

4 powerful examples for the Application of Semantic AI

Karlsruhe, 09.07.2019 – Dealing with large amounts of data is the central challenge companies and institutions are facing today. Here it comes to Semantic Artificial Intelligence. Prior to the [SEMANTICS 2019](#) conference, four international scientists present promising application examples.

Knowledge graphs for elderly affected by dementia

One of the most engaging and moving use cases I have worked on is with elderly affected by dementia. The goal here is to help them slowing down the degeneration of cognitive abilities, for example their memory. I've had the opportunity to meet some people suffering from this disease and willing to share their experience. It was very touching, they just want to be helped remembering because of the profound sadness of being unable to remember the nice time with their partner. It's like, they say, if you lose a piece of your life with your loved ones, and you want it back. Based on input from psychologists and physicians, we have built a personalised knowledge graph, connected with multimedia content such as photographs and music tracks that the robot uses for interacting with its human and helping her remembering places, people, events, etc. Although there's a long way to go before this type of application can work with a smooth interaction, the prototype we developed has been welcomed with unbelievable enthusiasm. It has been the first time in my life that I realise that my work can really make a difference and be life changing, and more importantly, bring happiness to people that may have thought it was not possible anymore. *Valentina Presutti, Semantic Technology Laboratory of the National Research Council (CNR) in Rome*

Big Data in Healthcare

AI applications in image analysis have already been used for more than five years. Siemens Healthineers have been doing pioneering work and are working on many future use cases. In general, I would suggest that the data situation in the medical area is as good or as bad as in any other enterprise. Mission critical data has high quality and the rest is "not well maintained." The situation is different in clinical studies where personnel is paid to ensure a high quality for study relevant data. This process can partially be automated but also involves a huge amount of manual work.

I am completely convinced that knowledge graphs will become more important. As in the medical area, most domains consist of unstructured data (sensory data, images, ...) and structured data (diagnosis, procedures, lab results, blood counts). Roughly speaking, structured data is the domain of the knowledge graph and unstructured data is the domain of deep learning. A challenge is to have both talk to one another. That is what we are working on! *Volker Tresp, Distinguished Research Scientist at Siemens*

Artificial Intelligence in Cities

I love all my projects, but ... The Data Science Federation is an innovative way to create lots of social good by partnering students and professors with city departments to better inform policies through data. I've been a professor at UCLA for 20 years, and also worked in government for 35 years. The Data Science Federation (DSF) empowers the following people:

- Students get the chance to make a significant difference and see the impact they can have working in the government, they have projects that look amazing on their resumes, and we notify them of new job postings (we are hiring ~15,000 people in the next three years at the City).
- Professors have access to real data and interesting problems, and we encourage them to publish the results in peer-reviewed publications and conferences. We have been successful in bringing \$1.5M in grants to the City and universities based on this work.
- The City staff are presented with new ideas and exposed to new technology in a way that encourages learning, and we improve the data literacy of our City employees.
- Really creative, youth-oriented, out-of-the-box ideas are made in a way that enriches everyone, especially the citizens of Los Angeles.
- We have now expanded this program to include 88 other cities to share the wealth of good ideas.

Cities do not need money to start using data. Sources like Data.gov, Esri, Open Street Map, and others provide a place to start. Models like our Data Science Federation can bring experts and youth to work on projects for free. Additionally, groups like [Code for America](#) or [Code for Africa](#) can help connect technologists with cities. Using structured, organized, and standardized data is a great place to start, while working your way up to linked data!

There are three processes that cities should definitely automate:

1. Procurement (buying, purchases, payments)
2. Human resources (timekeeping, payroll, career development, management)
3. Transportation whenever possible (bus and train planning and schedules, automated traffic signals, scheduling street repairs, traffic flow analysis, etc.)

Jeanne Holm, Deputy CIO of the City of Los Angeles

Semantic Technologies for Digital Humanities

With increased digitization efforts, many cultural heritage datasets are being published online. Recently, institutions have started publishing their collections as linked data. Examples include Rijksmuseum Amsterdam, The German National Library or the many vocabularies and datasets published by the Getty institute.

With more and more of this very heterogeneous (meta)data being published online, questions about interoperability arise. As end-users, we would like to be able to explore the relations between a documentary film about Pablo Picasso, his paintings in Paris museums and archival documentation about his life. Knowledge graphs can play an important role here, where explicit semantics are used to express meaning for object metadata and semantic links between datasets integrates these datasets. Shared vocabularies such as those published by Getty can be used as stepping stones to link objects from different collections and data models such as

the Europeana Data Model, Dublin Core or CIDOC-CRM can be used to structure metadata and define shared semantics.

One specific use for such semantically interlinked heritage data is that of Digital Humanities. Digital Humanities is an emerging field bringing together researchers and practitioners from the domains of computer science, cultural heritage, humanities and social science. Through the integration of previously unconnected datasets, new types of analyses and research questions become possible.

Examples of Digital Humanities projects that involve semantic technologies are those by Aalto university in Finland, the Linked Jazz project or the "Audio-Visual Rhetorics of Affect" research initiative working on the semantic annotation of audio-visual data.

The DIVE project, to which I personally contributed, brings together heterogeneous heritage datasets and make this knowledge graph explorable through an exploratory interface that matches humanities scholars' needs and research practice. *Victor de Boer, assistant professor at the User-Centric Data Science group at the Computer Science department of the Vrije Universiteit Amsterdam (VU)*

About SEMANTiCS Conference

SEMANTiCS is an established knowledge hub where technology professionals, industry experts, researchers and decision makers can learn about new technologies, innovations and enterprise implementations in the fields of Linked Data and Semantic AI. Founded in 2005 the SEMANTiCS is the only European conference at the intersection of research and industry.

This year's event is hosted by the Semantic Web Company, FIZ Karlsruhe – Leibniz Institute for Information Infrastructure GmbH, Fachhochschule St. Pölten Forschungs GmbH, KILT Competence Center am Institut für Angewandte Informatik e.V. and Vrije Universiteit Amsterdam.

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