



Lightweight XML-based query, integration and visualization of distributed multimodality brain imaging data

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1. Introduction

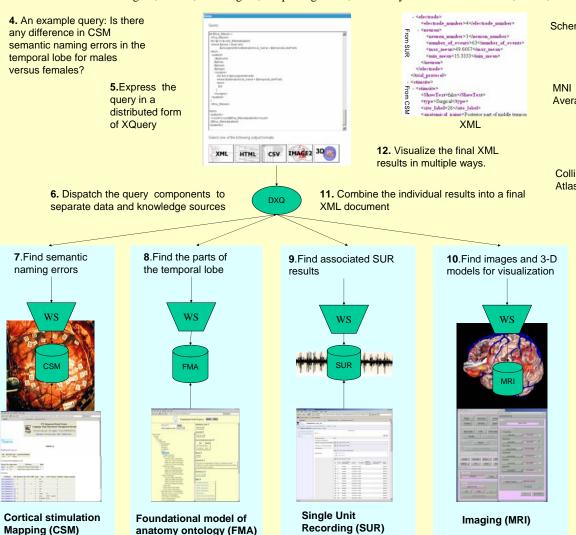
With the proliferation of brain imaging modalities and the inability of any one lab to be expert in all modalities or to acquire sufficient data from a single population, there is a need to integrate distributed sources of brain imaging data. We have developed a "lightweight" approach to integration that does not require a central mediator.

2. Driving neuroscience problem

Language organization in the brain. Multiple types of data are acquired on patients undergoing neurosurgery for epilepsy. Each data type alone has shown correlations with behavioral and demographic factors. An interest is to integrate these separate sources in order to gain insights that could not be obtained from a single source alone.

3. Approach

Separately maintained local or remote data and knowledge sources are encapsulated in web services (WS), and made to appear as XML for access by a distributed XMLbased query engine (DXQ). Distributed XML queries are dispatched to the separate data sources, the results or which are combined by DXQ, and then converted to various formats for visualization or offline analysis.

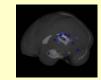






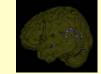
Average





Collin Atlas





Females, n=14

Males, n=10

13. Conclusions

Example results show that the framework is in place for use in exploratory neuroscience research. The lightweight nature of the system should allow any webencapsulated XML source to be added with minimal effort. The tradeoff is that users need to understand each source in detail and to know XQuery. Current research is addressing how to reduce this burden on the user. In addition, issues of interoperability are being addressed through ontologies like the FMA and a spatial normalization web service.