CS 6463 Adv Topics In Computer Science

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Program Analysis And Its Support for Software Development

Program Analysis refers to the process of automatically analyzing the behavior of computer programs without executing them. It is used to support program understanding, debugging, testing, reverse engineering, as well as optimization for better performance. Program analysis can work at any stage of software development, even when your program is not complete at all. It is a critically important part of almost all tools that support programming.

Have you ever spent hours or even days debugging a piece of code that just wouldn't work properly? Have you ever been asked to take over or modify a chunk of code that is written by somebody else and is hard to understand? Have you ever submitted/finalized a project thinking that it worked perfectly and then later found not that you have not tested your project comprehensively? If you have, then this class can show you a better way of eliminating coding errors, understanding other people's code, and making sure your test coverage is complete.

We will study existing program analysis tools as well as how to adapt existing tools to build your own program checkers. The class will be separated into three components:

(1) Instructor lectures that cover fundamental program analysis techniques and algorithms.
(2) Student presentations of research papers in the area of applying program analysis to improve programming productivity.
(3) Student team projects that use existing open-source tool support to build quick program checkers.

By the end of this class, you will have a better understanding of how programs work, how to automatically discover their runtime behavior without running them, and how to use tools to make programming easier.