Machine learning with ontologies

Organizers

- Sarah Alghamdi
- Maxat Kulmanov
- Sumyyah Toonsi
- Fernando Zhapa
- Robert Hoehndorf

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
- ontologies and deep learning

Learning goals

- machine learning with ontologies as *features* (or background knowledge)
- unsupervised or supervised:
  - here: mostly unsupervised *feature* learning
  - semantic similarity
  - "deep" learning
- focus on existing tools and methods
  - Jupyter Notebooks and code examples
  - mOWL library
- 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
  - 15min break
- Machine learning:
  - graph-based
    - 15min break
  - syntactic
  - (model-theoretic)
- application of ontology embeddings

Agenda

- Introduction: ontologies and graphs
- Semantic similarity
  - 15min break
- Machine learning:
  - graph-based
    - 15min break
  - syntactic
  - (model-theoretic)
- application of ontology embeddings
- most hands-on components based on the mOWL library

Quiz

We will have quizzes at
`https://quizizz.com/join`

Quiz code will be shown on the slides.