OntoVIP: an ontology for the annotation of object models used for medical image simulation

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Context:
• Medical image simulation produces virtual images from software representations of imaging devices and virtual object models representing the human body. Object models consist of the geometry of the objects (e.g. organs, tissues, pathological structures, etc.) and of their physical parameters used for the simulation.
• The VIP platforms aims at supporting the sharing of image simulation resources [1,2]

Goal: create an application ontology that can be used to annotate the object models in the VIP platform’s model repository, to facilitate their sharing and reuse.

Methods:
• Use of a common integration framework provided by a foundational ontology called DOLCE, successfully used in a previous project [3]
• Development of an ontology module to depict the content of object models and their physical characteristics
• Extraction of relevant subsets of existing ontologies, using vSPARQL [4]
  - FMA v3.1: anatomy (865)
  - PATO V1.2: patho. anat. object quality (84)
  - MPATH V1.2: pathological objects (494)
  - RadLex V3.2: contrast agents (81), radiopharmaceuticals (49), foreign bodies (189)

Results:
Representation of a set of layers:
- Anatomy
- Pathology
- External agents
- Foreign bodies
- Geometrical objects

Taxonomy of object models represented in OWL (using Protégé)

Implementation:
(in progress)
- Semantic annotation of object models at importation time
- Description Logics and rule-based inferencing of object models’ classes
- Semantic querying of object models

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References