Expressiveness and Effectiveness of Program Comprehension: Thoughts on Future Research Directions

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Program Comprehension

- A major activity during software maintenance and evolution
- Need tools, techniques, and theories to support the process of program comprehension
- ICPC, ICSM, ASE, WCRE
Expressiveness & Effectiveness

- Focus on the expressiveness and effectiveness of program comprehension research
- Identify specific areas that require further research
- Supporting comprehension of large real-world software systems
Program Comprehension

- Expressiveness
- Effectiveness
Expressiveness

- Why we are trying to comprehend (i.e., task)
- What we are trying to comprehend (i.e., object)
- Who’s trying to comprehend (i.e., subject)
• Issue of incremental vs. complete understanding

• What is our position on expressiveness?
Effectiveness

- Quality of tools - the litmus test
- Better measures to assess tools
- Developer acceptance - the ultimate test
- Is it better than grep?
Open Issues in Effectiveness

- Library design
- Formal methods

- What we did in effectiveness? Eye tracking..
Improving Effectiveness

- Use eye movement measurements in conducting empirical studies of software engineering tools, especially visualization techniques.
- Eye tracking adds a new additional dimension to the assessment arsenal by allowing access to the gaze activity of human subjects.
Video of a Session

Name the class that controls the active window of an application.
Human subject given a number of specific tasks concerning UML class diagrams
Assess the effectiveness of different layouts (of UML Class diagrams)
See if labeling of classes with their stereotype/color information is helpful
Understand how we explore, examine, and navigate
Understand difference between novices and experts
New Measure for Effort

Number of fixation (effort)
- Classes and relationships are laid out in ways that can lead to inefficient visual exploration, explanation, and navigation
- Spans the attention of the subject across a number of objects instead of narrowing down to a relevant area of interest
- Utilized for objective assessment of class diagram layout