On the Use of Genetic Programming for Automated Refactoring and the Introduction of Design Patterns

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Abstract

Maintaining an object-oriented design for a piece of software is a difficult, time-consuming task. Prior approaches to automated design refactoring have focused on making small, iterative changes to a given software design. However, such approaches do not take advantage of composition of design changes, thus limiting the richness of the refactoring strategies that they can generate. In order to address this problem, we introduce an evolutionary computation-based approach that supports composition of design changes and makes the introduction of design patterns a primary goal of the refactoring process. The proposed approach uses genetic programming and software engineering metrics to identify the most suitable set of refactorings to apply to a software design. We illustrate the efficacy of this approach by applying it to a large set of published models, as well as a real-world case study.