Proceedings of AMIA Annual Symposium 2000;:971.
© 2000 AMIA, Inc

# A Semantic Navigation Tool for the UMLS

**Olivier Bodenreider, M.D., Ph.D.**
**National Library of Medicine, Bethesda, Maryland**
olivier@nlm.nih.gov

**Background**. The Knowledge Source Server[*] (KSS) allows users to browse virtually every bit of information in the Unified Medical Language System® (UMLS®). In KSS, the presentation of contextual information from the Metathesaurus tends to reflect the organization of terms in the source vocabularies. For example, hierarchically related concepts are presented as lists of indented terms, one list for each vocabulary using this term. Instead of multiple trees, the semantic structure of the UMLS can be visualized as a graph in which concepts are the nodes and inter-concept relationships are the links between nodes. The graph structure offers a unified view of the context (Figure 1).

**System description**. Starting from the UMLS relational files loaded in a local database, the graph of ancestors and descendants is built for a given concept. Various concept properties (preferred name, list of sources) are attributes of the nodes, while inter-concept relationship properties (type, attributes, list of sources) are stored with the edges. A method added to the graph class allows the graph description to be written in the Graphviz[☆] formalism. This graph visualization tool produces an image file from a graph description, together with a list of coordinates for every object in the graph. An interactive map combining the client-side image map created from the coordinates to the image rendering of the graph is distributed through a web server. Clicking on a node generates a new display in which this node is the center of the graph. Graphic properties of nodes and edges such as shape and color are used to display properties of the corresponding concepts and relationships. Additional features include performing a transitive reduction on the graph (removal of indirect relationships), highlighting graph elements based on their attributes, and restricting the graph to a particular source.

**Conclusion**. Although less comprehensive than KSS, this experimental semantic navigation tool, implemented through a middleware approach, offers alternative display and navigation features, suitable for knowledge exploration.

---

[*] umksks.nlm.nih.gov
[☆] www.research.att.com/sw/tools/graphviz/

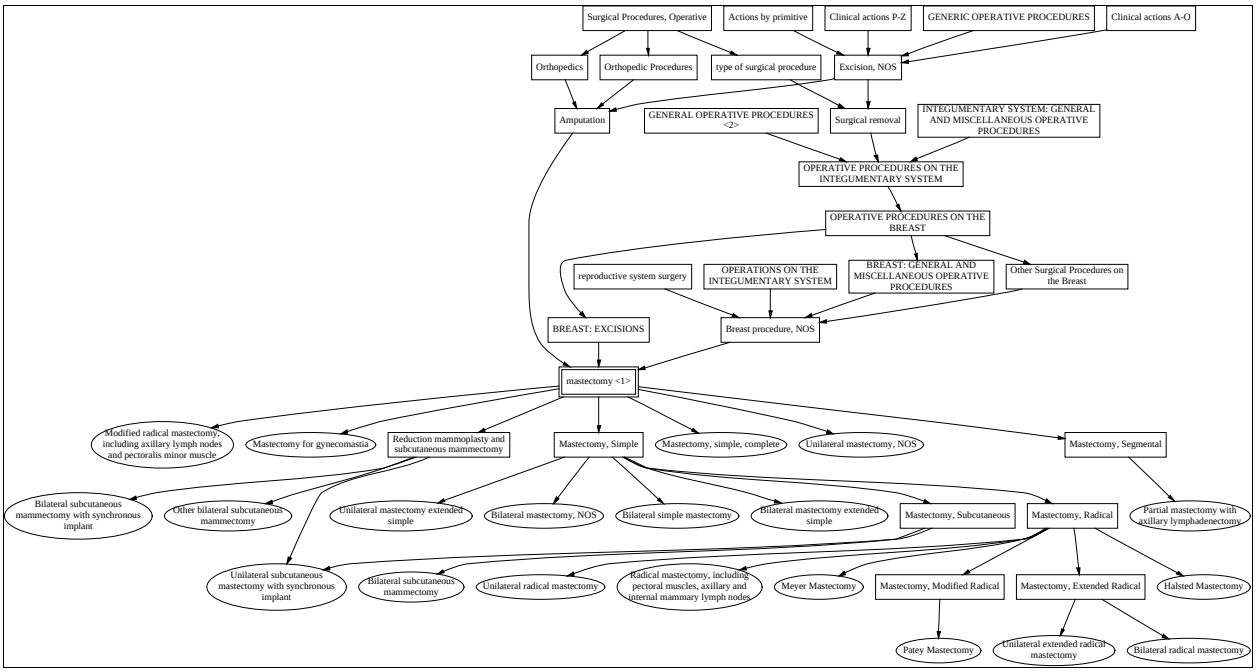


*Figure 1 – Graph of the concepts hierarchically related to "mastectomy" (C0024881) in the UMLS.*