



## Software Engineering Seminar

# Semantics based Automated Program Repair

## Description

The research field of automated program repair is currently explored using different strategies to tackle the problems. One interesting and promising method uses semantic information to repair a fault, i.e., it analyzes the behavior of the given program in some way. The methodology behind this repair approach is that a repair candidate (a patch) is synthesized by using semantic information that is provided by, for example, symbolic execution and constraint solving. A state-of-the-art semantics based repair tool is ANGELIX [1] which is the successor to SEMFIX [2]. A main goal of ANGELIX is to scale to larger, real-world programs to be able to compete with other repair strategies like, for example, search-based automated repair.

The student is to examine and discuss the current state of semantics based automated program repair.

## References

- [1] Sergey Mechtaev, Manh-Dung Nguyen, Yannic Noller, Lars Grunske, and Abhik Roychoudhury. Semantic program repair using a reference implementation. In *Proceedings of 40th International Conference on Software Engineering*, ICSE '18, New York, NY, USA, 2018. ACM.
- [2] Sergey Mechtaev, Jooyong Yi, and Abhik Roychoudhury. Angelix: Scalable multiline program patch synthesis via symbolic analysis. In *Proceedings of the 38th International Conference on Software Engineering*, ICSE '16, pages 691–701, New York, NY, USA, 2016. ACM.
- [3] Hoang Duong Thien Nguyen, Dawei Qi, Abhik Roychoudhury, and Satish Chandra. Semfix: Program repair via semantic analysis. In *Proceedings of the 2013 International Conference on Software Engineering*, ICSE '13, pages 772–781, Piscataway, NJ, USA, 2013. IEEE Press.

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