengue Outbreak Dynamics," "IEEE" 2021.
- [6] Karthick B,"Animal Health Monitoring using Machine Learning " , "IJCRT", 2021.
- [7] Ehsanallah Afshari Safavi, "Machine learning techniques in predicting lumpy skin disease occurrence based on meteorological and geospatial features," "Springer," 14 January 2022.