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Automatizing Software Cognitive Complexity Reduction: What is Next?

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Summary

Contents

Introduction

Software Cognitive Complexity

- **How hard** a code is to **understand and maintain**
- **Not new**, first metrics were proposed in 2003
- **SonarSource** proposed a **novel metric** in 2018

sonarlint sonarcloud sonarqube

Introduction

How does it compute Cognitive Complexity?

- It is a **positive number**
- It is **increased** every time a **control flow** sentence appear
- **Nested levels** contribute to the Cognitive Complexity

(LINK to SonarQube)

sonarlint sonarcloud sonarqube

Motivation

We want to help developers

but …

- Many **possible ways to refactor code**
- **More than one refactoring** could be required
- No tools to **assist developers**

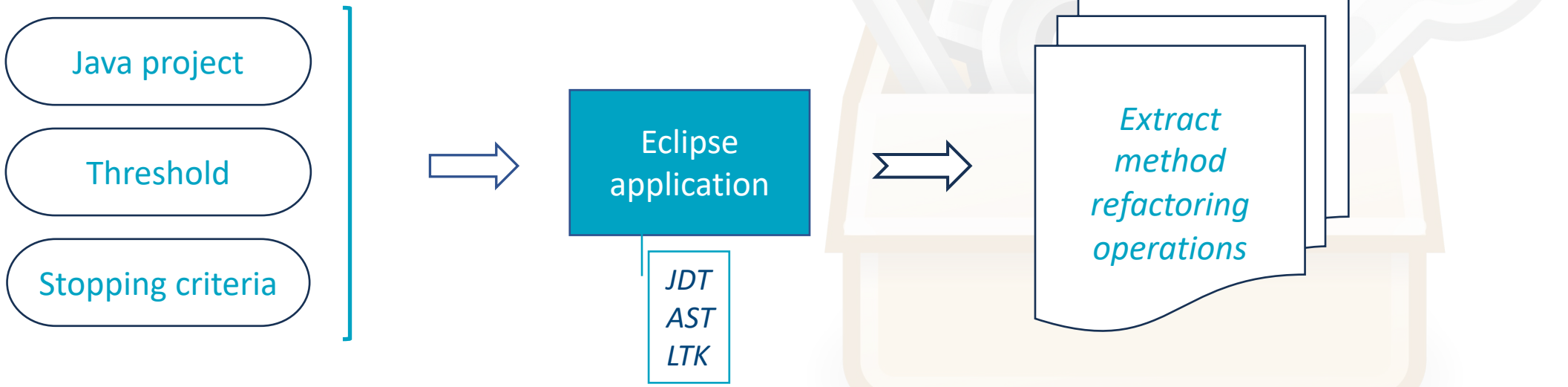
Motivation

How can we help developers?

*"Providing the **optimal sequence** of extract-method refactoring **operations** to apply in order to **reduce** Cognitive Complexity to/below a given **threshold**"*

Proposal

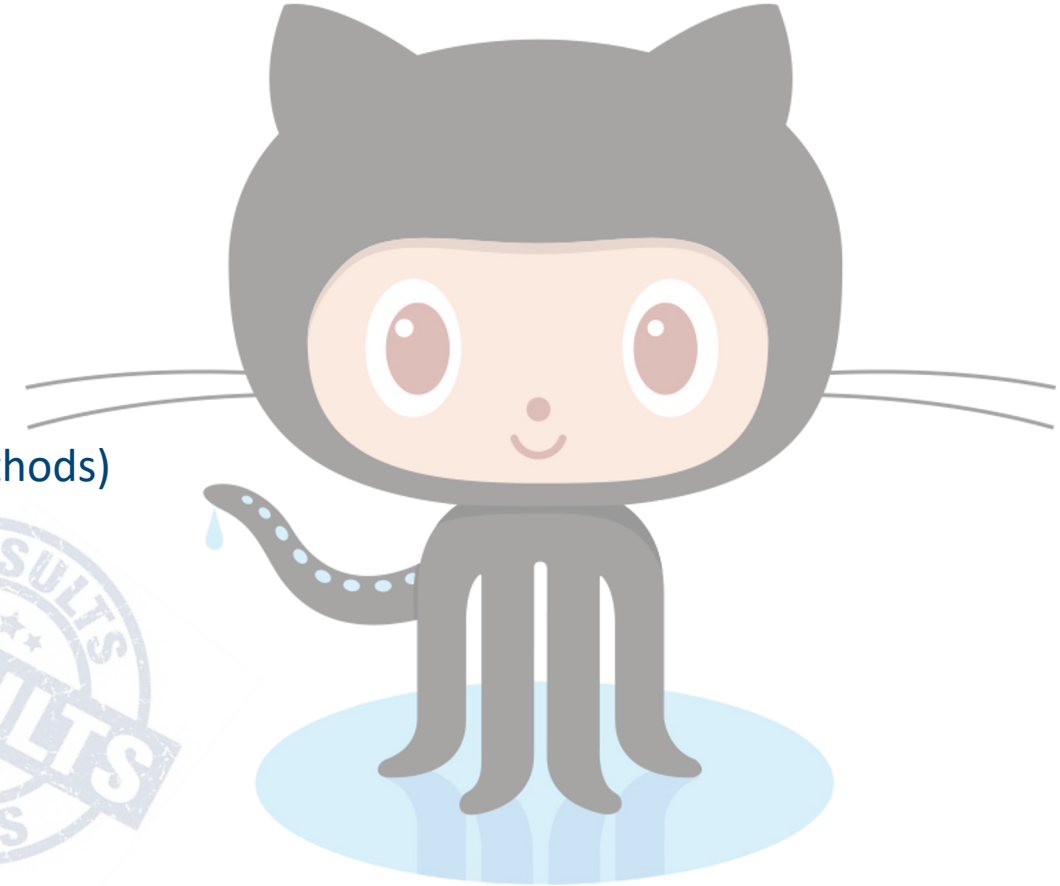
Java Cognitive Complexity Reducer Tool



Experiment

Case Study and Results

- **10 open-source Java projects** from GitHub:
  - Totaling **1,050 Cognitive Complexity issues** (in 3,259 methods)
- Complexity **reduction for 78% of the methods**
- Sequences **up to 30 extract method refactoring**



Future work

… and open questions for discussion

- How to **name extracted methods**?
- Multiple optimal solutions (**decision making**)
- **Coding practices** could hinder the reduction task
  - `break`, `continue`, `return`
- Other **programming languages**

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