

* iExplore: A provenance-based application for exploring biomedical knowledge

Vinh Nguyen (1), Olivier Bodenreider (2), Thomas Rindflesch (2), Amit Sheth (1)

(1) *Kno.e.sis Center, Wright State University, Dayton, OH*

(2) *National Library of Medicine, National Institute of Health, Bethesda, Maryland*

Data source: The data source in the backend of iExplore includes concepts and relations from Biomedical Knowledge Repository (BKR). The BKR schema contains approximately two millions of concepts in Unified Medical Language System (UMLS) that are integrated from various vocabularies and knowledge bases. Beside the relations taken from UMLS, the BKR also includes the relations extracted from millions of PubMed abstracts published from 2000 to 2009. The relations from both UMLS and PubMed are represented in RDF format with additional metadata to annotate the data provenance.

Application: iExplore, a Semantic Web application, allows non-technical users to interactively explore biomedical knowledge represented in the BKR. The tool generates a set of SPARQL queries based on the user context to form a graph of related concepts. A concept may be related to thousands of other concepts via hundreds of properties, and each concept is categorized into one or more semantic types. We provide the filtering options on relations and semantic types to put constraints on the resulted graph. A user may also choose to explore relations from either UMLS or PubMed.

Sample Scenario: Assume that we want to explore about the symptom "headache". While exploring this symptom, we may raise many questions about headache, such as:

1. What causes headache?
2. What treats headache?
3. Which pharmacological substances treat headache?
4. What treats headache for age groups, e.g. infant, toddler, child, adolescent?
5. What prevents headache?

We can answer these questions by forming of a graph that is restricted to specific filtered relation and/or semantic type. For example, for question 2, we can find that aspirin, caffeine, and acetaminophen can treat headache.

We can also assert the trustability of the answers by tracing back to the PubMed abstracts where the relations were extracted from. In this example, we can assert these relations in the PMID 16162254.

Headache is a common symptom that is classified into the semantic type "Sign or Symptoms". The same method can be applied to raise questions about other signs or symptoms, as well as other semantic types, e.g. "Disease or Syndrome". A live deployment of iExplore for further exploration is available at <http://knoesis.wright.edu/iExplore/iExplore.html>.