



Ontology Evaluation

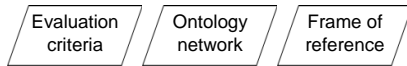
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Motivation

Ontology evaluation is an important topic that has attracted a considerable amount of work in the field of the Semantic Web. Ontology evaluation needs to be considered during the whole ontology development, during the re-engineering (to assess the quality and correctness of the obtained ontology), and during ontology selection (to compare the quality of a set of candidate ontologies and to rank them accordingly).

What is the process?

What is Ontology (Network) Evaluation?



Ontology network evaluation

Definition

Evaluation of Ontology Networks refers to the activity of checking the technical quality of the ontology network against a frame of reference.

Goal

The goal is to compare the ontology network with the specification requirements and golden standards (if available) by taking into account the evaluation criteria and applying various evaluation approaches (manual, automatic), yielding evaluation results and advices on how to improve the ontology network.

Input

A set of ontologies with interconnection links (network), evaluation criteria and a frame of reference.

Output

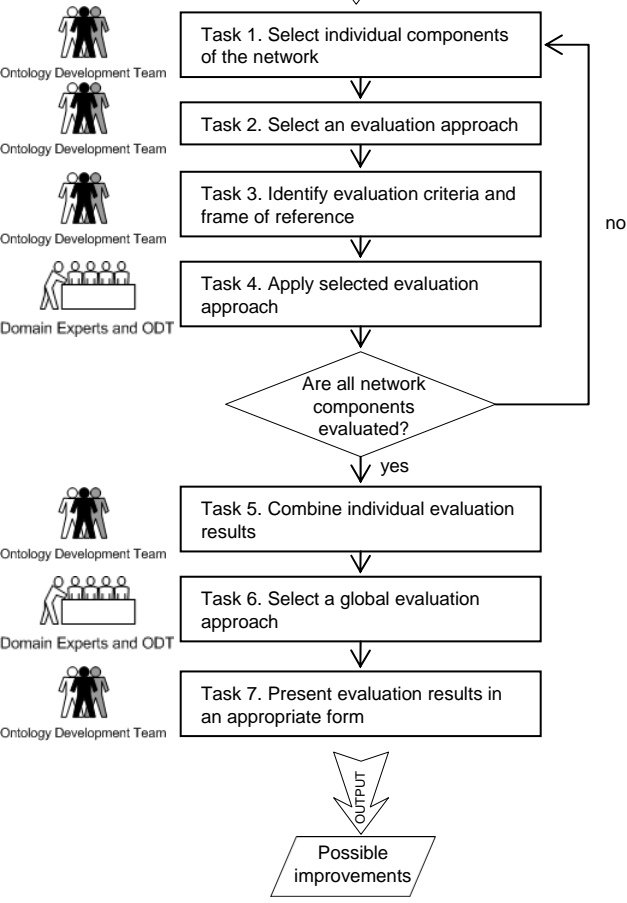
Evaluation results in the form of quantitative and qualitative measures, and informal advices on the possible ontology network modifications.

Who

Domain experts and users, also ontology developers and practitioners, who form the network ontology development team.

When

This activity should be carried out in parallel to the ontology network development and evolution, and after parts of the ontology network are (at least partially, as prototypes) implemented.



The process in detail (1)

Task 1. Selecting individual components of the ontology network.

In this task, the ontology development team identifies individual ontologies within the network, or pairs of related ontologies and the mappings/alignments between them, based on two criteria: (1) which ontologies and mappings are critical for the overall network, and (2) which can actually be evaluated. The latter means that there must exist some frame of reference against which these individual components can, at least in principle, be evaluated.



Ontology Evaluation

The process in detail (2)

Task 2. Selecting an evaluation approach.

For evaluating individual ontologies, the most common evaluation approaches are (i) to compare the ontology to a gold standard ontology; (ii) to use the ontology in an application and evaluating the results; (iii) to compare the ontology with a source of data about the domain to be covered (e.g., a set of documents); (iv) evaluation by human experts who assess how the ontology meets the requirements; and (v) evaluation in terms of ontology design patterns.

When evaluating mappings and alignments between ontologies, there are typically three evaluation approaches : (i) the open evaluation is made with already published reference alignments; (ii) the blind evaluation is made by evaluators from reference alignments, unknown to the methods used to compute the alignments; and (iii) the consensual evaluation, when there is no golden standard reference alignment, is obtained by reaching consensus over the results found by different methods.

Task 3. Identifying evaluation criteria and frame of reference.

Depending on the evaluation approach selected, a frame of reference (or golden standard) has to be specified and its corresponding evaluation measures defined. A frame of reference can be other existing resources available (reference ontologies and reference alignments), sources of data, from which the ontologies and mappings were derived (e.g., documents corpora), or human experts with the implicit understanding of the domain.

Evaluation criteria are various metrics which can be applied to the ontologies and mappings to be evaluated, such as precision and recall, cost-based evaluation metrics, measure of fit between an ontology or a mapping, and a corpus (domain knowledge), and lexical measures.

Task 4. Applying selected evaluation approach.

Applying the selected evaluation approach requires proper setup for the evaluation experiments and implementation of the software tools to compute the evaluation measures, and/or the commitment of the human experts in stimulating sessions to collect their evaluations.

Task 5. Combining individual evaluation results.

This task highlights the weakest spots in the ontology network by considering individual evaluation results and how they affect the rest of the network.

Task 6. Selecting a global evaluation approach.

Rather than evaluating individual ontologies or mappings between pairs of ontologies, it may be more practical to see how the results of the application are affected by the use of the ontology network in question. Instead of focusing on an individual application, one may also focus on an evaluation from the point of view of the individual user or the organization that will use the ontology network.

Task 7. Presenting evaluation results.

The final task is to present the results of the evaluation in an appropriate form for possible repair (corrections and additions), improvements and future evolution of the ontology network.

Additional information:

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- *NeOn Deliverable D2.2.1: Selection and integration of reusable components from formal or informal specifications*
- *NeOn Deliverable D2.2.3: Methods and Tools for the Evaluation and Selection of Knowledge Components*
- *NeOn Deliverable D5.4.2: Revision and Extension of the NeOn Methodology for Building Contextualized Ontology Networks*