Short paper

A Web-based UI to Enable Semantic Modeling for Everyone
André Pomp, Alexander Paulus, Daniel Klischies, Christian Schwier, Tobias Meisen

SEMANTiCS 2018 Vienna, Austria

Alexander Paulus, M.Sc.
Institute of Information Management in Mechanical Engineering
RWTH Aachen University
Germany
Motivation
Handling Heterogeneous Data

Distributed Data Sources
Data is created at various places inside a company.

- Heterogenous Provision:
- Heterogenous Formats:
- Heterogenous Models:
- Heterogenous Representations and Meanings:
ESKAPE is a company-wide data marketplace, which:

- ... can deal with **heterogeneous data** (in terms of format, representation, etc.)

- ... uses **semantic models** based on a **dynamic semantic knowledge graph** to describe the information of the data

- ... has a **knowledge graph** which **evolves incrementally** based on the provided data and their **semantic models**

- ... enables **search**, **retrieval** and **enrichment** of **integrated data**
Knowledge Graph

Extension of knowledge graph

- **New semantic models** are added / merged into the knowledge graph
  - Reused concepts serve as anchor points
  - Probabilities help assigning relations to concepts

- External sources help **validate concepts** and relations

- Knowledge graph is **constantly growing** / strengthened

- Semantic models allow users to model their sources **freely** and add concepts during this process
Motivation

Starting Point

Small example data schema

```json
{
    "id": "AL0025-20200123-1456-1634",
    "o": {
        "name": "Cologne",
        "shorthand": "CGN"
    },
    "d": {
        "name": "Berlin",
        "shorthand": "BER"
    },
    "staff": [
        {
            "name": "Pilot 1",
            "seat": "P1"
        },
        {
            "name": "Pilot 2",
            "seat": "P2"
        },
        {
            "name": "Flight attendant 1",
            "seat": "FA1"
        },
        {
            "name": "Flight attendant 2",
            "seat": "FA2"
        }
    ]
}
```
Motivation
Creating Semantic Models

```json
{
    "id": "AL0025-20200123-1456-1634",
    "o": {
        "name": "Cologne",
        "shorthand": "CGN"
    },
    "d": {
        "name": "Berlin",
        "shorthand": "BER"
    },
    "staff": [
        {
            "name": "Pilot 1",
            "seat": "P1"
        },
        {
            "name": "Pilot 2",
            "seat": "P2"
        },
        {
            "name": "Flight attendant 1",
            "seat": "FA1"
        },
        {
            "name": "Flight attendant 2",
            "seat": "FA2"
        }
    ]
}
```

Knowledge Graph
Display the detected data schema

- data type indicator (list)
- data type indicator (object)
- original label
- primitive data type (unknown)

Start from user’s point of view
Display the detected data schema

list of available entities

Clean and slim GUI for unexperienced users

switch to relations

view toggles
Use local and global semantic networks to offer concepts

create new entities / concepts and relations on the fly

Use drag and drop as well known form of user input
Entity types can be freely modified

- **Meta concept:**
- **Entity concept (universally valid, fixed):**
- **Data bound concept:**
- **Entity type (locally valid, freely renamable):**
- **Data type (string, number, boolean):**
Handle relations the same way as entities

Select … … and connect.

Do not restrict the user during the modeling process

drag and drop again
The more information the user gives, the stronger is the resulting model

Do not restrict the user during the modeling process
Model data values that contain more than one information

Define splitting patterns

Adapt the schema to the user’s needs
Future Work

Improving Handling and Support

- Improve zooming, focus on subtrees and auto alignment
- Change splitting dialog to be more user friendly
- Add multiple side projects to UI
  - Recommendation of Concepts and even subgraphs
  - Enable auto-detection of concepts
- Conduct greater user study
  - Compare to similar tools
  - Improve on modeling speed based on widespread user feedback
Thank you!

Alexander Paulus, M.Sc.
Scientific Researcher | Cognitive Computing & E-Health
Institute for Mechanical Engineering RWTH Aachen University
Tel: +49 241 / 80 91136
alexander.paulus@ima.rwth-aachen.de
Backup