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Meta-Analysis Study on Software Measurement Techniques

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ABSTRACT

Background: Software measurement techniques are critical in ensuring software quality, maintainability, and efficiency throughout the software development lifecycle. As software systems grow more complex, developers require accurate and scalable methods to assess attributes such as reliability, performance, and defect prediction.

Aims: This study aimed to evaluate the effectiveness, validity, and usability of various software measurement techniques. It seeks to compare both traditional metrics like Function Point Analysis, Cyclomatic Complexity, Defect Density and modern data-driven approaches like machine learning-based models in order to identify the most reliable and predictive techniques for use in modern software development practices.

Method: A meta-analysis approach was employed, synthesizing findings from ten peer-reviewed studies published between 2015 and 2025. These studies included both direct and indirect measurement methods across different software development paradigms like waterfall, agile and DevOps. Data was extracted and statistically analyzed to assess accuracy, effectiveness, and applicability of each software measurement technique.

Results: The analysis revealed that machine learning-based techniques such as Ensemble Learning and Naive Bayes classifiers outperform traditional measurement methods in terms of accuracy and predictive power. A shift towards smart, automated, and data-driven measurement tools is evident in the current development landscape. The findings support the integration of predictive models to enhance software quality management and provide practical recommendations for both researchers and practitioners.

Keywords:

Meta-analysis, Software Measurement, Cyclomatic Complexity, Defect Prediction, Software Quality, Software Metrics.

