EARLY STAGE DISEASE DETECTION PLATFORM IN CATTLES

[1]Varun Garg
[1]Electronics and Electrical Department Maharaja
[1]Agrasen Institute of Technology

[2]Kritika Garg
[2]Information Technolgy Department
[2]Ch. Brahm Prakash Government Engineering College

ABSTRACT: Developing countries like India, Bangladesh, Nepal and many more has dairy farming as one of the prior ways of occupation .Dairy farm automation plays a crucial role in the increase of productivity in dairy production. Cattle animals are susceptible to many disease some of which can lower the productivity and lower the quality of dairy products and if not detected at an early stage can even lead to death of the cattle .This paper provides a methodology that how the use of machine learning can detect cattle diseases which can provide economical medical solution to place with scarce in medical facilities for farm animals.

KEYWORDS: Artificial Neural Network, cattle Diseases, Feed forward network, HS, machine learning, mastitis, pattern recognition, and Raspberry pi.

I. INTRODUCTION

Health issues in cattle is one of the important factor which have a direct implication over the quality and production efficiency of farm production .Farm animals are prone to many pulmonary, infections, gastrointestinal diseases .Some of the diseases like mastitis can even lead to death of the cattle. The demand for the poultry is rising and with agriculture sector being the occupation of more than 40% in many developing nations use and growth of technology in daily practices for farm production should be a major concern. Most of the dairy farmers of the developing countries are not moneyed enough to have regular diagnosis of their cattle which can detect disease at an early stage and the medical infrastructure is not available at many places .Many farmers from villages have to take their cattle to very far distance for getting to a medical facility. An early diagnosis with an automated system which would record all the vital monitoring information related to cattle which would be helpful in speeding up the healing process and can avoid the deaths due to unavailability or lack of veterinary specialist at the locality .Speaking of India which is having a huge cattle population is deprived of doctors in the rural sectors. A system is needed for spreading awareness in villages regarding the prevention of these cattle diseases which would lead to reduction in dependency of medical expertise and would also reduce the expenditure of transportation of livestock in big cities or towns during a medical condition. System presented in this paper deals with an approach of having a hardware containing within a large database which include symptoms and data of commonly occurring health care problems and can report and monitor the health condition. This can be accomplished with the help of machine learning algorithms which identifies the scenario and provides a pre diagnosis of the problem with the data collected from sensors which is matched from the internal database. The system provides early detection of the disease which can prevent delays in identifying heinous diseases .System which further performs an intelligent analysis from the sensor data of a hardware device and detect whether the cattle is Suffering from a disease or not .The system performs the calculations using various sensors like temperature, pressure accelerometers. The mechanism involves both an image and sensor data acquisition from the hardware for monitoring. The process exploits the intelligent analysis mechanism feature of machine learning to produce results from the acquired data. This application becomes a first aid mechanism which analyses the symptoms to give you results on the bases of computation of data with the algorithms made for identification of cattle diseases.

II. ECONOMIC EFFECT OF CATTLE DISEASES

Diseases have influence on the farm production, therefore ends up in low production, low income and low quality. Highly contagious ethereal mammal diseases like Lameness, Ketosis, Milk Fever, Retained Placenta, Diarrhea, Pneumonia, Oestrus, Retained Placenta cause irreparable economic losses to the farming community. They conjointly occupy the highest position among the cattle diseases causing economic losses and their impact on cattle production and productivity A study was conducted to investigate the factors related to the amount of economic losses from diseases like bovines, mastitis, HS and Surra in Purvanchal Region of Uttar Pradesh. The findings of the study discovered that mastitis was additional prevailing in high yielding CB cows than ND cows and buffaloes. Buffaloes were at additional risk of HS than cattle. Economic losses per lactation in bovines as a result of mastitis were highest in CB cows at Rs 1,314.10 per lactation. In case of ND cows and buffaloes total losses as a result of mastitis per lactation were Rs 868.34 and Rs 1, 272.36. Total economic losses as a result of HS within the study space were Rs 1, 71, 839.50, Total losses as a result of HS per animal in ND cows, CB cows and buffaloes were Rs 2,355.78, Rs3,228.52 and Rs 4,262.57 per lactation. Total economic losses as a result are, Rs 11, 830. Per lactation. Total losses as a result of per animal in ND cows, CB cows and buffaloes were Rs 3, 328.18, Rs 6, 193 and Rs 9,872.33 per lactation .This information so discovered vital losses as a result of diseases in cattle's. There is ample scope of preventive measures to avoid the circumstances of the disease. The study specified that there is a need for sustained smart monitoring solutions and development and use of diagnostics for early detection of the diseases and prevent their adverse impact at the earliest.

Spp/Breed	Total loss (Rs)
ND Cows	868.34
CB cows	1314.1
Buffaloes	1272.36
Total	1248.67

Figure 1: Economic losses due to Mastitis per animal per lactation

Spp/Breed	Total losses per animal(Rs)
ND Cows	2355.78
CB cows	3228.52
Buffaloes	4262.57
Total	3755.95

Figure 2: Economic losses due to HS per animal per lactation

III. DESIGNING THE SOLUTION

The application involves data acquisition from sensor ,manual input and vision devices data could be a text , image or sensor reading like acceleration ,ECG from a device which is sensor device or an optical device like camera .The basic processes in the application would be collecting data , storing ,analyses and displaying the results. Data collection is about the application collecting data actively from the sensors .The data is filtered and extracted using data acquisition library in python called SCIPY, then input is analyzed using machine learning algorithm for similarity analysis over the data set ob- tained. The text input is analysed using processing algorithms in which we use similarity algorithm to find the symptoms associated to cattle in our database and when match is found it is send back to the application. This data is collected from active practitioners like research scientist, veterinary doctor .The data collected while diagnosis is compared with this data. If these values within the tolerance limit matches with the recorded data of the symptoms the disease the alert message or the emergency signal is prompted .Many of disease like HS, mastitis can be easily treated in primarily development stages but the detection of these disease is complicated with regular monitoring of cattle health these problems gets highlighted .With regular check of temperature, BP and other parameters any shift observed from the normal values get alerted. The platform which become the brain of this system which will combine all the system would be Enthought Canopy which is an envision unique platform in python for developing a sensing environment from variety of different interface and analyses sensed data with different level of abstraction. It also provide interface for data visualization.

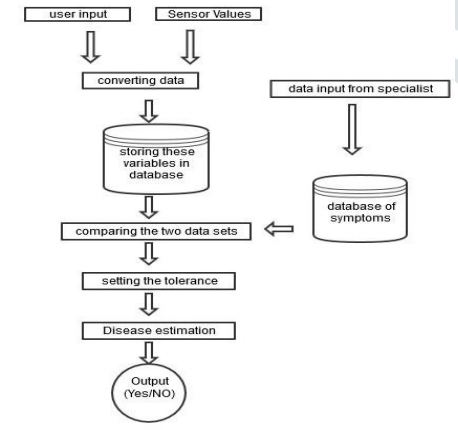

Figure 3: Detection Mechanism

IV. HARDWARE DESIGN

Hardware for the project consists of sensor interface which is connected to an analog device for amplification and signal conditioning .Proper signal output is observed by an ADC IC MCP3008 to provide data from sensor and establish a connection between the sensor and the microcontroller unit. For the micro controller unit we use raspberry pi which is a compact size, lightweight computer which is primarily programmed on python .The data from sensor ,camera and user input is inserted to a database file then these values are processed differently as per the requirement . Parts used in the building of the hardware are open source hardware platform. Following parts listed below are the bare minimum requirement for development of the prototype: Raspberry pi , MCP3008 ADC ,Sensors temperature , ECG ,Raspberry pi camera module ,Display Device. These electronics products are cheap and easily available.

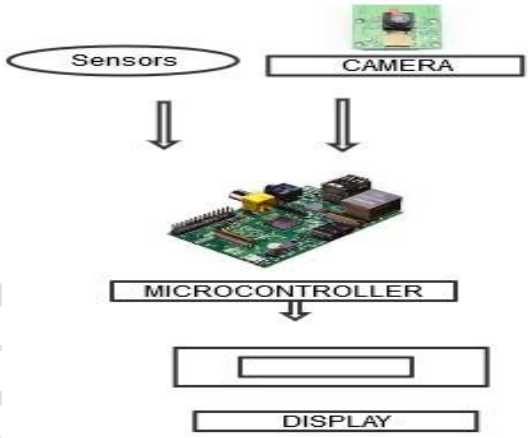

Figure 4: Hardware model

V. IMAGE ANALYSIS

Detecting differing types of skin diseases from color Image may be a terribly difficult task in computer vision. checking out totally different options from the color skin pictures of the infected space of various skin diseases and detecting them with a high accuracy rate is that the primary purpose of this analysis .Researchers are working on many algorithms that may be accustomed sight differing types of skin diseases. Artificial neural networks system can predict skin diseases in patients and their accuracy rate is 90%. An automatic dermatological diagnostic system [7] uses primarily processing algorithms like ours and used feed forward back propagation artificial neural networks for training and testing purpose. An image with back propagation neural network (BPNN) can help the specialist in achieving the accuracy rate was 91.2%. Successful development of detection of Psoriasis disease in humans proves that the feed forward artificial neural networks are an efficient technique to detect disease [8]. Automatic facial skin defects recognition system with an accuracy rate of 98.0%. In this analysis the approach like the examples above is employed so as to find differing kinds of skin diseases from color image. The most distinction between their system and our system is, they need thought-about region of interest (ROI) as image extracted feature however we've thought of average color code of infected space, shape, and space size and conjointly some inputs from user as options like elevation of the infected space, liquid color, and liquid kind. The system works on 2 phases- 1st pre-process the color skin pictures to extract vital portions and later identifies the diseases. For the identification initially we tend to explore the colored skin pictures and apply eight completely different image process algorithm on that to search out some visual pattern and vital options like average colour code of infected space, infected space size just in case of pixels and shape or edge detection of an infected space. Then we tend to use user inputs like gender, age, duration, liquid kind, liquid color, elevation and feeling. We tend to train user input values at the side of color skin image extracted options to coach and check into a feed forward back propagation ANN to spot the disease.

VI. LEARNING ALGORITHM

We have used feed-forward back-propagation neural net- work training to perform this step. We valid and tested our system exploitation the multiple cross validation method. The virtue of using a cross validation technique is that there are not any overlapping of the check information and training information, creating the system testing results viable and dependable. We have got trained our feed forward back- propagation neural network with nine completely different options, three of them area unit extracted from the image processing algorithms and six of them area unit from user inputs. During this system we've got used a hundred neurons in our hidden layer to induce the most effective result from the system. Some sample feature values area unit given below that we've got utilized in our input layer

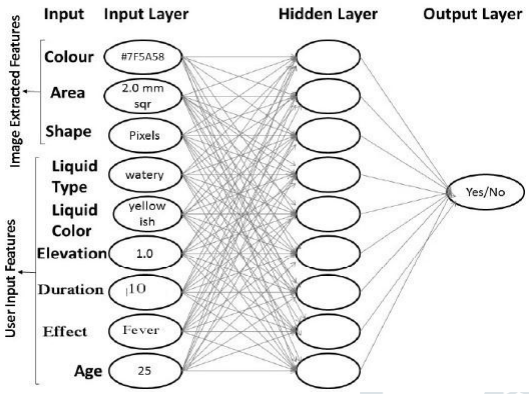

Figure 5: Machine Learning Network

VII. RESULT

The following are the cattle diseases can be detected with the proposed platform

Disease	Sensor
Heifer Pneumonia	Microphone , Accelerometer
Heifer Diarrhea	Temperature Sensor
Retained Placenta	Acce. , Load ,Microphone Heart beat,Temp.
Ovary Cysts	Pressure ,Temperature
Lameness	Accelerometer,Load ,GPS

Figure 6: Sensors that can detect diseases

VIII. CONCLUSION

Following are the objective which can be achieved using the proposed system • Disease detection from image and user input of the infected area

- Lowering the economic losses caused by health problems in cattle
- Early stage detection of health issues by regular monitoring of cattle health by collection of data such as images, temper- ature, blood pressure, ECG.

REFERENCES

[1] Dhananjay Singh, Sanjay Kumar, B. Singh and D. Bardhan .Economic losses due to important diseases of bovines in central India, Veterinary World, EISSN:2231-0916

[2] Yogesh Bangar, T. A. Khan, Amit Kumar Dohare Analysis of morbidity and mortality rate in cattle in village areas of Pune division in the Maharashtra state vetworld.2013.512-515

[3] Amna Abdullah , Mohammed Tarique , REAL TIME WIRELESS HEALTH MONITORING APPLICATION USING MOBILE DEVICES ,International Journal of Computer Networks Communications (IJCNC)Vol.7, No.3, May 2015

[4] Rahat Yasir, Md. Ashiqur Rahman Dermatological Disease Detection using Image Processing and Artificial Neural Network .Department of Electronics and computer engineering department .North South Univer- sity

[5] Caroline Viguier, Sushrut Arora , Mastitis detection: current trends and future perspectives Trends in Biotechnology Vol.27 No.8

[6] Skin Conditions in Cattle–NonParasitic NADIS2015

[7] M. Shamsul Arifin, M. Golam Kibria, Adnan Firoze, M. Ashraful Amin, Hong Yan, "Dermatological Disease Diagnosis Using Colour-skin Images", Proceedings of the 2012 International Conference on Machine Learning and Cybernetics, Xian, 15-17 July, 2012

[8] Nidhal K. Al Abbadi, Nizar Saadi Dahir, Muhsin A. AL-Dhalimi And Hind Restom,"Psoriasis Detection Using Skin Colour and Texture Fea- tures",Journal of Computer Science 6 (6): 626-630, 2010, ISSN 1549-3636,