E0 202 Jan 3:1

Automated Software Engineering with Machine Learning

Instructor

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Teaching Assistant

Email:

Department: CSA

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

Engineering high-quality software requires mastering advanced programming concepts, and dealing with large and complex code. This course will introduce program analysis and machine/deep learning techniques to help developers in this quest. It will focus on concurrency and security analysis of smartphone and web applications. There is growing realization in the software community that we can learn useful program properties from large codebases by treating code as data, and augmenting program analysis with machine learning. This course will introduce machine/deep learning techniques to build probabilistic models of source code, and discuss how they can be used to solve novel problems in software engineering.

Prerequisites

None

Syllabus

Programming Language Processing: tokenization, parsing and semantic analysis, graph representations, syntactic transformations. Smartphone and Web Programming: multi-threading, asynchronous event-handling, permissions. Program Analysis: static and dynamic analysis of concurrent programs, model checking,

information flow analysis for security, random testing. Probabilistic Models of Source Code: program embeddings, probabilistic grammars, statistical language models, structural models. Applications of Machine Learning (e.g., code completion, software testing and debugging).

Course outcomes

After completing this course successfully, students can:

* Design and implement simple Android applications

* Identify concurrency and security issues in Android applications

* Apply machine/deep learning for analyzing software

* Understand and use state-of-the-art program analysis tools

Grading policy

50% for assignments, 25% for mid-term, 25% for final

Assignments

Resources