AIMS² Research Project for Fall 2019 – Spring 2020

Title of Project: Evaluating Test Suite Generation Techniques for Introductory Computer Science Assignments

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Project Background

Introductory Computer Science assignments require students to write potentially significant amounts of code which must be evaluated by an instructor. Instructors commonly employ handwritten test suites to help in the evaluation process. While handwritten test suites are popular for evaluation purposes, they can be time-consuming to write, and are prone to missing key behaviors in student code.

Although test suites are traditionally written by hand, various techniques exist which can automatically generate test suites. These techniques range from simplistic to complex, and claim to offer different, potentially conflicting, benefits.

Goals and Objectives of the Project, Expectations and Outcomes

The purpose of this project is to experiment with a variety of automated test suite generation techniques in the context of introductory Computer Science assignments, and to qualitatively evaluate the benefits and limitations of each technique in this context. Students are expected to:

1. Read primary literature sources to learn about various automated test suite generation techniques.
2. Implement different test suite generation techniques by writing code which is non-trivial in both size and behavior.
3. Potentially setup and use external tools with minimal available documentation.
4. Write a technical report summarizing what has been learned, including relevant findings.

No prior software testing experience is necessary, though strong programming skills in any language are preferred. Individual students may choose to specialize in one or more techniques, and students are encouraged to work in groups. Technical writing may be a major component depending on student interest.