

Improvement of Technology in Healthcare and Artificial Intelligence

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Abstract— In this current era, several humans are suffering from health diseases, and the diagnosis process will be arduous to know the actual issue. Programming technologies contain many techniques to accomplish high values in healthcare activities such as diagnosis, decision-making, support, and treatment. However, there are several difficulties in understanding the root causes of the actual issue in the body. A programming technique with AI can improve the end-to-end process and save lives. A healthcare knowledge management system can ensure that the knowledge development system is based on several data sets in the hospital. It will enhance the big data technologies to capture, organize, transfer, and manage the large amount of the data of medical knowledge, which can't be handled with traditional data handling process techniques. Moreover, machine learning algorithms are used to drive understanding at the higher process level and treatment of patients. It will try to search for similar patterns of diseases in the data banks and try to give the output. This can lead to making an appropriate treatment and post-recovery process. The orchestration of the knowledge system, big data, and artificial intelligence bring several advantages to the healthcare system. My research shows that the system effectively ensures the knowledge development process, serving the knowledge exploration to improve the decision-making in the healthcare system and laboratories. The knowledge orchestration is demonstrated for detecting high blood pressure and brain hemorrhage in text and CT or MRI image processing for records of the hospitals. It could support doctors in accurately diagnosing diseases and giving appropriate treatment procedures.

I. INTRODUCTION

Data knowledge represents a vital resource that needs effective management to capture, organize, transfer, and apply this kind of actual property. A data knowledge management system is a class of information systems that manage all the organizational knowledge. Traditional information systems only focus on capturing, organizing, and managing knowledge processes. The advancement of data knowledge management systems has changed how organizations operate, in addition to medical organizations, in which healthcare is a knowledge-intensive industry. Healthcare data comes from several resources like hospital databases, other hospital databases, and private analytic databases. For example, Private hospital databases have different data from more than 1 billion patient encounters from over 1000 private and academic hospitals in the United States, corresponding to approximately 20% of all hospitalizations in the country. Several studies are available in databases to show valuable knowledge data, which can be helpful in other public healthcare. The vast database, including patient information, disease diagnosis, and medical treatment, allows for detecting rare diseases and uncommon complications that are not always possible, with different prospective database problems for knowledge management systems to improve the decision-making support process.

Additionally, the advancement of technology enhances the decision-making support process. The sensor devices are actively launched to monitor the patient's health remotely. This will constantly improve the size of the health record in healthcare systems.

The considerable amount of data needed to be collected and managed appropriately with advanced technology, such as big data and artificial intelligence, could help the data filter and search appropriate algorithms. Big data in healthcare contains heavy and tacit knowledge that supports a wide range of medical functions like disease monitoring, hospital and laboratory decision support, and healthcare management systems. Managing and building an effective data knowledge process with big data and artificial intelligence is essential.

II. BACKGROUND

Several studies and discussions show that big data is related to aspects like knowledge base, knowledge discovery, and knowledge fusion. To overcome the difficulties, we propose building big data-driven healthcare knowledge management systems to support decisions in a parallel and distributed environment. The extensive healthcare system ensures a complete and comprehensive knowledge development process, including data knowledge exploration. Moreover, artificial intelligence and big data processing are integrated to provide real-time diagnosis decision support with large volumes of medical records for predictable reasons so patients can respond on time. The proposed healthcare data knowledge management system for supporting medical diagnosis includes four layers. A data layer, an information layer, a knowledge layer, and an application layer. This system will be designed based on machine learning technology in the knowledge layer to generate knowledge for hypertension and brain hemorrhage diagnosis. Moreover, artificial intelligence can help the system identify the accurate data and verification process of the actual diagnosis.

It will search from the data bank available for the same kind of reports and procedures completed in the past, recovery, and lifestyle after surgery. Patient security concerns are highly involved in sharing the data across the system. The purpose of the system is to try to hide the patient's personal details. Moreover, the application will be designed for machine learning algorithms with several distributed technologies like Java and Python. The distributed system will be developed using cloud technologies with various tech stacks to handle the Process quickly due to the high volume of data. The database will be significant for storing all the data in the system for tracking, searching, filtering, and report generation. It will be designed in an optimized way to reduce time complexity.

According to the World Health Organization, all deaths happen due to blood pressure. This dangerous disease needs to be immediately detected and treated to limit the risk of death and death complications. We are using the tree to generate knowledge for hypertension diagnosis and classification. The decision tree learns and generates simple rules from a complex decision-making process like humans think. Moreover, we use deep learning techniques to generate knowledge for brain hemorrhage detection and Process for treatment. The decision tree will determine the process of how complex human thinking is. In addition, we are using deep learning techniques to generate knowledge of hemorrhage detection and summarize the reports. A brain hemorrhage is a type of stroke that is caused by an artery bursting in the brain. Stroke is the second leading cause of death, according to the World Health Organization. The disease diagnosis is based on the MRI and CT images from the image processing system. The image processing system is highly designed with tight security and algorithms that use advanced technologies. Technologies are important factors for image processing and the scalability of the systems. The architecture has complied with the requirements of the knowledge management system. Image processing is the first step to analyzing the symptoms of the disease from the patient. Moreover, image processing is the visualization of the body part in the system. Where we can see the root cause to do an appropriate treatment, the system will give the actual issue via graphical representation, which can demonstrate the diseases from the body. If more scanning is required, then the other sources are scanning to be performed.

The architecture design process can involve several processes per application prospect, such as Process, knowledge, information, data processing, etc.

A method is the activities that generate knowledge objects in the knowledge management process. Data and information are organized to become useful information. The information can be transferred based on the knowledge, which can be applied to synthesize new knowledge from existing knowledge processes. Which can capture, organize, transfer, and use. Data are captured in a sorted manner to reduce the time to process the result. These activities ensure the

knowledge management system can be explored and exploited.

Several technologies are incorporated to process the data at the application level. Apache Spark and Apache Kafka are very robust technologies to perform a large amount of data concurrently and parallelly from various systems. All the code will be written in high-performance languages to process the data and logical operations as separate tasks. Apache Kafka is a high-performance streaming message platform in different systems. It will have a topic, and brokers will pass all the data in JSON format. We can use several APIs to consume the message from the Kafka consumer. We must link the broker and partition of the topic based on the system's traffic. The published messages from the producer are stored on a series of servers. A consumer will listen to different brokers to get the messages, and brokers are connected to topic, partition, and offset. A consumer consumes the message immediately after receiving the message in the topic. It will be in the live-streaming Process for the data stream, which can connect to the topic. All live messages are to be listened to via the consumer. Apache Scala is a high-performance method for processing data in batch applications. Several batches are operating as per tasks. Spark allows real-time data processing, enabling powerful analytics on both real-time and historical data. Spark streaming easily integrates with many popular data sources, including HDFS Flume and Kafka.

Artificial Intelligence: Machine learning is a subset of artificial intelligence that allows a machine to learn from the historical data and information fed via systems. It will try to filter the data per the algorithm to function the specific operations.

Decision Tree: A decision tree is a model of machine learning algorithms. It will be a hierarchical tree structure used to classify objects in sequences. It can be applied to the problems of classification and regression. The decision tree is a popular data mining method given the query-based criteria. The tree is a tree for each path to find the shortest route for all the attributes.

Method: The study's problem is building a knowledge management system to support the medical Process for the detection of diseases. It must provide the whole design process and include the knowledge exploration with large amounts of data. Based on this research, I have proposed a knowledge management system architecture to support the hospitals and laboratories. Medical diagnostics include a different layer to process the data.

Data Layer: Two data sources are used in the study, including datasets collected from the various hospitals and real-time data collected from the patient via a different data bank system. Apache technology will process all the data with high performance with data filtering, managing, searching, consume the messages. Spark will be a big data technology that can perform large amounts of data sequencing and parallel processing.

Information Layer: All data will be sorted and organized in filtered order to access the database. This information will be stored in datasets on the distributed file system. Spark code will process and manage the batch data from HDFS—all the content according to the statistics of the Word database with hidden patient personal information.

Knowledge Layer: Machine learning algorithms can be performed in the spark application to a distributed environment to build the model for knowledge generation. The training testing phase will spark MLIB, a core component to execute the learning services.

The training phase will be the extraction process on the input dataset and then train the machine learning model. Model training is performed in the distributed environment, and the model of data is stored.

Health Care Management System: I can illustrate the proposed hypertension and brain hemorrhage diagnosis system. The input dataset is collected from several data centers with permission from the government.

These are the several processes that improve the healthcare systems with an accurate diagnosis of the disease and will try to save people's lives.

III. CONCLUSION

We can conclude that the new process of healthcare implementation helps in the current healthcare environment. There are technologies involved in the process. Machine learning and artificial intelligence can make faster and more accurate detection. The data processing will be high-speed per the technology stack and distributed environment. Moreover, we are using the live database from previous patient data. Which can give us a concrete understanding of the problems in the body.

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