Analyzing the Validity of Selective Mutation with Dominator Mutants

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Abstract

Various forms of selective mutation testing have long been accepted as valid approximations to full mutation testing. This paper presents counterevidence to traditional selective mutation. The recent development of dominator mutants and minimal mutation analysis lets us analyze selective mutation without the noise introduced by the redundancy inherent in traditional mutation. We then exhaustively evaluate all small sets of mutation operators for the Proteum mutation system and determine dominator mutation scores and required work for each of these sets on an empirical test bed. The results show that all possible selective mutation approaches have poor dominator mutation scores on at least some of these programs. This suggests that to achieve high performance with respect to full mutation analysis, selective approaches will have to become more sophisticated, possibly by choosing mutants based on the specifics of the artifact under test, that is, specialized selective mutation.

CCSConcepts •Software and its engineering → Software testing and debugging;

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