

Chapter 49

Big Data, Data Mining, and Data Analytics in IoT–Based Healthcare Applications

Isakki Alias Devi P

Ayya Nadar Janaki Ammal College, India

ABSTRACT

IoT seriously impacts every industry. The healthcare industry has experienced progression in digitizing medical records. Healthcare services are costlier than ever. Data mining is one of the largest challenges to face IoT. Big Data is an accumulation of data. IoT devices receive lots of data. Big data systems can do a lot of data analytics. The tools can also be used to perform these operations. The big health application system can be built by integrating medical health resources using intelligent terminals, internet of things (IoT), big data, and cloud computing. People suffer from many diseases. A big health system can be applied to scientific health management by detecting risk factors for the occurrence of diseases. Patients can have special attention to their health requirements and their devices can be tuned to remind them of their appointments, calorie count, exercise check, blood pressure variations, symptoms of any diseases, and so much more.

INTRODUCTION

The global population is aging and the chronic diseases are growing day by day. While technology can't stop the population from ageing, it can make healthcare easier in terms of ease of use. The combination of latest information technology with healthcare system will diminish the problems. A new paradigm, known as the Internet of Things (IoT), is an extensive applicability in healthcare industry also. Big data and data analytics are the in-demand. IoT devices collect lots of data. It is not possible for queries. If IoT devices collect data, Big data will analyze data. The information can be measured faster.

According to S. Haller et al. "A world where physical objects are seamlessly integrated into the information network, and where the physical objects can become active participants in business pro-

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cesses. Services are accessible to interact with these ‘smart object’ over the Internet, query their state and information associated with them, account security and privacy issues.”

IoT is the next generation of Internet which will contain trillions of nodes representing various objects from many ubiquitous sensor devices to large web servers (Dey et al., 2018). IoT incorporates the classical networks with the emerging technologies such as ubiquitous computing, cloud computing, data mining, sensor networks, RFID technology, etc. From the perspective of technology, IoT is an integration of sensor networks, which include RFID, and ubiquitous network (Lee & Yoon, 2017). From the perspective of economical view, IoT integrates new related technologies and applications, productions and services, R. & D., industry and market. Convenience, efficiency and automation are the goals of IoT.

Needs of IoT

- Quantified health will be the future of healthcare. The data affect the performance, and so that IoT is needed for better outcomes with respect to health tracking.
- IoT ensures that all information is considered to make better decisions for patients. It is possible by updating the health information of patients on the cloud.
- The primary area of focus is prevention because health care expenses are very high.
- Patient satisfaction is possible by IoT. Through internet-connected devices, valuable patient’s data will be gathered.
- IoT allows care teams to collect various data points on personal fitness like heart-rate, temperature, sleep routine etc.,

Challenges to Adopt IoT in Healthcare

The challenges are storage, security and data management (Pang, 2013). There are reliability and security issues with data along with the lack of infrastructure and training among providers. Another problem is the poor internet access. The medical resources are limited. The development of medical resources is not balanced. 80% people are living in areas with limited medical resources but 80% medical resources are provided to the big cities only. One third of diseases could be completely prevented, one third could be detected early and one third could be done with regular treatment to save people. In general, the status of health is from health to low-high risk status. The application of this paradigm in healthcare industry is a mutual hope because it allows medical centers to function proficiently and patients to obtain better treatment. With the help of this technology-based healthcare method, there are unique benefits which improve the quality and efficiency of healing and accordingly the patient’s health will be improved.

Internet-connected devices have been used for patients in various forms. Data comes from fetal monitors, electrocardiograms, temperature monitors or blood glucose levels, health information is essential for patients. These measures are needed follow-up interaction with a healthcare professional. The smart technology quickly became an asset in healthcare is when linked with home medication dispensers. These dispensers routinely upload data to the cloud when medication is not taken.

Internet-of-things technology implementations have issues about personal data privacy and security. IoT devices can be used to save the patient’s life. IoT in healthcare may be life threatening if not secured. In 2012, an episode of *Homeland* demonstrated a hacked pacemaker inducing a heart attack. Former Vice President Dick Cheney subsequently asked that the wireless capabilities of his pacemaker be disabled.

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