Towards developing a multi-dimensional health data analysis framework

2023-10-05 12:04:03

Authors

FAZLE RABBI, Yngve Lamo

Abstract

Healthcare services are becoming complex due to the advancement of revolutionary medical technologies, the increasing demand for personalized care, and the introduction of new healthcare policies and regulations. To provide better healthcare services, healthcare providers need to rely on healthcare applications. These applications encompass the utilization of both structured and unstructured data, serving multiple purposes, including disease pattern identification, support for decision-making, and optimization of resource allocation within the healthcare sector. While structured data are easier to process but the use of unstructured data in healthcare systems are unavoidable. Structured data offer ease of processing, but the integration of unstructured data into healthcare systems is now inevitable. Unstructured data encompass a wealth of information, including medical guidelines, clinical notes, and patients' historical records. Patients often convey their health concerns in natural language text when scheduling appointments or seeking help during medical emergencies. Unstructured data are also being used in healthcare for several treatment modules such as in cognitive behaviour therapy where patients articulate their feelings in text. However, processing unstructured data is typically time-intensive and can lead to service delays. To address this challenge, we propose harnessing the capabilities of large language models (LLMs) to efficiently structure information derived from healthcare applications. This integration empowers clinicians and healthcare administrators to conduct comprehensive data analysis, facilitating evidence-based decision-making. Giving clinicians and health data analysts the ability to explore and analyze data from diverse perspectives promotes evidence-based decision-making. Traditional analysis approaches such as data mining have limitation in extracting variants of patients' problems due to the inherent diversity among patients and healthcare settings. It is not easy to change the level of detail in order to accommodate user requirements by allowing them to analyze data from various perspectives or capture temporal aspects of the data. We propose to utilize LLMs for structuring information

from various healthcare applications and adopt a model-based approach to allow healthcare professionals to analyze data from a variety of perspectives. The proposed solution aims to facilitate efficient healthcare service delivery, and promote data-driven decision making.

Keywords

model-based framework, healthcare data analysis, large language models, data analysis