Introduction to Program Synthesis (WS 2024/25)

Chapter 1 - Introduction

Dr. rer. nat. Roman Kalkreuth

Chair for AI Methodology (**AIM**), Department of Computer Science,
RWTH Aachen University, Germany

Paper Discussion
Takeaways

- Landmarks for program synthesis:
  - **Decomposition** of programs into **building blocks**
    - Foundation for assembling new programs in the synthesis process
  - **Optimization** of programs with **monte-carlo methods**
    - Proof-of-concept that was later extended by genetic programming

References

[Sch73] Paul B. Schneck. "A survey of compiler optimization techniques". In: *Proceedings of the ACM Annual Conference*. ACM '73. Atlanta, Georgia, USA: Association for Computing Machinery, 1973, pp. 106–113. ISBN: 9781450374903. DOI: 10.1145/800192.805690. URL: https://doi.org/10.1145/800192.805690.

[Bac+57] J. W. Backus et al. "The FORTRAN automatic coding system". In: *Papers Presented at the February 26-28, 1957, Western Joint Computer Conference: Techniques for Reliability*. IRE-AIEE-ACM '57 (Western). Los Angeles, California: Association for Computing Machinery, 1957, pp. 188–198. ISBN: 9781450378611. DOI: 10.1145/1455567.1455599. URL: https://doi.org/10.1145/1455567.1455599.

[Koz89] John R. Koza. "Hierarchical Genetic Algorithms Operating on Populations of Computer Programs". In: *Proceedings of the 11th International Joint Conference on Artificial Intelligence. Detroit, MI, USA, August 1989*. Ed. by N. S. Sridharan. Morgan Kaufmann, 1989, pp. 768–774. URL: http://ijcai.org/Proceedings/89-1/Papers/123.pdf.