Potential Uses of an Object-Oriented Graph Database in Medical and Health Sciences Education

Curricula

Jennifer Abueg, M.L.I.S., M.A.1; Catherine West, M.D., Dr.P.H.2
1Touro University California, 2Touro University California College of Osteopathic Medicine

OBJECTIVES

We investigate the use of an open-source, object-oriented graph database to create custom-made concepts, terms with relevant, searchable relationships among them. We describe goals and methodology to search for (1) related lecture content based on lecture topic, and (2) lectures given in a specific time frame (same semester, same week).

BACKGROUND

Curriculum maps in medical and health sciences education have been used to plot, analyze, or determine curricular goals, changes, learning objectives and outcomes. While commercial off-the-shelf databases for curriculum maps can be limited to pre-defined search parameters, terms, topics and access points, we created a curriculum map for an Inter-Professional Education (IPE) faculty development workshop to develop the search queries described in the above objectives. This exercise is a first step towards the understanding and potential use of a graph database to create and search semantically linked data, and the unique embedded role that librarians can play in curricular planning.

METHODS

The Librarian collected, curated and cleaned curriculum data from contributing colleges and programs taught for the 2015-2016 academic year. The data included course names, lecture titles and the weeks in which they were taught. Course names and its corresponding data were organized and tracked in an Excel spreadsheet by week numbers and semesters (rows) and course names (columns). There were 74 Excel files created from 74 course names and programs, class cohorts, course names and semesters as nodes or concepts, with labeled relationships among them as displayed in Figure 1-1.

Using neo4j Inc.’s SQL based Cypher query language the Librarian created the search queries to search for similar lecture topics based on lecture title (e.g., “heart”) and all lectures given in a certain week in that semester (e.g., all lectures given in week 5 of Fall Semester 2015). Results for both were displayed in table format and converted to Excel files. The two search queries are displayed in Figure 2 and Figure 3. The corresponding query results are displayed in Figure 4 and Figure 5.

DISCUSSION

The Neo4j browser/ontology editor processes the code and creates a graph model of the ontology, displaying the labeled nodes and unique relationships between the nodes. The graph can be manually manipulated by moving nodes for visual effectiveness. The graph of the curriculum map is a large graph visualization tool that can be used to look for patterns, node clusters, or associations between or among nodes or objects. Additional file formats and published controlled vocabularies and graph visualization tools can be uploaded and utilized. Additional, compatible file formats include JSON and XML files. Graph visualization tools are helpful aids for large datasets and large-scales graphs. Neo4j-compatible data visualization tools include Tableau, and open source tools such as Linkurious, Alchemy.js, and sigma.js.

The librarian’s unique skill set and understanding in knowledge representation, domains, controlled vocabularies and data management present new opportunities for embedded librarianship in the curricula.

CONCLUSIONS

This curriculum map could be expanded to include outcomes and objectives at the course, college or institutional level, whether for IPE or accreditation, using the Cypher query language that allows for searching across the graph to look for patterns, node clusters, or associations between or among nodes or objects. Additional file formats and published controlled vocabularies and graph visualization tools can be uploaded and utilized. Additional, compatible file formats include JSON and XML files. Graph visualization tools are helpful aids for large datasets and large-scales graphs. Neo4j-compatible data visualization tools include Tableau, and open source tools such as Linkurious, Alchemy.js, and sigma.js.

The librarian’s unique skill set and understanding in knowledge representation, domains, controlled vocabularies and data management present new opportunities for embedded librarianship in the curricula.

REFERENCES


neo4j, Inc. (2017). The property graph model. Retrieved from

neo4j, Inc. (2017). What is a graph database? Retrieved from