ICBO: International Conference on Biomedical Ontology
July 24-26, 2009 ▪ Buffalo, New York, USA

Ontology Mapping of PATO to YATO for the Improvement of Interoperability of Quality Description

Hiroshi Masuya[1], Nobuhiko Tanaka[1], Kazunori Waki[1], Tatsuya Kushida[2], Riichiro Mizoguchi[3]
[1]RIKEN BioResource Center, Tsukuba, Japan; [2]NalaPro Technologies, Inc, Tokyo, Japan; [3]Osaka University, Ibaraki, Japan

Abstract

To facilitate broad interoperability for phenotype information between different ontological frameworks, we developed a reference ontology, PATO2YATO_ Quality, with the careful mapping of terms of PATO which is a quality ontology commonly used for biological phenotype annotation to the latest top-level ontology, YATO, which represents advanced modeling of quality-related concepts. This represents of interrelationships among quality-related concepts to provide fully integration of qualitative values and quantitative values obtained from phenotyping experiments and advanced representation of more detailed quality description.

Introduction

The description of qualities is a core issue for the integration of biological phenotype information. The Phenotype Quality Ontology (PATO) provides a practical basis for the integration of phenotype information across species. Typically, it is used for "entity plus quality" (E+Q) annotation of experimental parameters and parameter values[1]. However, there are multiple different methods of quality description recommended by the different top-level ontologies[2].

Recently, Yet Another Top-level Ontology (YATO) has been developed[3,4]. YATO represents not only ordinal quality descriptions covered by DOLCE and GALEN but also advanced quality descriptions not covered them. For the realization of more broad interoperability and advanced quality description of phenotypic quality using PATO terms, we developed a reference ontology called "PATO2YATO_Quality".

Results

We have worked out mapping of terms in the PATO2YATO framework by the careful examination with the helps of flags for subset of "attribute slim" and "value slim" embed in OBO format file of PATO as the remains of previous version. In this ongoing work, we currently have mapped about 500 terms of version 1.132 of PATO (quality_v1.132.obo) to YATO: (UpperOntology090112.ont: http://www.ei.sanken.osaka-u.ac.jp/hozo/onto_library/upperOnto.htm).

In PATO2YATO_Quality, quality-related concepts (dependent entities) are arranged as two hierarchies, "Quality type" and "Quality value", both of these are essential for an ontologically correct description of a change in quality. Furthermore, it allows systematic integration of numerical scales values and detailed representation such as <patient_1, diarrhea, yes> and <tail of mouse_1, short, severe>. We have started discussion with PATO developers to establish certain interoperability between two ontologies.

PATO2YATO_Quality is available at: http://www.brc.riken.jp/lab/bpmp/Ontologies/PATO2YATO/P2Y_Quality.html. Its OWL version, exported from Hozo, will be available soon.

Conclusion

We worked out mapping of PATO terms to the YATO framework, and successfully represented both the advanced meaning of each concept and the interrelationships among them.

Acknowledgements

With thanks to the Dr. Georgios V. Gkoutos for kindly sending us post-coordinated MP library, and for meaningful discussion.

References

1. Gkoutos GV, Green EC, Mallon AM, Blake A, Greenaway S, Hancock JM and Davidson D. Ontologies for the description of mouse phenotypes. Comp Funct Genomics. 2004:5:545–551.
2. Aranguren ME, Antezana E, Kuiper M and Stevens R. Applying ontology design patterns in bio-ontologies, Proc. of 16th International Conference:2008:LNAI 5268:7–16.
3. Mizoguchi R. Yet Another Top-level Ontology: YATO, Proceedings of the 2nd Interdisciplinary Ontology Meeting, 2009: in press.
4. Masuya H and Mizoguchi R. Toward fully integration of mouse phenotype information, Proceedings of the 2nd Interdisciplinary Ontology Meeting, 2009: in press.