Graduate School of Science and Technology Master's Thesis Abstract

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Thesis title	Facilitating Source Code Analysis: A Differential Approach to Reducing Warnings of Software Source Code Static Analysis (ソースコード静的解析における警告数の差分解析による削減)		

Abstract

This study discusses the challenges of software source code analysis using Static Analysis Tools (SAT). To reduce developers' manual workload, various automatic SATs are used in modern software engineering practices, with the purpose of identifying potential defects, vulnerabilities, code smells, or documentation issues. However, they often produce extensive lists of warnings, many of which are noisy or unrelated to the developer's actual changes to the software source code. Therefore, there is a need to facilitate software source code analysis. This study proposes a differential analysis approach to the changed source code fragments instead of analyzing the entire source code. This thesis has developed a method-level extractor tool, to perform differential approach. The tool parses the software source code, considering the locations of developers' changed fragments within methods, and generates special method-level source code files that can be analyzed by SATs. This thesis conducted experiments on three real world software projects, which confirmed the effectiveness of the differential approach. It reduces the analyzable source code and significantly reduces warnings of software source code static analysis, making warnings more accurate compared to analysis of the entire source code. This thesis paves the way for future integration of the differential approach into developers' daily development environment to reduce manual work during their local changes in the initial stage, before the software is published.