Abstract

This specification describes the ontology of general diseases and the diseases which gains high attention when it breaks up.

Status of This Document

This section describes the status of this document at the time of its publication.

This document was prepared by the Masters student Shivvasangari Subramani, based on the Diseases ontology which was developed as a part of “Semantics Web” course work on May 18, 2009.

Ontology is being developed in various topics in the wide range of fields. Need of ontology has been increasing in the past few years. Ontology on diseases has been evolving gradually since its first creation on 2003. There is no stable core of classes and properties for the diseases ontology. It keeps on changing with the changes to their documentation to track implementation feedback and emerging best practices. New terms may be added at any time (as with a natural-language dictionary), and consequently this specification is an evolving work.

The ontology specification is produced as part of the “General Diseases ontology” project, to provide authoritative documentation of the contents, status and purpose of this ontology. This document is created by combining the RDF/XML/OWL machine-readable Disease ontology with a set of per-term documents.

There are future plans of improving the present version of diseases ontology with increased number of diseases and new diseases, if any. Comments are welcome and may be sent to shivva1@umbc.edu.

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Diseases ontology at a glance

An A-Z index of terms of diseases ontology, by class (categories or types) and by property.

**Classes:** Agent | Details | Disease carrier | Diseases | Kind | Period | Prevention | Risk | Season | Symptom

**Sub-classes of Diseases:** Dental_Diseases | General_Diseases | Injuries

**Sub-classes of General_Diseases:** Acute_diarrhea | Alcoholic_liver_disease | Allergic_Reaction | Anemia | Asthma | Brain_tumor | Chickenpox | Cholera | Cold_soars | Common_cold | Common_fever | Dehydration | Depression | Diabetes | Food_allergy | Food_poisoning | HIV | Hay_fever | Hepatitis | Influenza | Leukemia | Malaria | Measles | Mumps | Nosebleed | Pneumonia | Polio | Prickly_heat | Rabies | Radiation_sickness | Rickets | Rubella | STD | Smoking | Snoring | Stress | Thyroid_disorders | Tuberculosis | Typhoid

**Sub-classes of Dental_Diseases:** Dental_ulcer_of_tounge | Gum_diseases | Tooth_diseases

**Sub-classes of Injuries:** Burn | Fracture | Wound

**Properties:** Caused_by | Disease_details | Disease_kind | Disease_period | Disease_prevention | Disease_season | Risk_of_the_disease | Transmitted_by | hasSymptom

**Example**

Here is a document describing the disease Asthma:

```xml
<owl:Class rdf:about="#Asthma">
  <rdfs:subClassOf>
    <owl:Class>
      <owl:intersectionOf rdf:parseType="Collection">
        <rdfs:subClassOf>
          <owl:Class>
            <owl:intersectionOf rdf:parseType="Collection">
              <owl:Restriction>
                <owl:onProperty rdf:resource="#Caused_by"/>
                <owl:hasValue rdf:resource="#Blood_borne"/>
              </owl:Restriction>
              <owl:Restriction>
                <owl:onProperty rdf:resource="#Caused_by"/>
                <owl:hasValue rdf:resource="#Hereditary"/>
              </owl:Restriction>
            </owl:intersectionOf>
          </owl:Class>
        </rdfs:subClassOf>
      </owl:intersectionOf>
    </owl:Class>
  </rdfs:subClassOf>
  <owl:Restriction>
    <owl:onProperty rdf:resource="#Disease_details"/>
    <owl:hasValue rdf:resource="#Non_contagious"/>
  </owl:Restriction>
  <owl:Restriction>
    <owl:onProperty rdf:resource="#Disease_details"/>
    <owl:hasValue rdf:resource="#Treatable"/>
  </owl:Restriction>
</owl:Class>
```
It explains the disease Asthma as a general disease caused by one of {Hereditary, Blood borne} which is non-contagious and treatable. It is a respiratory disease which can persist lifelong if it is not treated properly. There is no prevention for this disease and it can occur at any time and its symptoms cough with sputum and wheezing has been enlisted.

1 Introduction: Ontology Basics

The Basic Idea

An ontology defines a common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them. Ontologies have become common on the World-Wide Web. People develop ontologies for various reasons.

- Ontologies can unambiguously define things.
- Ontologies can expand/narrow search terms.
- Ontologies enable “Activity-based” search.
- Ontologies can validate taxonomy membership.
Ontologies can be distributed and aggregated.
- Ontologies map to dbms, OOP and UML modeling.
- Ontologies + Rules = Inference.
- Ontology concepts are mature.

2 What's Diseases Ontology for?

Ontology is an object model or entity-relationship model.

There are lots of diseases affecting human beings. The medical knowledge is less for large population of people. There is need for the ontology of diseases, which occurs frequently to every human and the list of highly influencing diseases like AIDS.

The ontologies that are existing now for diseases mainly deal with particular kind of a disease and give wide analysis of that particular disease. They involve lot of medical terms, which make them difficult to understand without medical knowledge. There is need for an ontology that defines and gives structure for the general diseases, which is understandable by everyone.

This ontology will help normal people to understand the details and symptoms of most of the general diseases.

Hence the goals of the General Diseases ontology are:

- To share common understanding of the structure of information about diseases among people or software agents.
- To enable reuse of domain knowledge
- To separate domain knowledge which is in layman’s terms from the operational knowledge

3 Background

The first version of Disease Ontology was released in August of 2003 and due to various problems is no longer supported. The next version of Disease Ontology was implemented as a directed acyclic graph (DAG) on May 2005 and utilizes the Unified Medical Language System (UMLS) as its immediate source vocabulary to access medical Ontologies such as ICD9CM. This was followed by its third version on May 2007.

All these ontologies have complicated medical terms restricting their use to medical researchers and doctors.

Hence there is a need for ontology of general diseases in simple terms, describing various qualities of the diseases.
Listing General Diseases Ontology Classes and Properties

Classes

Class: Agent

This describes the possible living and non-living things which are capable of causing a disease in human. Some famous agents are virus, bacteria, protozoa, hormonal disorders. This class will be useful while describing a particular disease as the cause for the disease can be clearly mentioned.

Class: Details

This class contains various properties/qualities of the disease such as curable, contagiousness, treatability, and spreading nature of disease like epidemic and endemic.

Class: Disease Carrier

Various individuals such as air, food, water, animals which can spread a disease are listed in this class.

Class: Diseases

It represents various diseases. Contains three sub-classes namely general diseases, dental diseases and injuries. Every sub-class has possible diseases which occur more frequently in the day to day life.

Class: Kind

It is used to describe the kind of the disease such as respiratory, skin disease, inflammatory and metabolic disorder.

Class: Period

Used to mention the period of time the disease will stay in human body. This is given in terms of days, weeks, months and years.

Class: Prevention

Explains how a disease can be prevented. For example, vaccine, taking nutritious food, being hygienic etc.

Class: Risk

Defines the risk factor associated with a disease after a human has been attacked with that disease. Two individuals in this class are High and Low.

Class: Season

This has individuals hot half of the year, cold half of the year and throughout the year. As many diseases occur in particular time of the year this class will be helpful.
Class: Symptoms

It includes possible symptoms of the common diseases.

**Properties**

**Property: Caused_by**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Agent

This defines the individuals causing disease in human.

**Property: Disease details**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Details

It describes the disease in terms of curability, spreading nature.

**Property: Disease kind**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Kind

It describes the kind of disease such as respiratory, skin disease etc.

**Property: Disease period**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Period

Time that the human will have a disease.

**Property: Disease season**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Season

**Property: Risk_of_the_disease**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)
Range: Risk

Risk for the life of the human after getting the disease.

**Property: Transmitted_by**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Disease_carrier

**Property: hassymptom**

Domain: [http://www.w3.org/2002/07/owl#Thing](http://www.w3.org/2002/07/owl#Thing)

Range: Symptoms

It describes the symptoms of diseases.

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