Postgraduate Program in Computer Science
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TEST CASE PRIORITIZATION: RELEVANT FACTORS

This briefing reports scientific evidence on coverage-based test case prioritization techniques effectiveness.

FINDINGS

- Approximately 36% of test case prioritization (TCP) techniques available in primary studies from literature are coverage-based. Followed by history-based (approx. 14%) and modification-based (approx. 9%).

- Findings reported in this briefing consider only coverage-based test case prioritization techniques.

- Overall, the TCP techniques that achieved the higher effectiveness results in most projects in controlled experiments were "additional function coverage", in 5 different projects, followed by "total block coverage" in 4 different projects.

- Most compared test case prioritization techniques in different projects are "total branch coverage" (18 projects) and "additional statement coverage" (14 projects).

- Test case prioritization techniques effectiveness results may vary according to different context factors regarding the project being tested.

- Faults type does impact on test case prioritization techniques effectiveness. Techniques used on projects with real faults tend to achieve higher effectiveness than those with seeded faults.

- Amount of faults in the project being tested does impact on TCP techniques effectiveness. Its effectiveness grows as amount of faults also grows.

- Test case source doest impact on TCP techniques effectiveness. Techniques used on projects with test cases generated by researchers tend to achieve higher effectiveness than those with test cases provided by original developers.

- Test case type doesn't seem to impact on TCP techniques effectiveness. JUnit and TSL test suites seems to achieve similar effectiveness when prioritized.

- Program size (measured by LOC) also doesn't seem to impact on TCP techniques effectiveness.

- Type of seeded faults does impact on TCP techniques effectiveness. Faults seeded into the software through mutation seem to achieve higher effectiveness when prioritized than those seeded manually.

- TCP technique granularity does impact on its effectiveness.

- Block, branch and method/function granularity seem to perform equally well on TCP techniques. On the other hand, statement granularity may be not worth to use, since TCP techniques using this granularity achieve worse effectiveness, despite requiring more processing power to calculate.

- Test granularity does impact on TCP technique effectiveness. Techniques that use method level seem to achieve higher effectiveness than those with class level.

- Considering the most up-to-date JUnit version (5.0.1), there is no option to execute unit tests at method level. That is, arbitrary execution of test cases (methods) from different classes.

- A person interested on executing unit tests at the method level need to rely on third-party libraries.

Who is this briefing for?

Software engineering practitioners who want to make decisions about test case prioritization techniques based on scientific evidence. Also, researchers who want to design new test case prioritization techniques.

Where the findings come from?

All findings of this briefing were extracted from the systematic literature review and mapping conducted by Campos Junior et al.

What is a systematic review?

cin.ufpe.br/eseg/systematic-reviews

What is included in this briefing?

The main findings of the original systematic review and mapping.

What is not included in this briefing?

Details about the review process and included studies.

To access other evidence briefings on software engineering:

http://cbsoft.org/cbsoft2017/

For additional information about NEnC:

http://www.ufjf.br/nenc/

ORIGINAL RESEARCH REFERENCE

Campos Junior, H. S., Araújo, M. A. P., David, J. M. N., Braga, R., Campos, F., & Ströele, V. (2017, September). Test case prioritization: a systematic review and mapping of the literature. In Proceedings of the 31st Brazilian Symposium on Software Engineering (pp. 34-43). ACM. https://doi.org/10.1145/3131151.3131170