

Practical work proposals

Proposals by students for new themes are very welcome; following its adoption, these themes are developed in accordance with the general by-laws published in the UC page.

To trigger new project ideas:

If you've used Google, you've used the cornucopia of Linked data across the Web, through Google's Knowledge Graph (Google's Knowledge Graph is reportedly supported by [Freebase – the knowledge acquired by Google in 2010.](#)) If you've enjoyed the efficiency of rich snippets, you've enjoyed the riches schema.org ([based on RDF](#)) brings to the world of search since 2011. If you've used Wikidata – the structured encyclopedia – you've been using a giant RDF knowledge graph, describing about 100 million topics with over 10 billion properties and relationships. That is also one of the sources from which Google's Knowledge Graph is updated.

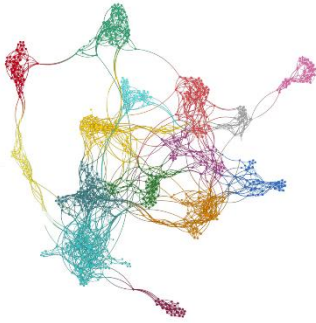
Apply these knowledge sources in an area of your interest (a tool to promote knowledge sharing within your Master programme?) to develop a project that both interest you and provides meaningful outputs for you and your colleagues.

Some general conditions that all projects must follow (subject to discussion on a case-by-case basis) are:

1. Involving web semantics technologies (URI, RDF, SPARQL, OWL, etc) to represent and query data, information and knowledge;
2. Involving the gathering of knowledge from different existing knowledge sources, represented using web semantics technologies and/or create more/new linked data, which can derive into new knowledge.;
3. Implement the [Linked Open Data Principles](#).

The projects for this unit instance may follow or be inspired by the topics presented below.

Data Driven Market Opportunities Map



Every day, we learn about emerging technologies and developments that have the potential to impact our lives, solve real business problems and exploit new open opportunities.

But how do we detect the early proof-of-concept, non-obvious opportunities with real growth potential?

This project aims to develop a visual representation of a given technology or application area (suggestions: food, energy, manufacturing/materials) evolution, providing a sound source

of insight to identify outliers or growing areas with high growth potential. Data can be retrieved from companies' websites, related news, social media, patents databases. The solution must present collected and associated data on a graph-based web interface that identifies outliers and growing opportunities. The implementation must provide tools for users to navigate the application area "graph" in a friendly way.

Intelligent Tagging

People save content in a way that makes sense to them, but when other people cannot easily find the content, it becomes a problem. Properly tagged content can solve this problem. Metadata tagging is one of the most powerful features of content management systems, and one of the areas that AI can assist in. Tagging enables content managers to attribute meaning and context to content. Intelligent tagging enables quicker and smarter search of information that is relevant to a given business. The main purpose of this work is to make data smarter.

Inspiration:

<https://www.refinitiv.com/en/products/intelligent-tagging-text-analytics>

<https://link.springer.com/article/10.1007/s10844-019-00584-7>

Health

One of the main challenges in the field of medicine is the extraction of knowledge from the heterogeneous data and knowledge sources. Semantic Web (SW) technologies can improve the quality of care by integrating data silos. As decision making in the healthcare is often a collaborative process that requires information sharing. This characteristic of the decision process helps the clinicians to collect the right information and avoid repeating the experiences. Given that the SW increases the integration of multiple sources to obtain new and useful results, facilitating and exploiting information by connecting them to their definition and context, it has the potential to significantly can improve the medical decision process. Design a system in which healthcare professionals can search context-based medical research information in a friendly way, which can be used as a foundation for future research, as well as for creating context-based rules for appointments, procedures, and tests so that the quality of healthcare is improved.

Inspiration and other related ideas:

https://link.springer.com/chapter/10.1007/978-3-030-95006-4_8

<https://www.nature.com/articles/s41598-022-07615-4>

Specific Use Case – ICU admissions after cardiac surgery

Intensive Care Unit readmissions represent both a health risk for patients and a financial burden for healthcare facilities. As healthcare became more data-driven with the introduction of Electronic Health Records, machine learning methods have been applied to predict Intensive Care Unit (ICU) readmission risk. However, these methods disregard the meaning and relationships of data objects and work blindly over clinical data without taking into account scientific knowledge and context. Ontologies and Knowledge Graphs can help bridge this gap between data and scientific context, as they are computational artefacts that represent the entities of a domain and their relationships to each other in a formalized way.

Projects Goal: Enriching patient data with semantic annotations to ontologies, and then generate Knowledge Graph embeddings to represent the patient's health status in a contextualized manner.

For this project, data can be used from the following project:

https://www.aicos.fraunhofer.pt/en/our_work/projects/cardiofollowai.html

Fraud Prevention and Fraud Detection

Money laundering is the process of turning illegal currency into legal. Economies across the globe have taken strict actions to curb money laundering schemes. Various methods are being used to record and report suspicious financial activities. Numerous fraud detection techniques have been used by financial institutions. Ontology-based solutions for deterrence and detection of financial fraud are one approach explored by others (cf.

<https://peerj.com/articles/cs-649.pdf>) that could serve as inspiration for this practical project.

Semantic Question Answering

Recently, many question answering systems that derive answers from linked data repositories have been developed. The following publications may serve as inspiration for this project proposal.

<https://www.cambridge.org/core/journals/knowledge-engineering-review/article/survey-on-semantic-question-answering-systems/07050F0CEFC12B0BA769CE25B67A42C9>

<https://dspace.uevora.pt/rdpc/handle/10174/32120>