ABSTRACT

The integration of Electronic Health Records (EHR) with Drug-Drug Interaction (DDI) knowledge graphs holds significant potential for improving patient safety and personalized medicine. This study presents a comprehensive methodology for constructing a knowledge graph from EHR data and subsequently fusing it with a pre-existing DDI database. The fusion process involves aligning entities and relationships between the EHR and DDI graphs to create a unified representation of medical knowledge. To ensure the integrity and utility of the fused knowledge graph, a multi-faceted evaluation framework is employed, including validation of the fused graph, entity coverage, relationship coverage, entity correctness, relationship correctness, and clinical accuracy. The validation process assesses the accuracy of the fusion, ensuring that the integrated graph faithfully represents the underlying data from both EHR and DDI sources. Entity and relationship coverage using python scripts are used to quantify the completeness of the graph, while correctness measures evaluate the accuracy of the represented information. Finally, clinical accuracy is assessed to determine the practical relevance and reliability of the knowledge graph in a real-world healthcare setting. The correctness of entities and relationships, as well as clinical accuracy, are evaluated by medical experts to ensure the practical relevance and reliability of the graph in clinical settings. This dynamic approach, which leverages both machine-based and human expert methodologies, proves to be effective in ensuring the quality and clinical utility of the fused knowledge graph. The study concludes that such an integrated evaluation strategy is essential for developing reliable and accurate knowledge graphs in healthcare, enhancing decision support systems, and ultimately improving patient outcomes.

Keywords: Knowledge Graph, EHR, Constructing0