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POULTRY MANAGEMENT SYSTEM WITH DETECTION OF SICK BROILERS

S.Surya[1], Vedanarayanan SR[2] , Hrithik Kumar V[3], Vishnu MS[4]
[1]*Assistant Professor, Electronics and Communication Engineering, Sri Sairam Engineering College, Chennai*
[2]*UG student –Electronics and Communication Engineering, Sri Sairam Engineering College, Chennai*
[3]*UG student – Electronics and Communication Engineering, Sri Sairam Engineering College, Chennai*
[4]*UG student – Electronics and Communication Engineering, Sri Sairam Engineering College, Chennai*

ABSTRACT
Frequently, the occurrence of poultry diseases can seriously threaten human health. Even though the quantity and density of poultry rearing are high, monitoring of poultry diseases is still based on manual observation. The project is to develop a prototype that can develop a solution using digital image processing and Machine Learning algorithm implemented that can effectively detect and classify sick/diseased birds from healthy Birds whilst giving high accuracy and good performance which will aid in giving early warning signals.

Keywords—Poultry Farm, Machine Learning Techniques, Image Processing

1. Introduction

In recent years, poultry disease outbreaks have occurred frequently, it affects the poultry industry. They have not only caused enormous economic losses to the poultry farm owners but also seriously threatened human health. Therefore, poultry disease has become a key issue for poultry farmers and even the country.

At present, the monitoring of poultry disease is mainly carried out by manual observations by looking into the poultry posture, feathers, cockscombs, faeces and sounds. This Manual observation requires a large number of people to perform regular or irregular inspections, which is time-consuming and labor-intensive, and it may not find sick broilers in a timely fashion. At the same time, the rapidity and accuracy of poultry disease observation depends mainly on the experience and knowledge of poultry farmers.

To overcome this issue and to detect the sick broilers a prototype is developed that could develop a solution using some Machine Learning algorithm. It performs image processing on a broiler and depicts whether the broiler is sick or healthy. However, it can be very difficult to segment broilers from the background to extract their features when the colors and the textures of the foreground and background are similar.

The Light conditions are a challenge when using these kinds of methods. Early warning of changes in the health status of broilers has always been a difficult challenge for research. Although amidst the various affecting factors it can give high accuracy and good performance which could give early warning signals.

This project also includes a prototype that can monitor poultry environmental parameters using appropriate sensors and displays it in real time to the poultry farm owners using IOT.

2. Methodology

2.1 Proposed Solution

In order to improve the accuracy in result the feature extraction including eight different pre - processing algorithms were used. The algorithms used were converting to grey scale image, sharpening filter, median filter, smooth filter, binary mask, RGB extraction, histogram and Sobel operator. The RGB values of the images are extracted before converting it into a grey scale

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image. Sharpening filter is applied to the grey scale image in order to sharpen the details of the infected region. By using CNN algorithm to detect to send through the Wi-Fi module

2.2 Existing Work

In the previous works related to disease detection in broilers where not that accurate due to the failure in pre-processing algorithms and edge filtering which identifies the object and focuses on them. The new filter is an edge-preserving filter especially performs when images are polluted by mixed noise containing Gaussian noise, Poisson noise, and impulse noise. The structural features are obtained from multi resolution analyses which are used to discriminate the structures as borders, dots and streaks. On the other side, the textural features computed by LBP operators are used to discriminate the local variation of colours, the pigment network etc. Later, these features are fused in multiple combinations to investigate the influence of each combination in the performance of detecting broilers. Instead of Manually checking process it uses CNN algorithm that compares the pre-processed image with the already trained dataset to display the image.

2.3 Scope of the Project

Poultry industry which provides cheap source of animal protein has taken a quantum leap in the last three decades evolving from a near backyard practice to a venture of industrial promotion.Poultry is one of the fastest growing segments of the agricultural sector in India today. While the production of agricultural crops has been rising at a rate of 1.5 to 2 percent per annum and also that of eggs has been rising at a rate of 8 percent per annum. India is on the world map as one of the top five egg producing countries.The poultry sector in India has undergone a paradigm shift in structure and operation. This transformation has involved sizable investments in breeding, hatching, rearing and processing.High quality chicks, equipment, vaccines and medicines are available. Technically and professionally competent guidance is available to the farmers. The management practices have improved and disease and mortality incidences are reduced to a great extent.

2.4 Block Diagram

The below figure shows the block diagram designed using the proposed methodology. It depicts firstly the broiler image from the poultry farm is pre-processed and the image segmentations are done. Now, that image is compared with the already trained poultry dataset using the CNN algorithm and lastly displays a result whether the broiler is sick or healthy in real-time using IOT. It also turns on the buzzer to alert the poultry farm owner if the processed broiler is sick. The prototype also contains Humidity sensor, moisture sensor and fire sensor to capture the environmental parameters of the poultry farm in real time and display it to the poultry farm owner using an IOT technology.

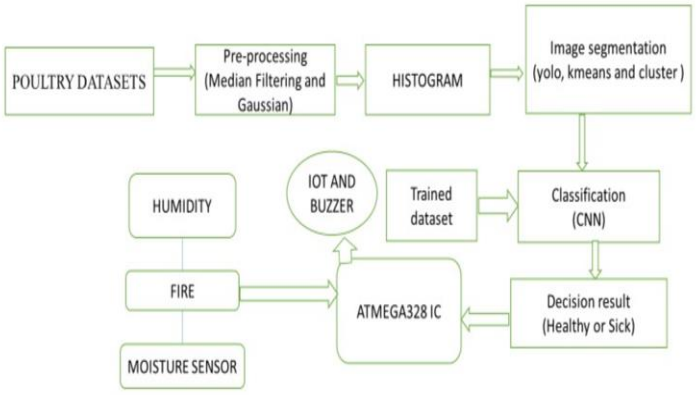

Fig 1. Block Diagram

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3.Results and Discussion

Thus, the poultry management system using MATLAB could detect the image, analyse and compare with the given dataset to determine whether the given broiler is healthy or not with an accuracy of above 90.3%. The poultry's environmental parameters such as soil moisture and humidity are calculated using appropriate sensors and are displayed in real time through a web application to the poultry farm owner.

3.1 Web Application Snapshot

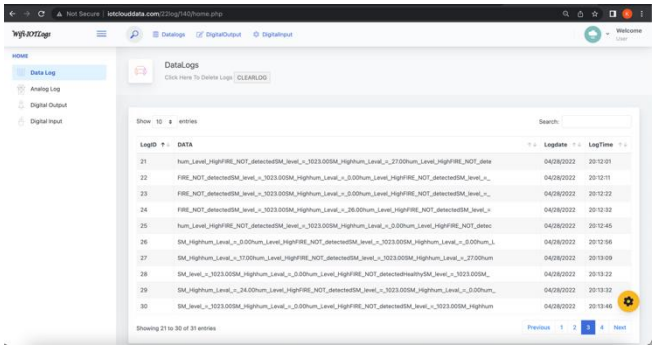

Fig 2. Web Application Snapshot

The above figure is a snapshot of the web application displaying the poultry's environmental parameter in real time

3.2 MATLAB final output with segmented images

The snapshots displayed below shows the various segmentation methodology processed for analysing broiler image and the help dialog box that shows whether broiler considered for processing is healthy or not.

Fig 3.Depicts Conversion of RGB image to a Greyscale image

Fig 4.Depicts Application of median filter to reduce noise

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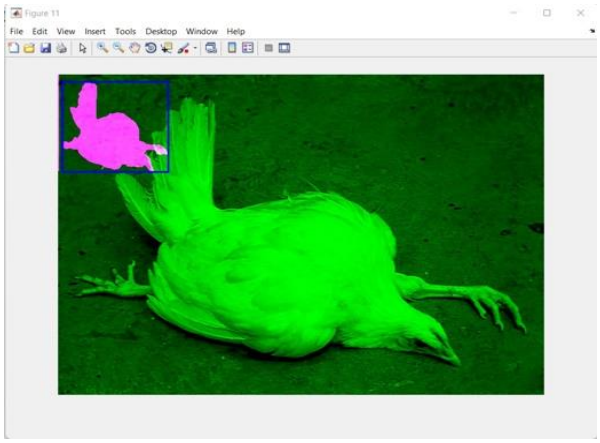

Fig 5. Depicts Object detection using yolo algorithm

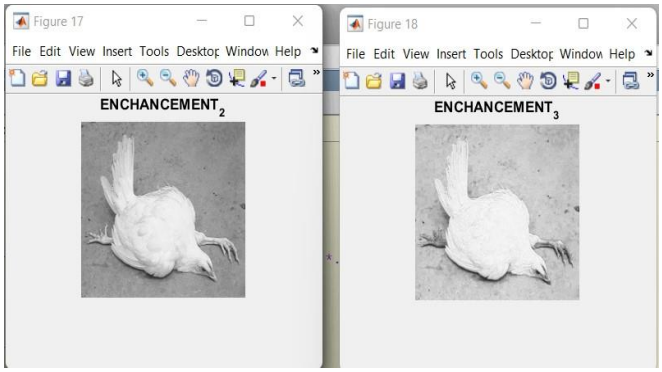

Fig 6. Depicts Increasing contrast to increase sharpness and texture

Fig 7.Depicts Edge based segmentation using canny edge filter

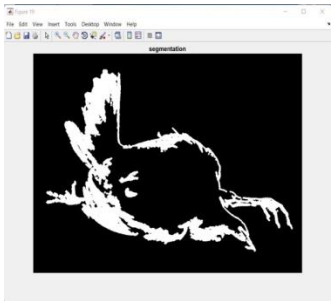

Fig 8. Depicts Segmentation of image

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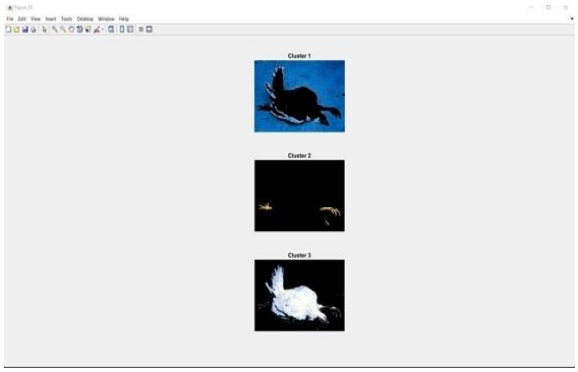

Fig 9. Depicts Clustering the image using k mean algorithm

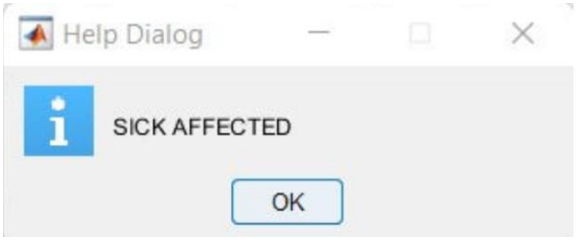

Fig 10.Depicts Final result

4. CONCLUSION

These technologies have the potential to substantially increase the production capabilities of farm and allow health issues or abnormal patterns to be quickly detected by real-time monitoring of environmental conditions, behaviour patterns and rearing conditions, etc. of poultry. It can reduce manual intervention and decrease economic losses by early detection of diseases, poor health. It has a direct impact on farmers, egg and meat producers, and breeders and will enable them to make informed decisions and changes. This technology can also be extended to cattle or pig health monitoring in future.

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