

Reducing the Failure Analysis Effort

Bachelor's Thesis

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Context

Sophisticated test infrastructure is required to test modern vehicles. However, if a test fails, it is not clear whether the failure is due to the tested vehicle being faulty, or a broken test setup. As a consequence, the time required to analyze failures turns out to be one important cost factor. In software systems, it is commonly assumed that a large number of failures (in one batch of test executions) usually happen due to a few underlying faults. This led to the idea that clustering failures based on the responsible faults might help reducing the overall analysis time. The rationale behind this is that only one representative of each cluster may be inspected rather than investigating all failing tests one by one. [1, 2, 3]

Goal

The aim of this thesis is to take over the ideas from the software testing literature and apply them to the system-level vehicle testing context. Moreover, we want to investigate and evaluate the applicability in at least one running V&V project at our industry partner.

Working Plan

1. Familiarize with the listed literature
2. Familiarize with different project settings at our industry partner
3. Write the exposé
4. Implement the approach for at least one project at our industry partner.
5. Evaluate the performance
6. Write the thesis report

Deliverables

- Exposé (about 6 weeks after kick-off)
- Source code of the implementation.
- Technical report with comprehensive documentation of the implementation, i.e. design decision, architecture description, API description and usage instructions.
- Final thesis report written in English and in conformance with TUM guidelines
- Presentation of the work at the chair (2-3 weeks after submission)

References

- [1] Mojdeh Golagha et al. "Reducing failure analysis time: An industrial evaluation". In: *Proc. - 2017 IEEE/ACM 39th Int. Conf. Softw. Eng. Softw. Eng. Pract. Track, ICSE-SEIP 2017*. 2017, pp. 293–302.
- [2] Mojdeh Golagha et al. "Failure clustering without coverage". In: *Proc. 28th ACM SIGSOFT Int. Symp. Softw. Test. Anal. - ISSA 2019*. New York, New York, USA: ACM Press, 2019, pp. 134–145.
- [3] Claudius V Jordan et al. "Time-Series-Based Clustering for Failure Analysis in Hardware-in-the-Loop Setups : An Automotive Case Study". In: *2020 IEEE Int. Symp. Softw. Reliab. Eng. Work.* 2020, pp. 67–72.

Application:

Please apply via email to claudius.jordan@tum.de. Your email should explain your interest in the topic and contain your current transcript of records. The most promising candidates will be invited for an informal interview. Upon mutual agreement, the thesis will be performed in cooperation with TraceTronic GmbH.