Signature Change Analysis

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Biological and Software Evolution
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v1 → v2 → v3
Biological and Software Evolution

• Can we shape software evolution path?
  – LOC
  – Number of Changes
  – Structural Changes
  – Signature Changes
The most common signature change kinds are complex data type, parameter addition, parameter ordering, and parameter deletion.
Found Signature Change properties

• More than **half of function signatures never change**. About 90% of function signatures change less than three times.

• **A function’s signature changes after every 5-15 function body changes.**

• **A project’s average number of parameters per function remains relatively constant** over time.

• Functions typically have parameter lists with **1, 2, or 3 parameters**.
Found Signature Change properties

- Weak **correlations between signature change and other changes** including LOC and function body changes.
- Each project has its own **signature change patterns**, and the pattern can be discovered after analyzing the first 1000 to 1500 revisions.
Found Signature Change properties

- Probability of a change kind depends on previous changes.

(a) APR

(b) Apache 2
Future Work

- **Signature change analysis on OOP (Java)**
  - The results presented here are based on a procedural programming language (C) open source projects: Apache HTTP 1.3, Apache HTTP 2.0, Apache Portable Runtime, APR utility, CVS, GCC, and Subversion
  - Find OOP signature change properties and compare the with those from a procedural language

- **Changes inside Struct/Class**
  - Variable addition/deletion
  - Variable renaming
  - Method addition/deletion
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