What Makes Good Software Engineering Research?

Course Overview
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Spring 2005
http://spoke.compose.cs.cmu.edu/ser04/

Course Description
• In software engineering, as in other areas, a good research result requires a problem worth solving, a solution of that problem that contributes interesting and useful new knowledge, and an analysis that shows that the solution actually solves the problem.
• Individual results accumulate over time, refuting or reinforcing each other to give more significant results in which we have more confidence.
• This course will examine principal research results of software engineering with attention to problem selection, research paradigm, and validation of results. We will pay particular attention to the way results in an area mature.

Some Context
• Other science and engineering disciplines have well-refined explanations of their research paradigms.
• Software engineering research lacks these.
  > Within the field, this impedes the design of research projects.
  > Outside the field, it leads to characterizations such as “software engineering research is awfully soft and mushy”
• This course addresses the problem by studying the body of software engineering research not only for its specific content but also to identify the research methods that lead us to believe the results.
• We will create a set of reports that explains the paradigms by analyzing several subfields.

Objectives
• Understand results in software engineering, common research approaches, and the way research results mature.
• A student should gain proficiency in three areas:
  > General research skills
    » Read research papers critically, identifying and evaluating the reasoning
    » Understand how research results evolve over time
    » Apply software engineering results to your own work
  > Software engineering research methods
    » Exercise good judgement in recognizing good research problems
    » Recognize types of research problems and select appropriate methods
    » Understand several validation techniques and when to apply them
  > Specific software engineering results
    » Understand results in diverse subfields of software engineering
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Course Organization

- **January: Foundations**
  - Overview of engineering and software engineering
  - Types of research strategies
  - Model of how research ideas mature
- **February: Work on projects**
  - Read existing surveys to identify major results and events
  - Document the flow of ideas as the subfield evolves
  - Identify research strategies
- **March: Reports on research in software engineering subfields**
  - Seminal results, major current results
- **April: Reports on research methods, technology maturation**
  - Ground rules and applicability of research methods
  - Evolution of results in subfields

Project and Assignments

- **Project**
  - Select specific technology, line of research, or subfield to study
  - Study important events and results in history of subfield
  - Show how results are related, using a model of technology maturity
  - Identify research methods in the area and study one in depth
  - Present reports on these three topics
- **Assignments**
  - Most class days, read relevant papers
  - Write one-page summaries of two papers (one classic, one modern)

Current interests

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