

# Semantic similarity and machine learning with ontologies

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# Ontologies, machine learning, and AI

- ontologies are ubiquitous
- rich formal characterization (axioms)
- how can they be used for (predictive) data analysis?
  - ▶ “fuzzy”, similarity-based search
  - ▶ predictive analysis and machine learning
  - ▶ background knowledge

# Learning goals

- machine learning with ontologies as *features* (or background knowledge)
- unsupervised or supervised:
  - ▶ here: mostly unsupervised *feature* learning
  - ▶ “deep” learning
- focus on existing tools and methods
  - ▶ Jupyter Notebooks and code examples
- not covered:
  - ▶ learning ontologies (axioms, definitions) from data
  - ▶ (most) natural language processing
  - ▶ reasoning with ontologies
  - ▶ learning on “knowledge graphs”
  - ▶ machine learning theory

# Agenda

- Introduction: ontologies and graphs
- Semantic similarity
- Machine learning:
  - ▶ syntactic
  - ▶ graph-based
  - ▶ model-theoretic