A Novel Approach for Discovering Barriers in Using Automatic Static Analysis

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joint work with Jan-Peter Ostberg and Jasmin Ramadani
Static analysis tools have a great potential

• Wagner et al. (2005): finds mostly different defects than testing
• Wagner et al. (2008): cost efficient with detecting one severe defect
• Zheng et al. (2006): can find vulnerabilities
Static analysis tools are hardly used
• What operability problems do static analysis tools have?

• What are the understandability problems of warnings?
Computer with static analysis tool

Eye tracking

Observation by researcher

User

Think aloud

Questionnaire

User
Tracked Areas of Interest
User Strategy 1

Areas of Interest

Fixations

- Blue line: part. 1 Average visit duration
- Red line: part. 1 Average fixations per AOI
User Strategy 2

Areas of Interest

Fixations

Seconds

- part. 5 Average visit duration
- part. 5 Average fixations per AOI
Additional Results

• It is hard to find where to start the analysis
• The lack of feedback is frustrating
• Programming knowledge is needed for the effective use automatic static analysis
• Found fixes are reused without second thoughts
• Severity of warnings is not prominently enough displayed
Conclusions

• Combination of quantitative and qualitative data gives comprehensive insights
• Better support for different usage patterns could help users.
• Partial analysis of changes for direct feedback would be helpful. (cf. Yuriy Brun's tool Solistice)
• Display and information of warnings has a large effect and could be improved.

• We will analyse further with more participants for better generalisability.