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Review of Inference Model for Environment Detection

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Abstract: ***The Internet of Things (IoTs) refers to the interconnection of billions of smart devices. The steadily increasing number of IoT devices with heterogeneous characteristics requires that future networks evolve to provide a new architecture to cope with the expected increase in data generation. The IoT paradigm has to be connected to the Cloud to increase the reach the scale at which it can be implemented. Today due to introduction of 4G the devices connected to the internet are growing rapidly which increases the scope of useful hardware connecting to internet. The IoT can be applied to many day today useful applications such as Home automation, Healthcare and Environment. But as the hardware generates a lot of data per second to the cloud, it can cause a headache to maintain and analyze such a large data on the cloud. So to solve this problem we have thought of developing a application which will analyze the data coming from the connected devices and with the help of Machine learning's Support vector Machine (SVM) algorithm we can distinguish the data in two categories harmful and safe. After recognizing the safe and unsafe environments using MQ2 and MQ7 gas sensors we are going to send only harmful data to the cloud. This will decrease the amount of data going on the cloud. We will also send an alert which will help the concerned authorities to take the steps necessary for reducing the pollution in the environment. The concerned authority can view the data on his mobile device remotely with the help of cloud.***

Keywords: Android, Arduino, Spreadsheet,, Cloud, Smartphone, Machine Learning.

I. INTRODUCTION

Humans have a limited capacity of grasping and analyzing the large amount of data that can be generated and hammered by day to day IoT devices. However, sensors connected to a IoT Device can collect a large amount of data that has to be analyzed for proper decision making by a given application. This forms the heart of Internet of Things (IoT) concept. Thus with the help of inference model and machine learning a large amount of data can be analyzed and help in easy decision making. Thus IoT can become a integral part of various services such as smart buildings, intelligent transport systems, industrial automation, pervasive healthcare, smart grid, self-driving vehicles, smart cities, etc. thus promising a revolution in social and industrial sectors and the way they can be handled for better productivity.

The growth of IoT is jaw dropping and ever increasing. As per the study in 2016 there were more than 17 billion devices and which will increase and cross 50 billion mark by 2020 more than six times the human population. This will lead to explosion of data that will be generated by IoT Devices. This amount of data cannot be handled by cloud services if uploaded fully. However, the Inference models trained and applied with machine learning will decrease the amount of data sent to the cloud tremendously. Thus various machine learning approaches has to be implemented and studied to decrease the load on the cloud which is heart of a IoT revolution.

II. LITERATURE SURVEY

This topic describes the fundamentals of IOT model. It helps in understanding various ideas put forward by various technical papers published by various polishers.

M. Nia etal. [1] authored a paper which studies the security related to Internet of Things (IoT), also referred to as the Internet of Objects, is viewed as a translating approach for providing numerous services. This paper explains how cyber-attacks on various IoT structures have increased and how loss of data and money increased. The first goal of this paper was to, briefly describe three widely-known IoT reference models and define security in the context of IoT platform. Secondly the applications that arise from the use of IoT and potential motivations of the attackers who target this new architecture where discussed briefly. Third different attacks and threats that arise from the use of IoT where discussed briefly. Fourth, be possible security measures that can avoid attacks where discussed briefly. The drawback of this paper is that it only concentrates on security and not on cloud as well.

Dhananjay Singh etal. [2] authored a paper which studies Internet-of-Things (IoT) and present a approach which will make it more smart and intelligent. This paper presents a unique model for IoT with the help of Semantic Fusion Model (SFM). This SFM model introduces the use of Smart Semantic framework to extract and analyze the processed information from sensor networks and the data generated by it. It introduces a smart embedded system is having linguistic logic and linguistic value based Information to make the system an intelligent system and smarter than the those explained in the paper. This paper also discusson IoT applications, services, visual aspect and challenges for IoT using RFID, 6lowpan and sensor networks. The drawback of this paper is that it only concentrates on embedded systems not on cloud as well.

Dae-Man Han etal. [3] explains the use of WPAN, WSN and ZigBee networks. This paper designs and explains smart home device descriptions and standard practices for demand response and load management "Smart Energy" applications needed in a smart energy based residential or light commercial environment using ZigBee networks. It explains the design and implementation of control application domains included in this initial version are sensing device control, pricing and demand response and load control applications etc. In this paper they design and implement a smart home interfaces and device definitions to allow interoperability among ZigBee devices produced by various manufacturers of electrical equipment, meters, and smart energy enabling products. It introduces and implements the proposed home energy control systems design that provides intelligent services for users and we demonstrate its implementation using a real testbed. The drawback of this paper is that it only concentrates on ZigBee devices and ZigBee networks and not on cloud as well.

Nomusa DLODLO etal. [4] authored a paper which mainly concentrates on building smart cities. This paper explains the implementation and design of smart cities applications as applied to the domains of smart transport, smart tourism and recreation, smart health, crime prevention and community safety, governance, monitoring and infrastructure, disaster management, environment management, refuse collection and sewer management, smart homes and smart energy and thus handling the day to day and improving the user experience of IoT devices. The paper presents a technical solution for energy control and comfort in a home for proof of concept of a smart city infrastructure application using IoT devices. It demonstrates how smart applications can manage energy control and comfort in a room that has a varied number of people and electrical appliances, with each being a source of heat and having a separate IoT device to handle it. The drawback of this paper is that it only concentrates on building smart homes and not on cloud that has to handle the data to achieve it.

Praveen Kumar etal. [5] authored a paper which mainly concentrates on monitoring and control of appliances that can be used in a Smart Home. This paper explains a technique of home automation technology which provides smart monitoring and control of the home appliances as well as door permission system to differentiate between a owner and visitor of a home. This paper implements control and monitoring the status i.e. ON/OFF of the appliances thus implementing Internet, electrical switch, and GUI. Using the technology and implementation of the concept of this paper, the consumer can reduce the wastage of electrical power by regular monitoring of home appliances or the proper ON/OFF scheduling of the devices. The drawback of this paper is that it only concentrates on building smart homes and not on cloud that has to handle the data to achieve it.

Igor Miladinovic etal. [6] authored a paper which mainly concentrates on to provide a new architecture to cope with the expected increase in data generation by IoT devices. Network function virtualization (NFV) provides the architecture necessary for IoT services by enabling the automated control, management and orchestration of network resources using Web. The drawback of this paper is that it only concentrates on sending all the data to web and the data is not infered to send only the needed data.

Luís Nóbrega etal. [7] authored a paper which mainly proposes an animal behavior monitoring platform, based on IoT technologies and its use. In this paper the animals are monitored and all the data is sent to the cloud. The drawback of this paper is that it only concentrates on sending all the data to web and the data is not inferred to send only the needed data.

Dweepayan Mishra etal. [8] authored a paper which mainly proposes a programmed water system with framework for the terrains which will reduce manual labor and optimizing water usage increasing productivity of crops. The data from the sensors are sent to the cloud. The drawback of this paper is that it only concentrates on sending all the data to web and the data is not inferred to send only the needed data.

Preeti Yadav etal. [9] authored a paper which mainly proposed a framework for brilliant city improvement in light of IoT utilizing the investigation of Huge Information The data from the sensors are sent to the cloud. The drawback of this paper is that it only concentrates on sending all the data to web and the data is not inferred to send only the needed data.

Sai Sreekar Siddula etal. [10] authored a paper which mainly proposes a novel idea of collecting and sharing real-time information about water levels to an authorized central command center through far field communication. The data from the sensors are sent to the cloud. The drawback of this paper is that it only concentrates on sending all the data to web and the data is not inferred to send only the needed data.

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III. SYSTEM ARCHITECTURE

A. System Architecture

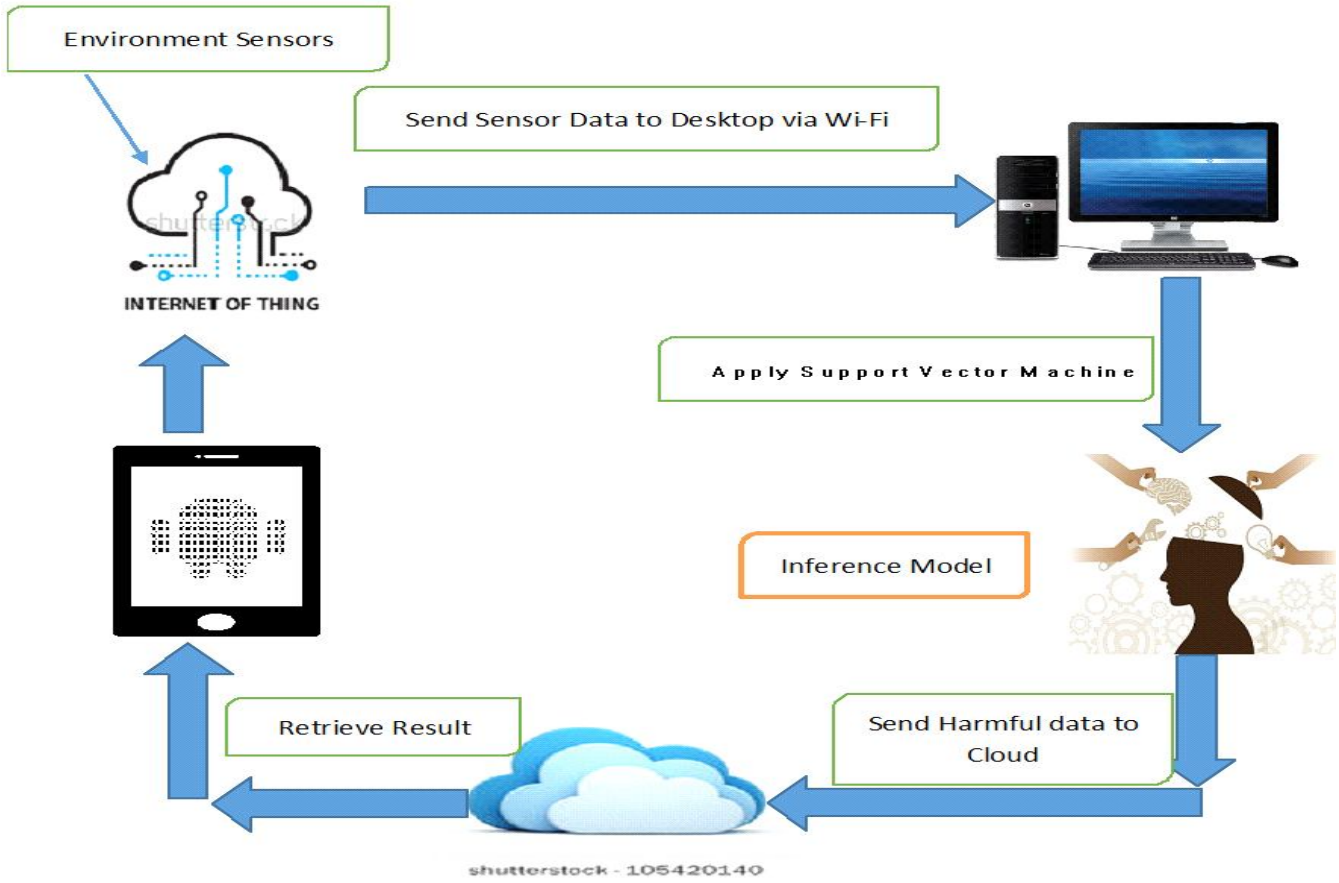

Fig: System Architecture

B. Details

1) Sensors: Here various environment detection sensors are connected to Arduino Board.
2) IoT: Here sensor data is gathered from the sensors and sent to Arduino.
3) Wi-Fi: Here a Wi-Fi communication of client server is made between Arduino and Desktop using Esp8266 module and the sensor data is sent from Arduino to Server for further analysis.
4) Desktop: Here the Sensor data is received and the data is shown on desktop as shown below.
5) Training Dataset: Here the training dataset is generated using two classes harmful and healthy.
6) Testing Dataset: Here the testing dataset is generated using two classes harmful and healthy.
7) SVM: Here machine learning algorithm SVM is applied on training and testing datasets and the environment parameters are found.
8) Upload: Here of the environment parameters are under harmful category than only the data is ent on the cloud for the concerned authority to view it.
9) Mobile: Here the harmful data can be viewed by the user and necessary command is sent to the IoT.

IV. GOAL AND OBJECTIVES

A. To detect harmful environment.
B. To avoid congestion of data on the cloud.
C. To send only harmful data on the cloud.
D. To use Cloud Computing.
E. To use Mobile Computing.

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V. STATEMENT OF SCOPE

There are few scopes of the system to achieve successful Inventory Management System:

1) *IoT:* The System will detect the harmful environment using MQ2 and MQ7 gas sensors.
2) *Cloud Computing*: The System will use Google Drive and Google Spreadsheet as the cloud.
3) *Machine Learning:* The system will use SVM (Support Vector Machine) algorithm for detecting harmful and safe environment.
4) *Mobile Computing:* The system can view the data on the mobile from cloud.

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VI. CONCLUSION

In this paper, we have studied various concepts that have been used by other users and thus developing a unique IoT inference model using IoT, Machine Learning, Cloud Computing and Smart phone together as new architecture. This project mainly concentrates on detecting the environment around us taking in to account two parameters mainly Healthy environment and Harmful environment. We are going to assemble various data from sensors connected to IoT and then analyze the data. If the data is found harmful than only it will be sent to the cloud for concerned authorities to view it on the smart phone. Thus it will decrease the amount of data sent to the cloud and full blown inference model for data on the cloud. The main drawback of this framework is that if the sensors does not properly take readings it will create a failure of the system.

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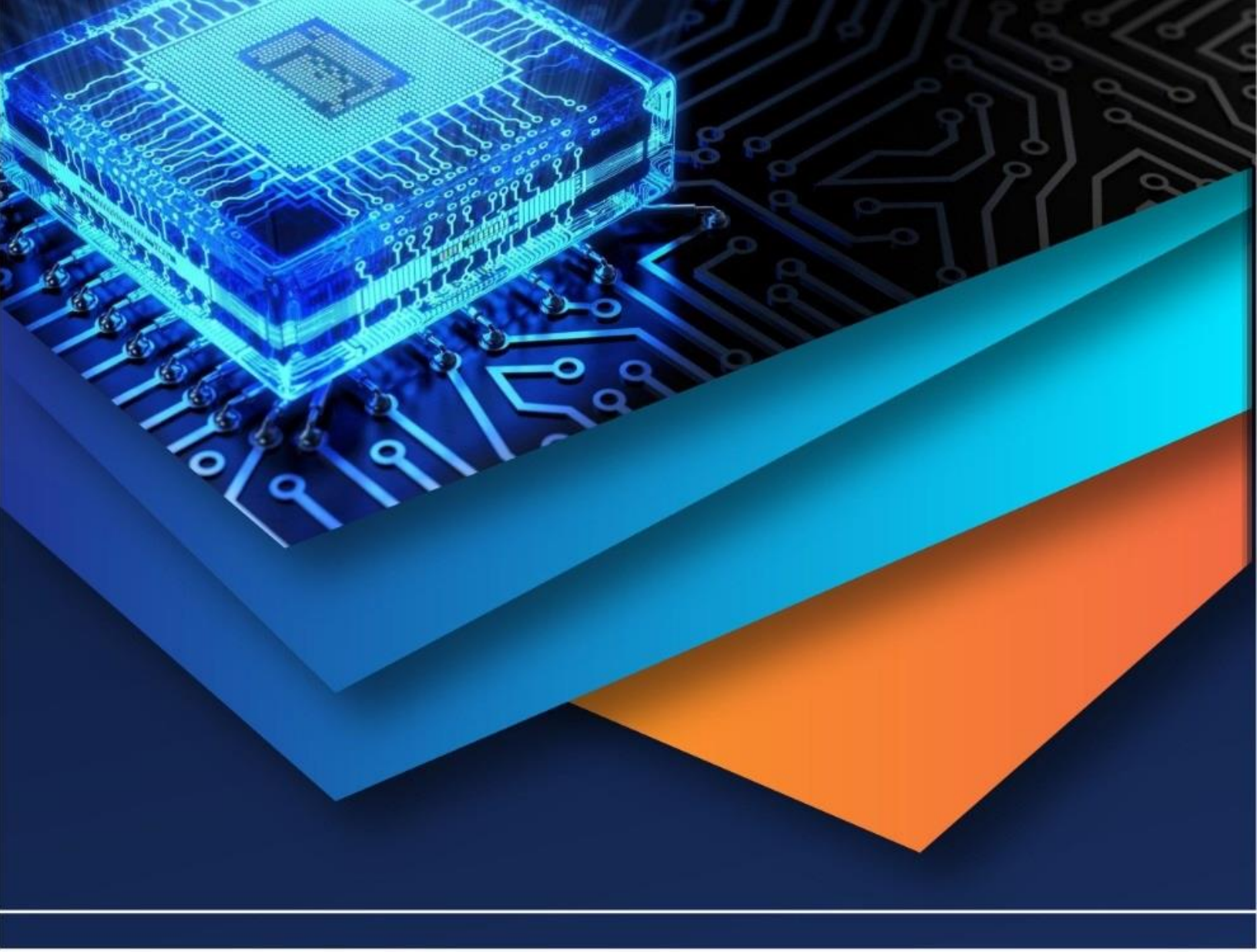

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