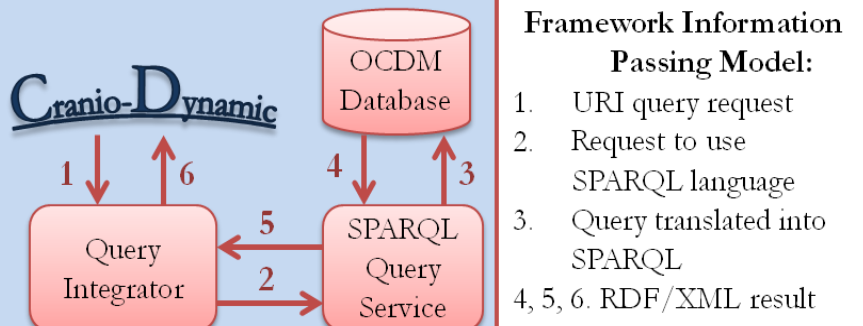


Overview

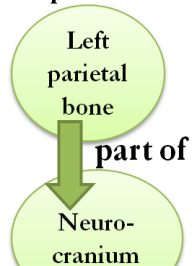
- The Ontology of Craniofacial Development and Malformation (OCDM) is a computer-parsable source of knowledge about the anatomy of human and mouse heads
- OCDM contains 28,000+ names of anatomical structures, 190+ unique properties, and 300+ mappings between structures
- An efficient, intuitive query engine is required for a user to retrieve knowledge relevant to his/her questions
- The purpose of Cranio-Dynamic is to allow users to manipulate sets of query results and to navigate the OCDM using patterns of properties

Accessing the OCDM



- The OCDM is stored as OWL, which are statements structured in triplet format: <Subject><Property><Object>
- Querying the OCDM using SPARQL returns results in RDF/XML format
- These results are visualized using a directed graph format

Directed Graph Format:



RDF/XML Format:

```

<rdf:Description subject=Left_parietal_bone>
  <ocdm:part_of object=Neurocranium/>
  ...
</rdf:Description>
  
```

Triplet Format:

<Left parietal bone, part of, Neurocranium>

Future Enhancements

- The Combine Properties panel could be extended to make use of regular expressions by allowing properties to be repeated 0 or more times (*), 1 or more times (+), or 0-1 times exactly (?)
- Properties in patterns could be joined to other properties using the “AND”, “OR”, “BUT NOT”, and “THEN” operations

Using Cranio-Dynamic

- Steps in query creation (see red numbers):

1. Select an ontology
2. Type subject or browse for subject; completing this step provides a list of relevant properties
3. Choose property, pattern, or check mapping box

- A set is a group of results (objects) returned by a query
- Sets can be used as query subjects or combined with other sets
- Sets aid the user in building nested queries

Query Setup

Ontology: Canonical Human

Subject: Left stapes

Property: regional part

Find Pattern

Show Mapping

Create Query

Query Results

Set Configuration

Set 1 (Left stapes regional part unknown)

Rename Set as Subject Delete

Query Results

List View Tree View Mapping View

Anterior limb of left stapes
Base of left stapes
Head of left stapes
Posterior limb of left stapes

- A pattern is a group of properties which can be applied to a single subject or a set
- Users can interact with useful default or custom patterns

Query Setup

Ontology: Canonical Human

Subject: Face

Property: Select Property

Pattern 5

Create Query

Pattern Configuration

Default 1: Given an anatomical structure, find its points (bounded by\regional part*\bounded by\bounded by)

Default 2: Given a point, find its anatomical structure (bounds\bounds\regional part of*\bounds)

Default 3: Walk down branched tree structure (regional part\regional part*)

Default 4: Walk up branched tree structure (regional part of*\regional part of)

Pattern 5 (constitutional part\regional part*)

Query Results

List View Tree View Mapping View

Integument of cheek
Integument of nose
Left iris
Left pupil

Class Traversal using Pattern 5 (constitutional part\regional part*)

