



Distinguished Lecture Series

Syntax-Guided Synthesis



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Auditorium 106

Professor
Rajeev Alur

University of Pennsylvania

Abstract

The classical synthesis problem is to find a program or a system that meets a correctness specification given as a logical formula. Recent work on synthesis and optimization illustrates many potential benefits of allowing the user to supplement the logical specification with a syntactic template that constrains the space of allowed implementations. The formulation of the syntax-guided synthesis problem (SyGuS) is aimed at standardizing the core computational problem common to these proposals in a logical framework. The input to the SyGuS problem consists of a background theory, a semantic correctness specification for the desired program given by a logical formula, and a syntactic set of candidate implementations given by a grammar. The computational problem then is to find an implementation from the set of candidate expressions so that it satisfies the specification in the given theory.

In this talk, we first describe how a wide range of problems such as automatic synthesis of loop invariants, program optimization, program repair to defend against timing-based attacks, and learning programs from examples can be formalized as SyGuS instances. We then describe the counterexample-guided-inductive-synthesis (CEGIS) strategy for solving the SyGuS problem. Finally we discuss our efforts over the past three years on defining the standardized interchange format built on top of SMT-LIB, repository of benchmarks from diverse applications, organization of the annual competition, SyGuS-COMP, of solvers, and experimental evaluation of solution strategies.

For more information: <http://www.iis.sinica.edu.tw/>

