Bachelor or Master Thesis

Development of a knowledge management platform for visionary solutions and challenges in the implementation of R-strategies in circular construction

UNIVERSITÄT BIELEFELD
Faculty of Technology

Semantic Computing Group
Dr. Basil Ell
bell@techfak.uni-bielefeld.de

Motivation. Circular economy and specifically circular construction are important keys to sustainable development. Circular construction means planning and constructing buildings and building elements in such a way that they remain usable for as long as possible per life cycle and that their building products and materials can be recycled at the end of their service life. The 10 R strategies in environmental protection provide a guideline for implementing the circular economy (more information on the R strategies can be found here: `https://prosperkolleg.ruhr/wp-content/uploads/2022/05/rethink_22-03_r-strategien.pdf`). Strategies R0 to R2 aim to avoid or reduce the amount of raw materials used in buildings. Strategies R3 to R7 aim to keep buildings, components and raw materials within the economic system. If R0 to R7 cannot be applied, it is possible to use strategies R8 and R9 to save buildings, components or raw materials from construction projects that are no longer functional. The components are destroyed in the process. This approach means that fewer raw materials have to be extracted from the environment.

Topic/Project. The aim of this master's thesis is to build a knowledge management platform based on competence issues from the domain of circular construction. On the platform, information from case studies of visionary players in the construction industry will be collected and analyzed. Specifically, the methods used by these players to implement R strategies are collected from web texts by means of crawling and processed using semantic modeling. The platform is intended to make already implemented solutions and challenges with regard to the implementation of R-strategies in circular construction visible. In addition, methods from computer science / computational linguistics are to be applied and evaluated on the resulting corpus and / or the information obtained.

Related literature

Felipe Ossio et al. (2023): Circular economy in the built environment: A systematic literature review and definition of the circular construction concept. Journal of Cleaner Production. Volume 414. doi: https://doi.org/10.1016/j.jclepro.2023.137738.
Valeria Superti at al. (2021): A systemic framework to categorize Circular Economy interventions: An application to the construction and demolition sector. Resources, Conservation and Recycling. Vol. 173. doi: https://doi.org/10.1016/j.resconrec.2021.105711.

The Semantic Computing Group researches and develops methods that enable machines to acquire relevant knowledge as well as linguistic capabilities. Using methods from natural language understanding and machine learning, we are aiming at machines that are capable of knowledge acquisition by reading unstructured textual data. In particular, the group focuses on methods for information extraction, semantic parsing, ontology learning, sentiment analysis, entity linking, as well as question answering.

More information is available at:
https://uni-bielefeld.de/fakultaeten/technische-fakultaet/arbeitsgruppen/semantic-computing

Interested? @mail to `bell@techfak.uni-bielefeld.de`