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INFORMATION PROCESSING WITH THE HELP OF BIG DATA ANALYSIS IN THE IOT

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Abstract
Innovations in enduring technologies such as wearable touch gadgets, sensor devices, and wireless private communication networks are connecting things in everyday life to the Internet, commonly referred to as the Internet of Things (IoT). IoT is seen as an active organization for the design and development of intelligent and contextual services and applications in the fields of business, science, and engineering. These apps and services can respond strongly to changes around them and user preferences. Developing a large-scale system for analyzing, processing, and mining huge real-world-based data sets has become one of the demanding challenges facing systems researchers and data management researchers. The use of big data analytics with IoT technologies is one of the ways to analyze data flows (i.e., data, events) in real-time. In this article, we propose an integrated approach that integrates IoT systems with big data tools into a holistic platform for real-time and continuous data monitoring and processing.

Keywords: innovation, analytical capability, classification techniques, trend, paradigm, robotics, evolution, cloud technology.

Introduction

In the modern world of big data, almost all companies around the world use various methods to extract useful and actionable information and process their data. These methods include various algorithms, statistical models, prediction and classification models, decision-making processes, and many more. Social media plays a significant role in generating large amounts of data. This is because most industries, regardless of the size of their organization (it can be a corporate company or a small-scale industry), use social media to connect with their employees and customers, promote new products or services. In turn, customers rely on social media to learn about new products and services. Other devices such as GPS, sensors, smart phones, IOT devices, telemedia also generate large amounts of data. This massive growth in data has triggered the development of big data analytics for real-time problems. On the other hand, this

poses major challenges for machine learning approaches, such as highly distributed data, eliminating noisy data, limiting labeled data, and much more [1-5].

Big data analysis in IoT

Data analysis techniques such as indexing, storage, information processing, and the tools associated with these techniques are also facing many challenges due to the increase in data. In addition to having high-performance solutions, the techniques cannot be implemented on traditional mass processing devices. Large-scale processing techniques encourage experts to use distributed processing devices. The use of highly complex models for analyzing big data is an initiative to use distributed computing devices. In general, the rapid growth of data has triggered two important aspects of analysis. The first is the growth of technologies and tools related to analysis, and the second is related to corporations and organizations with big data, which are called big data analytical capabilities. As the amount of big data increases, the techniques and tools associated with it also increase.

However, due to the abundance of alternative techniques and tools, it is very difficult for researchers and others to analyze and select each problem. They face difficulties in choosing appropriate models for analysis. Thus, the number of studies in this field is still increasing and is likely to continue to increase in the future. More research is being conducted to address the scale and errors to meet the challenges. Organizations need to be constantly updated in terms of digital technologies to compete with other organizations and face the digital world. The potential of an organization is judged by its awareness of emerging digital technologies and its response to these technologies. Decision-making methods are a key factor in information processing that requires detailed market research. Decisions need to be made immediately based on the current situation and it is always changing. In this scenario, organizations need to adopt the latest technologies and methods to process information effectively. Thus, an organization needs to frequently update its decision-making technologies to meet its challenges [5-10].

IoT is an important part of big data and artificial intelligence.

With the advancement of technology, it is now possible to communicate between devices and the internet, which is called the internet of things, which receives data from devices and converts it into useful information. IoT is developing as an important part of big data and artificial intelligence. Most of the data that is input into big data analytics and artificial intelligence systems is obtained from IoT devices. In turn, the information processing and decision-making models of big data analytics make the IoT system more efficient. Thus, IoT systems use big data analytics and machine learning algorithms to work together for an efficient system. This efficient system helps humans in many ways and reduces labor costs. Processing and analyzing data in a distributed environment is the most important factor of IoT, which can be used in business and research-based applications. Big data is stored and processed, which can be more difficult, so classification techniques can be used.

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Using IoT in industries

IoT in healthcare is constantly growing. Remote monitoring of patients and senior citizens, home care are the latest trends in healthcare using IoT. The use of RFID, tracking, monitoring are other areas of healthcare. These technologies can be adopted by medical people, ordinary people and hospitals. However, more people are approaching these applications with a need. People are concerned about their health factors and therefore use IoT devices to personally monitor their health. Some people need IoT applications to monitor elders or sick people at home. More effective IoT applications are needed to solve this. Inventions in healthcare are only in their initial stages compared to the needs of the medical industry. The completion of healthcare research is largely achieved by integrating interdisciplinary personnel and services into a single paradigm: medical, government, insurance, statistics, social and research. The system must analytically balance between cost, efficiency, quality, reach and delivery.

The successful outcome of any health service research is the provision of thorough and satisfactory services to individuals and the public. The system should include many interdisciplinary services in addition to medical services, such as insurance services, research activities, government support, and system improvement. Medical service should include everything from doctor appointments to obtaining insurance policies, if necessary. Advanced research can include possible ways to pay for hospital bills, including policy innovations, nursing homes, home care for the elderly, and robotics in hospitals. How health service research studies other areas such as social, financial, and economic; Technology affects the quality and cost of the health system. Health research is beneficial to individuals, society, organizations, governments, and researchers.

Many advanced researches need to be invented in this area, where IoT plays an important role. Smart tablets, home care, personal health monitoring, care robots, real-time health monitoring system are some of the upcoming researches in healthcare using IoT. A new technology called Internet of Things (IoT) is in the evolutionary stage and has been mainly implemented till 2020. The survey shows that from 2017 to 2022, a lot of research was done in healthcare using IoT.

IoT devices are used, controlled and can access data from it by users from remote locations. Users communicate with IoT devices through specially designed programs or applications. The end point of the user and the devices allows them to communicate with each other. Service providers facilitate communication between devices and users through various technologies. Communication between many end users and many devices is also possible through LAN or Wi-Fi technology. The nature of the devices connected to the network may be the same or different. The data exchanged by IoT devices may not always be small, thus requiring network collaboration. The data needs to be transferred to other networks for analysis, processing or storage. This is where cloud computing comes into the picture to store the data generated by IoT devices. Cloud technology solves the scalability and viability problem faced by IoT devices.

Cloud computing enables industries to efficiently manage big data and extract useful insights from the collected data, which are the main challenges faced by big data technologies. Cloud provides a large area for storing and processing data to ensure the quality of applications. However, cloud computing is affected by the number of breaches and leaks. The framework

should be designed to maintain the confidentiality of data. Encryption methods can be more useful to reduce the theft of data by unauthorized users. A distributed approach should provide a separate compartment for data and analysis to make the system more independent and efficient. This increases the accuracy of analysis by providing a secure cloud platform for data. Security is a major issue in the cloud environment, and new technologies need to be developed to ensure the security and confidentiality of data in the cloud environment [11-14].

Fog computing is a technology used between IoT devices and cloud storage. This is similar to edge computing in that it brings together technologies related to data processing. Fog computing is used for security purposes. In a fog environment, the processing technology is deployed on the LAN and the data is shared from third-party nodes to the fog gateway. In edge computing, the technology is deployed at the endpoint or gateway. Edge computing allows only one device to share data at a time. Fog computing is more scalable and allows data to be shared with multiple devices at the same time. Since edge computing cannot be used for all applications, fog computing is used. Fog computing reduces the amount of data sent to the cloud and reduces bandwidth. In the real world, using a Fog system connects all IoT devices used by people to monitor their personal health. Spark streams are used to receive and process data sets in real time from devices. The Spark engine processes each batch separately, and then the result is stored again in some storage application, such as a database system or a cloud system. Spark stream automatically receives continuous data from real-time devices on a regular basis. Along with IoT devices, Apache spark applications are emerging as a new technology for data processing. Apache Spark can be used for real-time applications. Data is collected from IoT devices, edge computing or fog computing approaches are used, and then the data is fed into Spark stream. The data is processed and triggered on real-time events.

The Hadoop framework is modeled to scale from a single machine to several thousand machines in a cluster group, where each node in the cluster provides local computation and storage. This Hadoop framework consists of the following components:

Common Hadoop: This component consists of utilities provided by various Hadoop components.

Hadoop Distributed File System (HDFS): This is a distributed file model known as a storage component in the Hadoop platform. It enables high-throughput access to data by various applications by dividing a large file into small blocks and storing these blocks on different nodes across clusters.

Hadoop Map Reduce: This component is an implementation of the MapReduce model, which accesses a large file and then generates small chunks.

The proposed architecture for the Smart and Real-Time Healthcare Information Processing (SRHIP) system consists of three layers: (1) the IoT body sensor network layer, which performs the function of data collection and aggregation, (2) the FoG processing and computation layer, which performs the function of processing, analyzing, and classifying information using a

naive bayes (NB) classifier, (3) the Cloud computing layer performs data analysis, storage, classification, and decision-making [1,2,3].

RESULTS

When processing big data from IoT (Internet of Things) devices, modern analytical methods, such as machine learning and artificial intelligence (AI), are used to increase the value of data and create opportunities for forecasting. In addition, by analyzing big data, IoT systems are being effectively used in various fields, from manufacturing processes to healthcare and smart cities. Data collected through IoT, such as signals and measurements from sensors and devices, provide significant results in areas such as improved services, energy conservation, and increased security. However, among the main problems that arise when analyzing big data are data privacy, security, and processing speed. To solve these problems, improved algorithms, efficient data storage systems, and advanced analysis methodologies are required [7,8].

Conclusion

In the healthcare sector, IoT sensors enable WSN to generate large amounts of high-speed and high-volume data, which requires an efficient approach to analyze such large amounts of data with secure, confidential, and accurate infection severity prediction mechanisms. For this purpose, we propose a Smart and Real-Time Healthcare Information Processing (SRHIP) system using FoG, which processes and analyzes data using Hadoop and Apache Spark systems.

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