Data-driven and production-oriented tendering design using artificial intelligence

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Abstract

Construction projects are facing an increase in requirements, making requirement management labour intense. Therefore, this research project explores possibilities to automate the requirement analysis in the bidding phase and link these requirements to verifications in the production phase. The first part of the research targets the requirement analysis and applies natural language processing techniques for automation possibilities. The second part of the research explores production data as a data-driven verification method and how the data can be used in knowledge feedback loops. The results show that applying natural language processing techniques for analysing construction project requirements is a possible step towards systematic requirements management. Furthermore, production data can be used as a knowledge base for quality improvement in construction companies.

Keywords: requirements; NLP; verifications; production-data; knowledge.

1 Introduction

Construction projects are experiencing increased regulatory and client requirements due to the industry's increased focus on sustainability [1]. Introducing new requirements can be challenging since the construction industry lacks systematic requirements management. The requirements found in tendering procurements in construction projects show problems such as openness to multiple interpretations, lack of relations between requirements, and requirements unnecessary prescribing design solutions [2]. There is also a lack of traceability and match with proper verifications and validation methods [3].

Today, the methods for analysing requirements are mainly manual, resulting in requirement management quickly getting overwhelming. Consequently, the construction industry tends to trust craftsmanship and gut feeling rather than