Evolution of Type-1 Clones

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Software Clones
String nameParts[] = author[1].split(" ");
int i = 0;
for (i = 0; i < nameParts.length; i++) {
    c = nameParts[i].charAt(0);
    sb.append(c + ".");
}
String nameParts[] = author[1].split(" ");
int i = 0;
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int i = 0;
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```
null

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    sb.append(c + ".");
}
```
Why Another Evolution Model?

- Overcome limitation to predefined patterns
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- Overcome limitation to predefined patterns
- Map fragments instead of classes
Why Another Evolution Model?

- Overcome limitation to predefined patterns
- Map fragments instead of classes
- Reduce computational effort
Clone Evolution Model

Version

1

...
Clone Evolution Model

Version

1

2

3

... 

n
Clone Evolution Model

Version

1

2

3

... 

n

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Clone Evolution Model

Version

1

2

3

... 

n
Why More Case Studies?

Controversial results

Results contradict our experience

Limited diversity of subject systems

Our case studies covered:

→ 9 subject systems
→ 200 versions each (≈ 4 years)
→ 3 programming languages (C++, Java, C)
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Clone Ratio

Version

1

2

3

\ldots

n

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“[…] the overall ratio of function clones remains stable […]”

[Laguë et al., 1997]
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“[…] the CP% remains relatively stable over the several recent versions […]”

[Li et al., 2006]
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“[…] the number of code clones […] is somewhat proportional to the size […]”

[Livieri et al., 2007]
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[Li et al., 2006]

“[…] the number of code clones […] is somewhat proportional to the size […]”

[Livieri et al., 2007]
Mean Fragment Lifetime

Version

1

2

3

\ldots

n
“[...] a large number of clones were volatile.”

[Kim et al., 2005]
“[…] a large number of clones were volatile.”

[Kim et al., 2005]
Inconsistent Changes

Version

1

2

3

\ldots

n

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“[…] the majority of clone classes is always maintained consistently.”

[Aversano et al., 2007]
Inconsistent Changes

“[…] the majority of clone classes is always maintained consistently.”

[Aversano et al., 2007]

“[…] clone groups are consistently changed in roughly half of the time […]”

[Krinke, 2007]
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[Aversano et al., 2007]

“[. . .] clone groups are consistently changed in roughly half of the time [. . .]”

[Krinke, 2007]
“The harmfulness of clones cannot be judged without considering their evolution.”


