Machine Learning with Biomedical Ontologies

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Abstract

Ontologies are increasingly being used to provide background knowledge in machine learning models. We provide an introduction to different methods that use ontologies in machine learning models. We will start the tutorial by introducing semantic similarity measures that rely on axioms in ontologies to compare domain entities. From semantic similarity, we will develop and discuss unsupervised machine learning methods that can "embed" ontologies in vector spaces to allow comparison of domain entities based on similarity in these spaces. We will introduce mOWL, a software library for machine learning with ontologies, based on which the methods we discuss can be implemented. Throughout the tutorial, we will use biomedical examples for hands-on tasks. The methods and experiments we describe are available as a set of executable notebooks, and we also provide a set of slides and additional resources at https://github.com/bio-ontology-research-group/machine-learning-with-ontologies.