TITLE: The Use of NLP-Based Text Representation Techniques to Support Requirement Engineering Tasks: A Systematic Mapping Review

Paper link: [[2206.00421] The Use of NLP-Based Text Representation Techniques to Support Requirement Engineering Tasks: A Systematic Mapping Review (arxiv.org)](https://web3.arxiv.org/abs/2206.00421)

youtube link: [CSE431 individual research paper review - YouTube](https://www.youtube.com/watch?v=lfHXtVoAUKk)

Abstract:

This study provides an in-depth examination of the developing landscape of Natural Language Processing (NLP)-based text representation strategies for various Requirements Engineering (RE) applications. There has been a noticeable change in interest from standard lexical and syntactic features to more complex embedding techniques throughout the years, with a particular boom in interest noticed in the last two years. The study emphasizes the efficacy of advanced embedding representations in a variety of RE tasks, including as requirement analysis, extracting requirements from reviews and forums, and solving semantic-level quality problems. Notably, lexical and syntactic aspects continue to be important, particularly in modeling and syntax-level quality tasks, where they provide critical information for the design of rules and regular expressions.

Introduction:

Requirements Engineering (RE) is a critical stage in the software development life cycle that is devoted to carefully outlining the criteria that a desired system must meet. The complex nature of RE includes responsibilities such as requirement extraction, documentation, analysis, validation, and management. Because of their importance, requirements play a critical influence in the success or failure of software initiatives. According to studies, the RE phase is a significant source of errors in software development projects. Inadequate understanding of requirements causes hazards such as time and cost overruns, which are exacerbated by the diversity of stakeholders each with their own needs, roles, and responsibilities. The fact that requirements are frequently communicated in natural languages introduces inherent complexity due to ambiguity, incompleteness, and inaccuracy.

Literature Review:

The review focuses on the dynamic evolution of RE approaches, demonstrating a trend toward advanced embedding techniques powered by NLP. This change is emphasized by their demonstrated competence in dealing with a variety of RE assignments. Notably, the introduction of advanced embedding representations has resulted in significant gains in tasks like as requirement analysis, requirement extraction from reviews and forums, and semantic-level quality assessments. However, the paper acknowledges the enduring importance of lexical and syntactic aspects in activities such as modeling and addressing syntax-level quality concerns. These traditional procedures provide critical information for developing rules and regular expressions required to handle these specialized tasks.

Challenges in Requirements Engineering:

The study focuses light on the inherent obstacles in RE, which originate from the complex interaction of elements such as the different origins of requirements, their formulation in natural languages, and the resulting concerns of ambiguity, incompleteness, and inaccuracy. It emphasizes the importance of correct requirement representations in addressing these obstacles, as well as the ongoing need for additional study to close existing gaps in the literature.

Conclusion:

Finally, this comprehensive assessment of the literature gives a nuanced perspective of the evolution of NLP-based text representation techniques in the context of Requirements Engineering. Although there is a shift toward advanced embedding approaches, the enduring usefulness of lexical and syntactic data in specific RE tasks is acknowledged. The report calls for further research efforts to improve the accuracy of requirement representations, providing a viable avenue for tackling the field's continuing difficulties. Advances in text representation techniques have the prospect of considerably increasing the overall success and quality of software projects as RE remains a cornerstone in software development.