Summary Lecture

CPRE 416-Software Evolution and Maintenance-Lecture 6

Contents

- Summary of our program comprehension discussions:

  - First students will generate all the key points.
  - We will then organize the points.

- Discuss why developing program comprehension methods and tools has proved to be difficult.

What have we discussed?

- Points listed by students:
  - An analysis tool for Java, memory leaks, dangling pointers, fixing code problems creates new problems, three types of reading techniques, significance of software evolution and maintenance, impact analysis, call graph, dependencies, ..

Organizing the Information

- Program Understanding:
- *How* do we understand: different reading techniques, structural analysis, ..
- *What* do we understand: structure, defects,..
- *Why* is it important: critical in many activities - quality assurance, reverse engineering, analyzing impact of changes, etc.- consumes a lot of money and time.

Challenging Problem

- PC has proved to be difficult:
  - *Lack of specificity*: program understanding problems have so far eluded precise formulations. Good solutions not possible without precise formulations.
  - It is well-known that certain formally defined program analysis techniques can be useful for program understanding. However, applying them in practice is a problem because the formal analysis techniques involve *non-polynomial algorithms*.

Research Directions

- Specificity problem is being addressed by the so called *concern*-based approach.

- Concern is not an agreed upon term, similar research is being carried out under different names (aspect-oriented programming, feature analysis, etc.).

- More research is needed to add specificity and to develop practical analysis techniques.

Empirical Studies

- Good problems should be extracted empirically and then generalized and formalized.

- As an illustration, we will discuss in class a concrete code understanding program. The code is from the Xinu operating system.

- In an upcoming homework students are expected to come up with other concrete examples.

Concern-Based Understanding

- In the next few classes we will focus on concern-based understanding:

- We will discuss the FEAT project and the tool. It will give us a glimpse of advanced research and a practical tool.

- To understand FEAT, you we will need to master significant new terminology. It will help if you read the FEAT presentation and come up with questions to guide our discussions.

8