Chapter 25: Properties

This chapter considers the properties in the domain of anatomy, also call the horizontal hierarchy in opposition to the taxonomy and the partonomy. The relations between entities of the vertical hierarchies are named properties.
Warning: there is currently no substantial implementation of the properties in the database of the $\mathbf{T}_{logy}$.
This document is the chapter 25 of the book Universal Terminology which presents a global documentation on the $\mathbf{T}_{logy}$.

Contents

25.1 About properties

Properties make the natural description of the domain of anatomy and complement the vertical hierarchies. An example of property is the following: LA:*ovarium* contained_in LA:*fossa ovarica* This is self explanatory, it means that the ovary is contained in the ovarian fossa of the peritoneum.

25.1.1 Definition

Currently, the properties are exclusively represented as binary relations. Probably an extension to unary relations is necessary for a complete representation of the reality.

Property
`A property (definition) is a binary relation linking a physical entity either to another physical entity or to some non physical entity specified in the taxonomy.`

Most relations stand between two physical entities of the domain. But a few of them are related either to some non physical entity, or to some numerical expression, or to some value of an enumeration type.

25.1.2 Property type

There are numerous types for properties and their list is extensible at will when describing new aspects or details of the domain of anatomy. To each type of property may be associated one or several relations typical of this type. See the table 25.1 for a non exhaustive list of property types.

property type	**relation example**	**category**
taxonomy	isa	vertical hierarchy
partonomy	part_of	vertical hierarchy
supporting	contained_in	spatial
adjacency	adjacent_to	spatial
artery	is_artery_of	supply
vein	is_vein_of	supply
nerve	is_nerve_of	supply
lymphatic	is_lymph_of	supply
tract	proximal_to	functional
dependency	connected_to	functional
synonymy	is_word_of	vocabulary
physical	has_mass	quality

Table 25.1: Samples of properties.

A few examples would help understanding the world of properties. All the examples below are related to the duodenum:
LA:*duodenum* isa LA:*segmentum intestini tenuis*
LA:*digestive tract* has_stage LA:*intestinum tenue*
LA:*duodenum* is_continuous_of LA:*gaster*
LA:*duodenum* is_proximal_to LA:*jejunum*

LA:*duodenum* adjacent_to LA:*ren dexter*
LA:*duodenum* adjacent_to LA:*colon transversum*
LA:*duodenum* adjacent_to LA:*pancreas*
LA:*arteria pancreaticoduodenalis inferior* artery_of LA:*duodenum*
LA:*duodenum* connected_to LA:*gallbladder*
LA:*duodenum* part_of LA:*systema digestorium*
LA:*duodenum* has_length 25-38 cm
etc ...

What appears from this simple example is the fact that any anatomical entity is the center of a network of several properties. Here the list is far from being exhaustive. A complete collection of all properties of the duodenum would certainly include 50 or more properties. With more than 10000 physical entities and despite many properties are simultaneously used by different entities, the set of all property relations amounts to some 500000 items: that's the reality of a complex human body.

25.2 Property relations

This section will examine each relation in use for the definition of a property. The properties isa and part_of are documented in their respective chapters.

25.2.1 Adjacent_to

This is a relation of the spatial category. It documents the close proximity of two entities. It means that the two entities are for at least some partial surface of them in direct contact without any intervening membrane. This relation is not transitive. Any entity may be adjacent to any number of other entities.

This relation should not be confused with relations indicating the continuity, for example, the duodenum is not adjacent to the stomach. On the contrary, this relation is indicated when the two concerned entities are discontinuous, or at least locally discontinuous.

Typical examples are:
LA:*duodenum* adjacent_to LA:*ren dexter*
LA:*trachea* adjacent_to LA:*oesophagus*

25.2.2 Artery_of

This is a relation of the supply category. It says that an entity - which is an artery - supplies blood to a material entity. This supply is either direct or by a branch starting from this artery.

25.2.3 Contained_in

This is a relation of the spatial category. It says that some entity is within another entity, but evidently not a part of it. This is definitively not a partonomic relation. This relation is transitive.

Typical examples are:
LA:*ovarium* contained_in LA:*fossa ovarica*
LA:*cor* contained_in LA:*mediastinum*
LA:*testis* contained_in LA:*scrotum*

25.3 Implementation status

The anatomical entities are all implemented as members of the partonomy.

The position of anatomical entities in the taxonomy is realised for at minimum 70 percent of all cases. For each entity, the complete list of ancestors is created based on the FMA. The FMA names are systematically available in five languages.

The instanciation of the relations of property is not yet realized. The present chapter is to be considered as a design paper.

25.4 Log of updates

Dec 2023 Creation of the file.

25.5 Credentials

This document is part of the book "Universal Terminology" accompanying the website on Terminologia Anatomica. It expresses the vision of the authors of the $\mathbf{T}_{logy}$about the foundations of the science of ontology, supporting the here presented terminology. Despite it is as exact as possible, close to the reality of the database of the terminology and the surrounding software, approximations, errors and ambiguities are possible and should be considered as independent of their willingness and intents.

Identified comments about the content of the website and its presentation are welcome. An appropriate answer will be given when pertinent.

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