How Significant Is the Effect of Fault Interactions on Coverage based Fault Localizations?

By Xiaozhen Xue  
Texas Tech University

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Faculty Coordinator: Dr. Yong Chen (yong.chen@ttu.edu)  
Student Coordinators: Navaneeth Thiagarajan, Dan Ferguson, Lakhan Jhawar

Abstract:

The effectiveness of coverage-based fault localizations in the presence of multiple faults has been a major concern for the software testing research community. A commonly held belief is that the fault localization techniques based on coverage statistics are less effective in the presence of multiple faults and their performance are deteriorated. The fault interference phenomenon refers to cases where the software under test contains multiple faults whose interactions hurdle effective debugging. The immediate research question that arises is to what extent are fault interactions influential. This study focuses on verifying the existence of fault interferences phenomenon in programs developed in programming languages with object-oriented features. The study then statistically measures the influence and significance of fault interactions on the performance of debugging based on coverage-based fault localizations. The result verifies that the fault interleaving phenomenon occurs. However, its impact on the performance of fault localizations is negligible.

Speaker Bio:

Xiaozhen Xue is a Ph.D. student in the Department of Computer Science. His research interests are software testing and software empirical analysis. He joined Dr. Akbar Namin's AVESTA research group in 2010. Before that, he got the Bachelor and Master degree in 2007 and 2010 in Software Engineering from Beijing Jiaotong University (China).