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Livestock Monitoring Based On Iot Technology

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ABSTRACT: This system is going to monitoring cow feeding position and tracking taken food quantity with milk production. The animals in farm House requires additional support to the animal husbandry activities. Such support must include the monitoring and the conditioning of animal location and behaviour, specially their feeding posture. IOT network is performed to own processing ability. The cloud platform consist the machine learning feature and Data mining. it is used to extracting of relevant information from the Data gathering by IOT network.

Keywords: *Da*ta mining, *Animal monitoring technology, Machine Learning, IoT*.

1 Introduction

The project integrates an IoT sensor network, responsible for monitoring and conditioning animal. The cloud services allows the incorporation of Data Mining (DM) and Machine Learning (ML) techniques, that can be used for extracting additional and relevant information for whom manages farm house.. In the scope of this paper it is explored the cloud platform that receives animal sensor streamed data, performs data analysis (e.g. rule management), allows farm managers to access animal information and trigger alarms in real-time when certain situations are detected (e.g. panic attacks, attacks from predators, abnormal number of infractions, etc.). The paper also describes some preliminary results of an animal posture monitoring use case, for which several machine learning algorithms were tested. The overall platform architecture, focusing in the clouds one and its connection to the local IoT network. presents an example of the application of ML learning algorithms to predict the animal behavior.The Dairy Monitoring technologies are gain interest. Improvements in nutrition, management processes and animal welfare in general could lead to increased performance of dairy cows. However various factors such as diseases, low detection rates of insemination moments, and reproductive health problems still have a negative impact on overall economic performance of the dairy industry.

2. Related Works

2.1 IoT Network

Collars are the main data gathering interface, collecting data from sensors, being as well responsible for the supervision of the animal's posture behaviour and location. As these devices own processing abilities and because it is not suitable to wait for a decision to be handled and transmitted by a central node with more processing power, due to the delay associated, the posture control algorithm runs locally, analyzing sensor data and applying corrective stimuli (e.g. electrostatic and auditory cues). Thereafter, the relevant data for the user is transmitted to an infrastructural network composed by fixed beacons. These devices are installed accordingly to the intended grazing areas and besides being responsible for collecting collar's data, they implement a periodical and synchronized beaconing signal implement a periodical and synchronized beaconing signal emission all over the network that allow collars to evaluate their location through the use of RSSI-based localization techniques, and the network to trace back animal location.

2.2 Cloud Platform

The Cloud platform, as illustrated is composed by five different interconnected modules, responsible for the aggregation, analyze and processing of stream data. The Message Oriented Middleware is one of the first stages, allowing message routing through producers and consumers. It receives JSON messages from the Gateway and makes them available to the data processing engine. The broker supports several messaging protocols such as AMQP or MQTT, both based on asynchronous publish/subscribe architectures. Henceforth, RabbitMQ works as an intermediary between the Gateway and the remaining platform, managing all the received messages prompted by the Gateway in a First-In-First-Out (FIFO) queue. Also, the RabbitMQ allows security mechanisms to be employed, such as SSL/TLS certificates.

2.3 ML usecase detecting cow's posture infractions

Detecting if a cow is feeding on the food or on the weeds is not straightforward, being necessary to evaluate more than one sensor to avoid bad decisions. Thus, ML was chosen to help on the process, namely resorting on supervised algorithms, which means that the learning algorithm learns from a training set and then applies the learning model to a test set to be evaluated. In this particular application, the data evaluated is gathered from a 3-axis accelerometer and an ultrasound transceiver incorporated on collars, which yield measurements of neck pitch and distance to the ground. cow were released onto a plain field and their activity recorded on video for about 3 hours. At the same time, collars continuously retrieved time stamped raw sensor data and sent it into the network in order to be manually classified.

2.4Machine Learning algorithms comparison

Taking advantage of the ML module integrated within the Cow's computational platform, different ML algorithms were evaluated to asses with which accuracy cow's posture infractions could be detected. Different algorithms were tested, particularly the most popular in classification problems: Random Forest, Decision Trees (DT) using C50 and Rpart packages, XGBoost, K-Nearest Neighbours (KNN), Support Vector Machine (SVM) and Naïve Bayes.

2.5 Upload daily activity

In this module the user can upload the daily activity of the cow. The daily activity contains food, milk, health details, etc.The uploading file contains the entire details of the cow health.

2.6 View upload file

This module is used to view the uploading file. When the user try to upload the file

2.7 Analayzing cow & milk quantity

In this module the cow health and the milk quantity is monitored. This module is used to analysis the milk quantity based on the cow health.

2.8 Analayzing food & milk quantity

The module is used to analysis the milk quantity based on the food given to cow. Based on the food taken by the cow the milk quantity is analyzed.

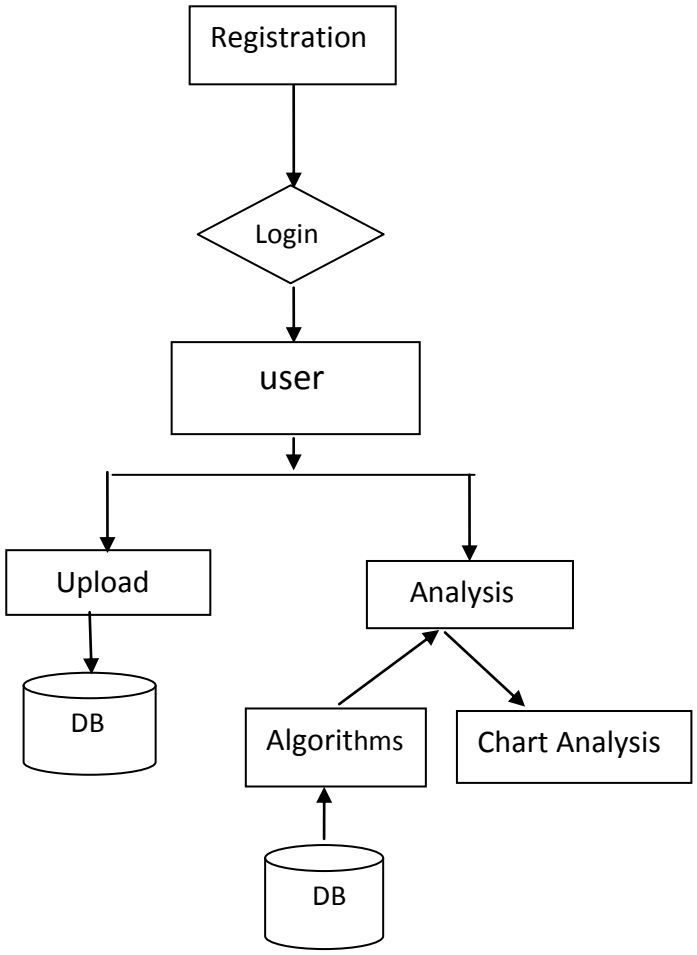

Fig1: Data flow

3. Result analysis

In this module the overall process is displayed based on the user query. In the result prediction module the user can view the cow health details and also the milk quantity based on the analysis.

Upload data format will be,

1. Date
2. Animal Id
3. Food Name
4. Quantity
5. Position(x , y)
6. Approx Milk Produce Quantity

Find the approx. food quantity and food to take the maximum milk produce value using the algorithms Random Forest, DT, XGBoost, KNN, SVN, DT(RPart), Navie Bayes. On calculation time, find the accuracy and some other characteristics also. Tried to display the result on table or graphical format

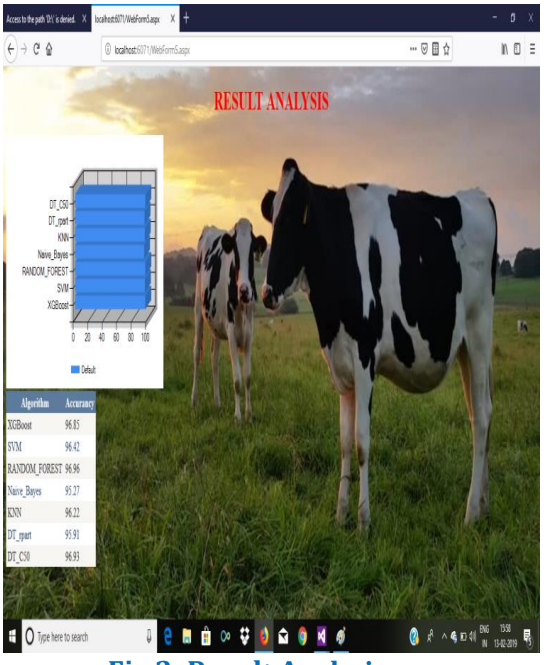

Fig 2: Result Analysis

3.1 Applications

Needs at Diary House, Cattle Feed Products Manufacturing Companies Our system helps to cattle companies as below,

1. Produced with the optimal blend of required nutritional elements.

2. Made with ultra modern technology which helps in producing a high quality product.

3. Increases milk production.

4. Improves body condition and overall herd health.

5. Formulated with superior quality raw materials resulting in a highly palatable cattle feed.

6. Gradually increases milk yield without causing stress to the animal and without compromising on the solid non-fat (SNF) and total fat contents of the milk.

7. Suggesting the foods to good.

4 Conclusions

The project used to increasing milk production on farm house. It demands from milk significant economic and labour efforts. Moreover, the solutions currently used, economic are intended to be avoided by producers in order to increase the quality of their products. This system is going to monitoring cow feeding position and tracking taken food quantity with milk production. Thus, cow, by their propensity to feed from food, are seen as an alternative environment besides the local operation, the system comprises a computational platform running on the cloud that receives the data gathered locally and process it in order to retrieve additional information from them. One of the mechanisms that may be used is Machine Learning. This paper presents the overall system architecture, from collars, the mobile nodes carried by cow, up to the cloud platform with different tasks as data analyses, data processing or data storage. In addition, this paper presents the evaluation methodology and results of the added value of a Dairy farm house monitoring from a dairy farmer's perspective.

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