Mutation-Based & Spectrum-Based Fault Localization

Description

The search for an error that occurred in a program is often times more time-consuming than the actual repair. Automated fault localization attempts to locate the source of the bug automatically with or without the support of the developer. Apart from the widely used spectrum-based fault localization (SBFL) which has been extensively studied and improved over the years, mutation-based fault localization (MBFL) has been proposed in [3]. In MBFL, the mutation of program statements allows for conclusions about the mutated statements being correct or faulty based on the results of executed test cases. In addition to both techniques applied by themselves, combinations of SBFL and MBFL have been proposed in [2, 1], for example.

The student should examine and discuss existing approaches to combine MBFL and SBFL techniques.

References

[1] Xia Li and Lingming Zhang. Transforming programs and tests in tandem for fault localization. *Proc. ACM Program. Lang.*, 1(OOPSLA):92:1–92:30, October 2017.

[2] Seokhyeon Moon, Yunho Kim, Moonzoo Kim, and Shin Yoo. Hybrid-muse: Mutating faulty programs for precise fault localization.

[3] Seokhyeon Moon, Yunho Kim, Moonzoo Kim, and Shin Yoo. Ask the mutants: Mutating faulty programs for fault localization. In *Proceedings of the 2014 IEEE International Conference on Software Testing, Verification, and Validation*, ICST '14, pages 153–162, Washington, DC, USA, 2014. IEEE Computer Society.

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