

## Classification of Non-Functional Requirements in Software Development using Deep Learning

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Non-functional requirements are the most significant quality attributes that define a software system as being reliable, secure and efficient under the real-world conditions. But, NFRs are often not taken into account in industry practice compared to functional requirements, which may contribute to project failures, increasing costs, and lower user satisfaction. The existing research on requirement classification has mostly concentrated on differentiating between functional and non-functional requirements and lower attention has been paid on determining the specific NFR subcategories. Moreover, existing research tends to apply a small and domain-related dataset, and traditional techniques of machine learning which cannot be applied in different contexts of software development. This study aimed to fill these research gaps by testing several deep learning models that could recognize the fine-grained categories. The study included multiple architectures that discuss the deficiencies of current NFR classification approaches and the performance of deep learning in classification. The XLNet, ELECTRA-Base, DistilRoBERTa, RNN, Bidirectional GRU, CNN, DistilBERT, DeBERTa-v3-small, were used for evaluation. The significance of the application of transformer-based models was encouraged in the present work. The experimental findings show that DistilRoBERTa has the best results and has a 0.77 accuracy, a macroaveraged precision of 0.78, a recall of 0.76 and F1-score of 0.75. Overall, the study supports the idea that deep learning can contribute to making the requirements engineering processes more efficient and predictable to help analyze the software quality at the early stages. Further optimization of deep learning architectures to improve accuracy may be included in future work, as well as expansion of the datasets.

**Keywords:** *Non-Functional Requirements, Deep Learning, DistilRoBERTa, Classification, Software Quality*