Review On Sensor Data Acquisition With Labview

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Abstract—In recent years many techniques has shown potential in solving the real-world problems. The objective of this paper is to put together the popular optimization techniques for understanding and utilize them for the benefit of the society. The early prediction of the disease can help the social health to be more leaning towards positive ratio. The main aim is to makethe person aware about the health and the problems that he will be facing. This can lead the person to consult the doctor or physician at the correct time and acquire proper treatment or measures as required. As it is well said, precautions are better than cure, one must be cautious about the health factor and look deep into it. This project aims at spreading awareness among people by using different biomedical sensors that are available. For the easy analysis of the data that is been collected in the realtime can be graphically represented by using the most popular LabVIEW software. Looking forward into the global technical world around, we can see the new technologies like artificial intelligence and machine learning emerging into the data handling. This machine learning will help us to calculate and optimize accurate results and the prediction rate would be more efficient.

Keywords—LabVIEW software, Machine Learning, Sensors, Data Acquisition

I. INTRODUCTION

According to recent research conducted till date, it is been observed that most of the deaths that have occurred is due to ignorance or improper detection of the health parameters. The need to have a healthy ageing society requires major help from the trending technology. Considering that technologies are been developed to assist the activities of human beings and to make their life a better living, the pre-diagnosis would definitely be a booster for the social health. The fast development and demonstration of the general feasibility, also the scientific effectiveness, social or legal plausibility, the technical effects on it and the acceptability by end-users of the co-operating machines or well termed as robot that are integrated with smart environments and working in the heterogeneous environments such as domestic appliances, condominiums and the outdoors. The project setup is used to record different physiological parameters of human. The data is collected from the sensors and is analyzed, computed using machine learning. The product outcome of the system would be an analyzed and computed data, which plays an important role in the diagnosis. This is significant on the grounds that anybody could basically gain the software and start gathering information right away. Since a significant objective of the undertaking is to not meddle with the medical procedure being finished by utilizing muddled software, this is beneficial. Likewise, another benefit to the software comes as different data sources, and Bio Bench is fit for utilizing sixteen information channels.

LITERATURE SURVEY

Dilip [1] has proposed in this paper regarding the development done of system which is capable of transferring the patient's important health parameters such as temperature, heart rate and ECG from the remote location to doctor using wireless technology. The author has discussed about the myRio embedded controller which is then connected to the human body. The author has conducted a real time data processing utilizing the LabVIEW tool.[1]

In this paper, the author has discussed about the project based on temperature measuring sensor using Arduino Uno and LabVIEW is implemented. We have used LM35 temperature sensor whose output voltage varies in linear proportion to the temperature in centigrade. Thus, providing us an advantage over other sensors to measure the temperature conveniently in degree Celsius. The LabVIEW 2012 provides a simple interface between temperature sensor and Arduino Uno to read output voltage where LabVIEW further plots the measured temperature data obtained in real time in the graphical form.[2]

In this paper the author has presented a Laboratory Virtual Instrument Engineering Workbench (LabVIEW) and Internet of Things (IoT)-based virtual health monitoring system called LI-Care to provide the diagnosis of the health in an cost-effective way. The parameters measured by the proposed system were validated using the traditional measurement systems, and the Root Mean Square (RMS) errors were obtained for the various parameters. The maximum RMS error as a percentage was 0.159%, which was found in the temperature measurement, and its power consumption is 1 Watt/h. The other RMS errors were 0.05% in measurement of systolic pressure, 0.029% in measurement of diastolic pressure, 0.059% in measurement of breathing rate, 0.002% in measurement of heart rate, 0.076% in measurement of oxygen level, and 0.015% in measurement of ECG. [3]

In this Paper, the author has discussed The main objective of this paper is to present a comparative analysis of ML algorithms for short-term load forecasting (STLF) regarding accuracy and forecast error. The paper gives brief about the different ML algorithms such as logistic regression (LR), support vector machines(SVM), naïve Bayes (NB), decision tree classifier (DTC), K-nearest neighbor (KNN), and neural networks(NNs), that have been implemented to analyze the performance.[4]

In this paper, we introduce a machine learning based COVID infection predictor. We measure the prediction accuracy of five ML models. We use Chi-square test and knowledge-based manual feature selection to select important features for prediction to reduce prediction time overhead without compromising prediction accuracy. [5]

In this paper the author has discuss the respective characteristics and differences between the using of third-party database and the using of file IO operations when the LabVIEW program needs to meet the requirement of the storage of data. Then after the author has discussed so as to how to uses TDMS format to design a database based on TDMS, and thecharacteristics and basic ideas of this kind of native high-speed TDMS database supported by LabVIEW. Next, in the part of the research and implementation methods, the paper will present how to use the make the TDMS database to support the basic operations of CRUD in relationship database. Following, a data processing interpreter whose core is the conversion between the TDMS format data and two-dimensional array is proposed, which has made the more complex operations of TDMS data realized. Subsequently, this paper shows how to add native SQL language support to the TDMS database. Finally, a comprehensive analysis and summary of database design using TDMS data format is made.[6]

The Spy robots are remotely inhibited vehicle, equipped by camera. Wireless Robot car is simple 2-Wheel robot, which is controlled using LABVIEW and PC's Parallel port with the help of LabVIEW Front Panel. Wireless communication established using 433 MHz RF-module. The goal of spy robot is to search interesting stuff from where people are not able to reach. It can reach specific location through its wheel encoder and return to its home. It is a little robot intended for surveillance, observation and assessment purposes.[7]

This paper designs a Lab View -based real-time operation data monitoring system for automobiles, which can receive data from sensors and record them through the CAN bus of automobiles. The system has simple hardware and friendly software interface, which can meet the users' needs for data acquisition and monitoring.[8]

This paper describes a hybrid laboratory stand builded on the conception of IoT, its structure, main software modules and test results are described. Authors proposed a concept according to which the stand can simultaneously behave as a standard research stand located in the laboratory and a remote research module.[9]

This paper presents an idea for using LabVIEW to create a virtual tool for determining the energy flows during charging an energy storage system made of connected in series supercapacitor cells. The preliminary developed charging algorithm is described and its basic equations are given. The presented tool allows the changing of some basic parameters of the energy storage system and observing if the algorithm is applicable.[10]

Recently, great efforts have been made to passing from traditional to online learning due to the COVID-19 pandemic. Regarding online learning, many concepts have been developed to use various learning methods in electrical engineering laboratories because this involves equipment that students have not access. To solve this problem, virtual instruments have been made to control and monitoring equipment from the laboratories. In this paper, we presented a solution for the development of a remote laboratory for measuring a DC motor speed. The greatest advantages of this method are the remote interaction of the students with the workbenches in classes, the shortening working time, the measured values accuracy, the automatic graph drawing, and reducing measurement errors.[11]

An Intelligent data processing is essential to create a large amount of data in Internet of things. We progress the consistent smooth and computerized uses of artificial intelligence, machine learning, deep Learning. To analyze the data using deep learning that is subcategory of machine learning techniques. This investigation designed and implemented the intelligent system that is used to detect the rise of Covid-19 cases using various artificial intelligent algorithms through machine learning. Here best algorithm is chosen for prediction of Covid 19 Omicron cases based on their accuracy of performance metrics.[12]

Neural network is a popular and significant research direction in machine learning, which is widely used in classification. regression, pattern recognition and other fields. Based on the current direction of academic research, the application of neural network in image classification has great research value. However, due to a large number of such articles, involving too wide a range of aspects, it is difficult to grasp the main idea quickly when quoting. We have selected and sorted out some representative basic articles and innovative cutting-edge articles. After systematic analysis and integration, we give each a better algorithm for some of the previous algorithms. This upgrade is reflected in performance, efficiency and other aspects.[13]

Deep learning is a technical tool with broad application prospects and has an important role in the field of image recognition. In view of the theoretical value and practical significance of image recognition technology in promoting the development of computer vision and artificial intelligence, this paper will review and study the application of deep learning in image recognition. This paper first outlines the development of icon recognition technology, and then introduces three main learning models in deep learning: convolutional neural networks, recurrent neural networks, and generative adversarial networks, and provides a comparative analysis of these three learning models. Finally, the research results of deep learning image recognition application fields, such as face recognition, medical image recognition, and remote sensing image classification, are analyzed and discussed. This paper also analyze the development trend of deep learning in the field of image recognition, and conclude that the future development direction is the effective recognition of video images and the theoretical strengthening of models.[14]

With the development of social economy, Internet of things(IOT) communication technology has been widely used in smart home, industrial control, smart city, smart agriculture and other aspects. This technology also provides a lot of convenience for our daily life. In this paper, we designed a multi-point data acquisition system by using embedded system and Internet of things communication technology. It can use the AD converter of embedded system to collect multi-point experimental data in real time, and then send it to the control terminal through the Internet of things, which is convenient for users to view the test data in real time and eliminate the security risks when the system is working, The experimental results show that the multi-point data acquisition system we designed can monitor the changes of multi-point data in real time, and the acquisition system has good stability.[15]

The main aim of this study is to develop and deploy a distributed data acquisition system to acquire different environmental parameters using sensors. The available literature has neglected to account for the role that the concept of real-time monitoring plays, a shortcoming this paper addresses. We explored to what extent, and in what ways can real-time monitoring improve the concept of data acquisition. We do so to better enable access to data from anywhere in the world using smartphones. In this paper, a distributed data acquisition system application for real-time monitoring using smartphone is presented. The system has two sensors, namely, DHT22 to measure both temperature and humidity, and BMP180 Barometer sensor which measures temperature, pressure, and altitude. For data acquisition, a Raspberry Pi is used, which acquires data from the sensors that are connected to it. The Raspberry Pi has in-built Wireless Fidelity (Wi-Fi) which enables it to communicate to the outside world. A webserver, in the form of Things peak is created and runs on the Raspberry Pi to allow real-time monitoring from a smartphone or any smart mobile device. The user can log into Thingspeak and monitor the temperature, humidity, air pressure and altitude of the environment. This paper gives an overview over existing literature, presenting the evolution of the real-time data acquisition in a full spectrum of different industries, and focusing on a particular subset that deals with digital-based data acquisition. In this study we explored people's conceptions of sensing and analysis capabilities of different data acquisition systems, their accuracy and reliability in big and small industries.[16]

This chapter familiarizes the reader with introducing and exploring LabVIEW software. It introduces the graphical programming environment for developing applications using LabVIEW. Also it provides a foundation in the use of this software for finding solutions to any real-time problems. LabVIEW is a graphical programming language that uses icons instead of lines of text to create applications. In contrast to text-based programming languages, where instructions

determine program execution, LabVIEW uses dataflow programming, where the flow of data determines execution.[17]

This paper presents the usage of LabVIEW software for automation of data acquisition and data post processing during structure testing. Using LabVIEW could accelerate preparation of testing reports especially during performing repeatedly (obtaining statistics). The paper shows automations made during tests of oil tank models and aluminum bridge.[18]

National Instruments LabVIEW is a graphical programming language that has its roots in automation control and data acquisition. Its graphical representation, similar to a process flow diagram, was created to provide an intuitive programming environment for scientists and engineers. The language has matured over the last 20 years to become a general-purpose programming environment. LabVIEW has several key features which make it a good choice in an automation environment. These include simple network communication, turnkey implementation of common communication protocols (RS232, GPIB, etc.), powerful toolsets for process control and data fitting, fast and easy user interface construction, and an efficient code execution environment. We discuss the merits of the language and provide an example application suite written in-house which is used in integrating and controlling automation platforms.[19]

Recent times are witnessing rapid development in machine learning algorithm systems, especially in reinforcement learning, natural language processing, computer and robot vision, image processing, speech, and emotional processing and understanding. In tune with the increasing importance and relevance of machine learning models, algorithms, and their applications, and with the emergence of more innovative uses–cases of deep learning and artificial intelligence, the current volume presents a few innovative research works and their applications in real-world, such as stock trading, medical and healthcare systems, and software automation. The chapters in the book illustrate how machine learning and deep learning algorithms and models are designed, optimized, and deployed. The volume will be useful for advanced graduate and doctoral students, researchers, faculty members of universities, practicing data scientists and data engineers, professionals, and consultants working on the broad areas of machine learning, deep learning, and artificial intelligence.[20]
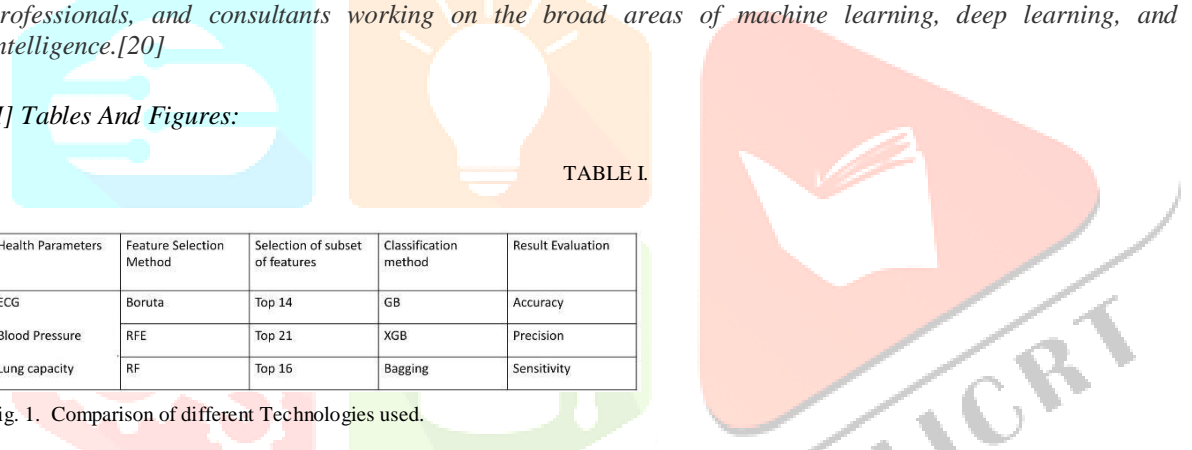
II] Tables And Figures:

TABLE I.

Health Parameters	Feature Selection Method	Selection of subset of features	Classification method	Result Evaluation
ECG	Boruta	Top 14	GB	Accuracy
Blood Pressure	RFE	Top 21	XGB	Precision
Lung capacity	RF	Top 16	Bagging	Sensitivity

Fig. 1. Comparison of different Technologies used.

TABLE II

Sr. No.	Authors	Software/technology Used	Controlling Device	Monitoring parameters	Results	Remarks
	Dilip ,Yogini Dilip Borole,S Sumalatha, HM Nethravathi	Wireless technology, LabVIEW software	myRio embedded controller	ECG	Remote location real time data processing	Analysis Conducted using myRio controller in LabVIEW
	Gaurav Soni	LabVIEW software	Arduino Uno	Temperature	Measured temperature data obtained in real time in the graphical form.	Analysis done using Arduino Uno in labVIEW

Kunja Swain, Murthy Cherukuri, Sunil Kumar Mishra, Bhargav Appasani	Internet of Things, LabVIEW software	myRIO-1900	Health Parameters	RMS errors were 0.05% in measurement of systolic pressure, 0.029% in measurement of diastolic pressure, 0.059% in measurement of breathing rate.	RMS Error checking and corrected in labVIEW and IoT	
THAMER ALQUTHAMI, MUHAMMAD ZULFIQAR,MUHAMMAD KAMRAN, AHMAD H. MILYANI ,AND MUHAMMAD BABAR RASHEED	Machine Learning platforms	-	-	Comparative analysis of ML algorithms for short-term load forecasting (STLF) regarding accuracy and forecast error.	Different ML algorithms have been implemented to analyze the performance.	
Leo Wang, Haiying Shen, Kyle Enfield, Karen Rheuban	Chi-square test	-	COVID-19 symptoms	Machine learning based COVID infection predictor	Prediction of COVID-19 Infection.	
NAGARJUN GOWDA, Dr RAVI KUMAR A V, SHREENIDHI H S	Wireless technology, LabVIEW software	433 MHz RF-module	-	Surveillance and monitoring using wireless camera	Spy-robots for surveillance, observation and assessment purposes.	
Chen Long, Li Zhuo	DAQ using CAN bus, LabVIEW software	-	Various automobile parameters	A Lab View -based real-time operation data monitoring system for automobiles	Monitoring different parameters of automobile using CAN bus and LabVIEW software.	

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