Investigation to make existing product to be smart with the development of novel Smart Modification Algorithm

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Abstract— **In the modern time, artificial intelligence (AI) is being used to livelihood plentiful solutions for human beings, such as industry equipment, healthcare, personal devices, autonomous transportation, and many more. Therefore AI with machine learning and deep learning will play an important role. How this important role will be played on the existing devices has mentioned in this research paper. To make this existing device to be smart we will have to consider IOT. Moreover, this entire process will take datasets. This will incorporate big data and data science in the system. The computing is characterized as this-generation application AI-based solutions, which offer human–machine interaction with personalized interactions and services that emulate human manners. Other way round, a large volume of data is generated from various sensors. There is constantly a concern on how to efficiently manage the large volume of produced data.**

In this research paper, we discussed the concerned concepts of AI, machine learning, deep learning, IOT, sensors and Big data to make the existing product to be smart. Byproduct of this process is huge data will be generated and it will be the subject of study by current researchers. We also discussed numerous technologies such as AI and big data analysis to implement the proposed architecture. Finally, we have proposed the system based on novel algorithm. The algorithm has developed by us. We have named in Smart Modification Algorithm. Moreover it takes the input for the algorithm from the IOT based device.

Keywords- Smart product, IOT, Patent, Smart Modification Algorithm

I. INTRODUCTION

The algorithm can be used on any working device, which has user who uses the device. Therefore the dataset of the device & user can be considered to make the device smarter with the implementation of the Smart Modification Algorithm. Moreover similar devices dataset will be considered. The similar devices may cover almost all the geography.

Now let's see examples of Artificial Intelligence in which machine learning and deep learning have been used. Nowadays there are lot of stuff is available.

(i) Sales and service engineers know about the clients thought process in context of their product.
(ii) User of Facebook gets whatever they thing and whatever they did.
(iii) Netflix users get sophisticated features of that like whatever user want to see it detects.
(iv) Driverless cars also use Artificial Intelligence.

Therefore these concepts certainly dominate the existing systems. This way Artificial Intelligence with the use of Machine Learning and Deep Learning has changed the entire scenario. To make entire products available in the market has to be transformed into Smart Product. Moreover product should be operated from the far distance. It fetched the IPv6 addresses to be available for each and every Smart Product. Therefore internet addresses are also very significant in that context.

Artificial Intelligence concept was first coined in 1956. Due to absence of High Computing Power and expensive storage, this concept was gone. Now since last 4-5 years it has gained popularity that too at very common level. It is due to availability of High end computing power and cheap storage. There are two kinds of hardware first is quality hardware and second is commodity hardware. Quality hardware gives reliability. Let's consider the storage as hardware. When your data is important; will you prefer to use quality storage hardware to store your data? The answer is no. You have to have number of copies of same data for the safe site. It does not matter which storage hardware you are using. When you have to have multiple copies of same data you must go with commodity storage hardware. Machine Learning uses less data as compared to Deep learning. Learning is done with the relevant available data. Therefore Machine Learning will take less learning time as compare to Deep Learning. Other way round we could say Deep Learning takes less time in execution and Machine Learning takes more time in execution. Training of Deep Learning is superior to Machine Learning due to volume of data. There has to be an algorithm for learning with particular product. The algorithm learns from relevant data of the product. Based on this learning, when the product is in working mode, the algorithm takes the predicted decision. This is the beauty of Machine Learning and Deep Learning.

II. DEEP LEARNING VERSES MACHINE LEARNING

What exactly is AI? What exactly is Machine Learning? What exactly is Deep Learning? AI starts the machine to think. Therefore the machine will take its own decision. Machine Learning is nothing more than a learning which comes under the umbrella of Artificial Intelligence. It provides a statistical tool to explore the relevant data and understand about this data. In Machine Learning we have three approaches. Supervised, semi supervised (Reinforced) In case of supervised learning we have past data. As an example let's consider popular case of height and weight mapping of peoples. It is past data. Based on this data, whenever a person comes this system asks about the height of the person and refer the mapping and advised about the appropriate weight for that person.

Deep Learning is nothing more than a concept which comes under the umbrella of Machine Learning. In this case the machine can be trained the way the machine could work further like human. It is because it creates multi neural network architecture. Logic of Deep Learning is to mimic human brain. In Deep Learning we have we have different learning techniques like Artificial Neural Network (ANN), it is usually used in case of numbers. There are other techniques like CNN which is being usually used in case of images. It is like (Data[Images] □ Define features □ Create Model □ Make Predictions. Deep Learning has been implemented through Neural Network. In other techniques RNN and Transfer Learning also come.

With the colossal amounts of data being manufactured by the existing Big Data Era, we are sure to perceive innovations that we can not even sound yet, and potentially as soon as in the next five years. According to the professionals, some of these will likely be deep learning applications.

III. SENSORS USED IN EXISTING PRODUCT TO MAKE THEM SMART

Productions and establishments have been using different kinds of sensors for a long time but the invention of the IOT has taken the advancements of sensors to a totally different level.

IOT platforms function and provide different kind of intelligence and data using a variety of sensors. They assist to collect data, pushing it and sharing it with a whole network of connected devices. All this collected data creates it possible for devices to autonomously function, and the whole biota is becoming smarter every day.

By mingling a set of sensors and a communication network, devices share information with one another and are cultivating their usefulness and functionality.

Example: Tesla vehicles.- All of the sensors on a car record their insight of the surroundings, uploading the information into a huge database. The data is then handled and all the significant new bits of information are sent to all other vehicles. This is an continuing process, through which a whole taskforce of Tesla vehicles are becoming smarter every day.

Let's take a appearance at some of the key sensors, widely being used in the IOT world.

1) Temperature sensors

It is used to measure amount of heat energy that allows detecting a physical change in temperature from a particular source and converts the data for a device or user, is recognized as a Temperature Sensor.

These sensors have been set out since long time in a diversity of devices. However, with the advent of IoT, they have found more room to be contemporary in an even more number of devices.

In agriculture, the temperature of soil is crucial for crop progress. This supports with the production of plants, maximizing the output.

Example: Resistor temperature detectors. The resistance of the device is straight proportional to the temperature.

Thermistors: It is a temperature penetrating resistor that changes its physical resistance with the change in temperature.

Integrated Circuits or Semiconductor: They are linear devices where the conductivity of the semiconductor rises linearly and it takes benefit of the variable resistance properties of semiconductor materials. It can deliver a direct temperature reading in digital form, particularly at low temperatures.

Infrared sensors: It detects temperature by intercepting a portion of emitted infrared energy of the object or substance, and sensing its intensity, can be used to measure temperature of solids and liquids only, Not possible to use it on gases because of their transparent nature.

2) Proximity sensor

A device that detects the existence or nonexistence of a proximate object, or properties of that object, and converts it into indication which can be easily read by user or a simple electronic appliance without getting in contact with them.

Proximity sensors are basically used in the retail industry, as they can detect motion and the correlation between the consumer and product they might be interested in. A user is immediately notified of rebates and special deals of nearby products.

Example: When we reverse the car, it alarms about an obstacle. It is the work of proximity sensor. They are too used for parking availability in places such as shopping mall, grounds etc.

Capacitive Sensors: It can detect both metallic as well as non-metallic targets. Almost all other materials are dielectric unalike from air. It can be used to sense very minor objects through a huge portion of target. Therefore, generally used in hard and complicated applications.

Photoelectric Sensors: It is made up of light-sensitive fragments and uses a beam of light to detect the existence or nonexistence of an object. It is an ideal substitute of inductive sensors. It is used for long distance sensing or to sense non-metal object.

Ultrasonic Sensors: Ultrasonic sensors are also used to detect the existence or to measure the distance of targets alike to radar or sonar. This makes a trustworthy solution for severe and demanding conditions.

3) Pressure sensor

It is a device that senses pressure and transforms it into an electric signal. Here, the amount be determined by the level of pressure applied.

Here amply of devices those rely on liquid or other forms of pressure. These sensors make it conceivable to create IOT arrangements that monitor systems and devices that are pressure driven. With any nonconformity from usual pressure range, the device notifies the system supervisor about any problems that should be fixed.

4) Water quality sensor

These are used to detect the water quality and Ion watching mainly in water supply systems. These sensors play an significant role as they monitor the quality of water for different purposes.

It includes Chlorine Residual Sensor that measures chlorine residua in water and most widely used as purifier because of its efficiency, Total organic carbon Sensor is used to measure organic component in water and Turbidity Sensors measure put off solids in water, typically it is used in river and stream testing, wastewater and effluent measurement.

There are many sensors, it could not be covered like Conductivity Sensor, Oxygen-Reduction Potential Sensor, Chemical sensor, Gas sensor, Smoke sensor, Optical smoke Sensor (Photoelectric), IR sensors, Level sensors, Image sensors, Motion detection sensors, Accelerometer sensors, Gyroscope sensors, Humidity sensors, Optical sensors.

IV. RELATED WORK: BIG DATA IN CONTEXT OF IOT

IoT is recognized for connecting a huge number of smart devices to the Internet to echo their frequently captured status of their surroundings. Recognizing and extracting significant patterns from huge raw input data is the primary utility of big data analytics as it outcomes in higher levels of understandings for decision-making and inclination prediction.

In social sciences, [1] relates the impression of big data analytics to that of the origination of the telescope and microscope for astronomy and biology, correspondingly. Several works have termed the common features of big data from different aspects [1]–[4] in terms of volume, velocity, and variety.

Big data is embodying the IOT big data through the following six V's landscapes:

Variety: In general, big data arises in different varieties and types. It might consist of structured, semi-structured, and unstructured data. A wide variety of data types may be produced by IOT such as text, audio, video, image, and sensory data and so on.

Volume: Data volume is a decisive element to consider a dataset as big data or traditional huge data. The quantity of generated data using IOT devices is much more than before and undoubtedly fits this feature.

Velocity: The rate of IOT big data production and processing is high enough to backing the availability of big data in real-time. This defends the prerequisites for cutting-edge tools and technologies for analytics to efficiently operate given this high rate of data production.

Variability: This assets refers to the different rates of data flow. Subject on the nature of IOT applications, different data generating components may have inconsistent data flows. Besides, it is possible for a data source to have different rates of data load based on specific times. For mockup, a parking service application that utilizes IOT sensors might have a peak data load in rush hours.

Veracity: Veracity mentions to the quality, consistency, and reliability of the data, which in turn leads to accurate analytics. This asset needs special attention to hold for IOT applications, especially those with crowd-sensing data.

Value: Value is the makeover of big data to useful information and insights that bring competitive advantage to organizations. A data value highly depends on both the underlying processes/services and the way that data is handled. For illustration, a certain application such as medical vital sign monitoring may need to capture all sensor data, while a weather forecast service may need just random samples of data from its sensors. As another illustration, a credit card provider may need to keep data for a specific period of time and discard them thereafter. Beyond the aforesaid properties, investigators [1] [3] have identified other characteristics such as: Big data can be a byproduct or footprint of a digital activity or IOT interplay. The use of Google's most common search terms to predict seasonal flu is a good illustration of such digital byproduct [5]. Big data systems should be horizontally scalable, i.e. big data sources should be able to be prolonged to multiple datasets. This trait also leads to the complexity attribute of big data, which in turn forces other challenges like transferring and cleansing data.

The term IoT was initially proposed to refer to uniquely identifiable interoperable connected objects with radio-frequency identification (RFID) technology [6]. Later on, researchers relate IoT with more technologies such as sensors, actuators, GPS devices, and mobile devices. Today, a commonly accepted definition for IoT is a dynamic global network infrastructure with selfconfiguring capabilities based on standard and interoperable communication protocols where physical and virtual 'Things' have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network [7].

Specifically, the integration of sensors/actuators, RFID tags, and communication technologies serves as the foundation of IoT and explains how a variety of physical objects and devices around us can be associated to the Internet and allow these objects and devices to cooperate and communicate with one another to reach common goals [8]. There is a growing interest in using IoT technologies in various industries [9]

IoT can be considered as a world-wide physical innerconnected network, in which things can be connected and controlled remotely. As more and more devices are equipped with RFID or intelligent sensors, connecting things becomes much easier [10]. In the sensing layer, the wireless smart systems with tags or sensors are now able to automatically sense and exchange information among different devices. These technology advances significantly improve the capability of IoT to sense and identify things or environment. In some industry sectors, intelligent service deployment schemes and a universal unique identifier (UUID) are assigned to each service or device that may be needed. A device with UUID can be easily identified and retrieved. Thus, UUIDs are critical for successful services deployment in a huge network like IoT [10], [11].

. For example, built-in sensors are used to determine user activities, environmental monitoring, health and well-being, location and so on [12]. Over the last few years social networking [13] has become popular and widely used. Context information gathered through social networking services [14] (e.g. Facebook, Myspace, Twitter, and Foursquare) has been fused with the other context information retrieved through mobile devices to build novel context-aware applications such as activity predictions, recommendations, and personal assistance [15]. For example, a mobile application may offer context-aware functionalities by fusing location information retrieved from mobile phones and recent 'likes' retrieved from social media sites to recommend nearby restaurants that a user might like. In the next phase, 'things' were connected to the Internet by creating the IoT paradigm

V. THE POWER OF COMBINING AI AND IOT

It refers to computational tools that can supernumerary for human intelligence in the performance of certain jobs. AI styles it possible for machines to learn from experience, adjust to new inputs and perform human-like jobs. It lives everywhere now from researches labs to your living. It has taken jobs from humans already and will continue to do so as it becomes more widely-adopted and operative. IOT connects devices and AI takes decisions. AI - The capability of a digital computer or computer-controlled machine to perform jobs usually associated with intelligent beings.

All industry has a great request for AI competences. AI is being used in Health attention — To provide personalized medicine and diagnosis, Personal health care assistants. Retail — To offer virtual shopping capabilities that offer personalized references and discuss purchase selections with the consumer. Work — To analyze workshop data as it streams from connected equipment to forecast expected load and demand using recurrent networks. Banking — To find which transactions are likely to be fraudulent, agree fast and truthful credit scoring and automate manually penetrating data management tasks. AI can consider logically without sentiments, making rational decisions with less or no faults. It requirements no sleep, rest, take breaks or get entertained as AI does not get bored or tired.

The IOT describes the network of physical objects — that are fixed with sensors, software, and other technologies for the drive of connecting and exchanging data with other devices and systems over the internet. These devices range from usual everyday objects to refined industrial tools.

IOT supports devices to notice, identify and realize a situation or the environs without being dependent on human help. From everyday stuffs such as kitchen appliances, cars, thermostats — to the internet via fixed devices everything is connected.

IOT devices have the possibility to produce a vast amount of data that can be then used with AI. All there's left to do is to figure an exact machine learning model by using those data. Since IOT platforms offer an interface to gather the data from various devices, they can easily be deployed into AI/ML systems. The value of AI in this context is its capability to quickly mash insights from data.

VI. Conclusion

The algorithm is very significant in present scenario because we have technologies like Data Science AI and IOT, this algorithm can be used on existing products to make them smart product. Moreover this algorithm will produce a novel product for the particular work and it can be patented due to novelty. This algorithm extracts the basic and refined features from all the available relevant products in the market. Finally, only with significant basic and refined features it presents the smart and novel product. This way the product for this particular work will get the monopoly in the market.

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