Development and Validation of a Comprehensive Code-based Quality Model for Embedded Systems

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Abstract: Existing software quality models typically focus on common quality characteristics such as the ISO 25010 software quality characteristics. However, most of them provide only insufficient operationalization for quality assessments of source code. Moreover, they usually focus on software in general or on information systems and do not sufficiently cover the particularities of embedded systems. We have developed a quality model that covers quality requirements for source code that are specific for embedded systems software. It provides comprehensive operationalization (with 336 measures) for C and C++ systems, which allows for largely automated quality assessments.

The empirical evaluations performed acknowledge moderate completeness of the requirements and the associated measures. Therefore, we still see room for improvements to allow covering even more aspects of embedded systems software quality. Nevertheless, the empirical validation (based on three industrial products) shows good concordance between the results gained by the automatic model-based assessment and independent expert judgment on code quality.