



## Review article

## Ontology learning: Grand tour and challenges

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## ABSTRACT

Ontologies are at the core of the semantic web. As knowledge bases, they are very useful resources for many artificial intelligence applications. Ontology learning, as a research area, proposes techniques to automate several tasks of the ontology construction process to simplify the tedious work of manually building ontologies. In this paper we present the state of the art of this field. Different classes of approaches are covered (linguistic, statistical, and machine learning), including some recent ones (deep-learning-based approaches). In addition, some relevant solutions (frameworks), which offer strategies and built-in methods for ontology learning, are presented. A descriptive summary is made to point out the capabilities of the different contributions based on criteria that have to do with the produced ontology components and the degree of automation. We also highlight the challenge of evaluating ontologies to make them reliable, since it is not a trivial task in this field; it actually represents a research area on its own. Finally, we identify some unresolved issues and open questions.

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## 1. Introduction

During the last decade we have witnessed a wide spread of artificial intelligence technologies to all walks of life (smart

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phones, cars, homes, robots, etc.). Most of these technologies use applications that make use of natural language processing, information retrieval, etc. These require some reference knowledge bases to express a conceptualization of the world, which enables a semantic comprehension of the environment. As such, ontologies have proved to be very useful in many domains and actually play a key role in the semantic web,<sup>1</sup> since they offer a formal method to define concepts and semantic relations between these; this

<sup>1</sup> <https://www.dataversity.net/semantic-web-semantic-technology-trends-2019/>.