Empirical Analysis of Pull Requests for Google Summer of Code

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Background

- Internships are key to gain real-world experience and meet expectations of workforce
- Internships need industry partners
- Open source as a viable alternative

Google Summer of Code

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Google Summer of Code

19,000 contributors, 18,000 mentors
more than 100 Countries

800 open-source organizations

43 million lines of code

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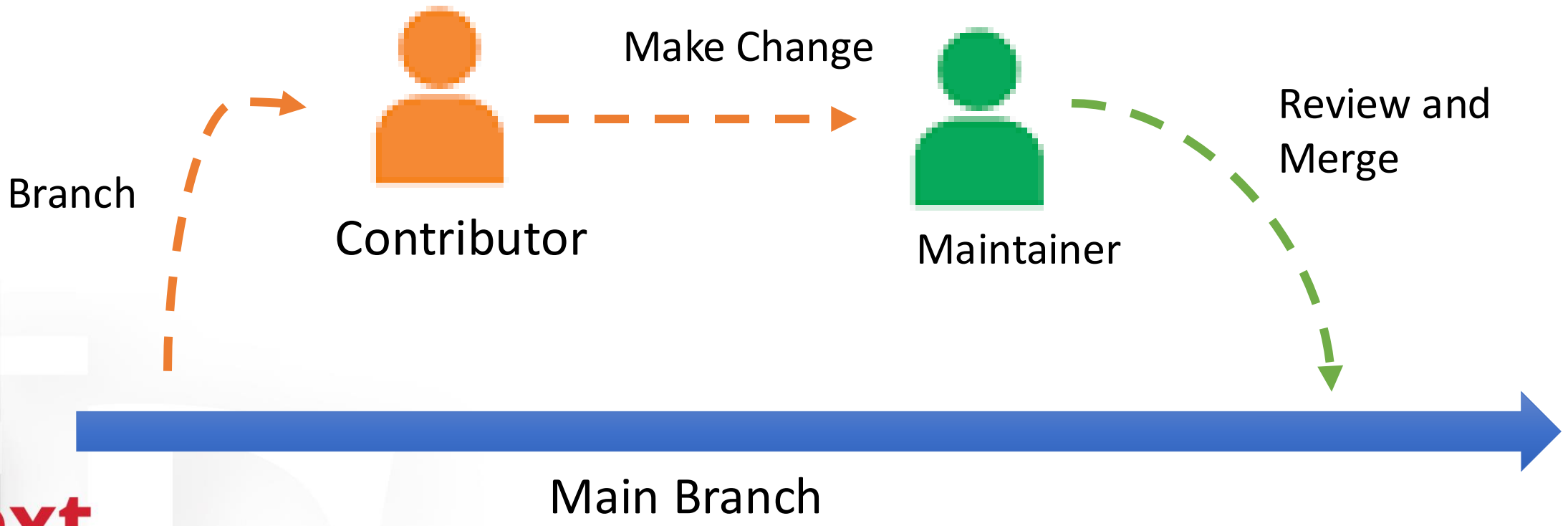
Pull Request



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Analyze pull requests to understand intern contributions and inform educatior

Contributions

- Publicly available dataset on GSoC pull requests
  - 17,232 PR (200 to 2023)
  - Python scripts for data collection and analysis
- Tasks
- Feedback

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Research Questions

- RQ1: GSoC success in encouraging contributions?
- RQ2: What tasks do interns work on?
- RQ3: What feedback do interns receive?

Data Collection

Scrape reflection pages on GSoC Website → Extract Github pages → Github API to extract PR

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Methodology

- Topic Modeling
  - Latent Dirichlet Allocation (LDA) - Gensim
  - Manual coding

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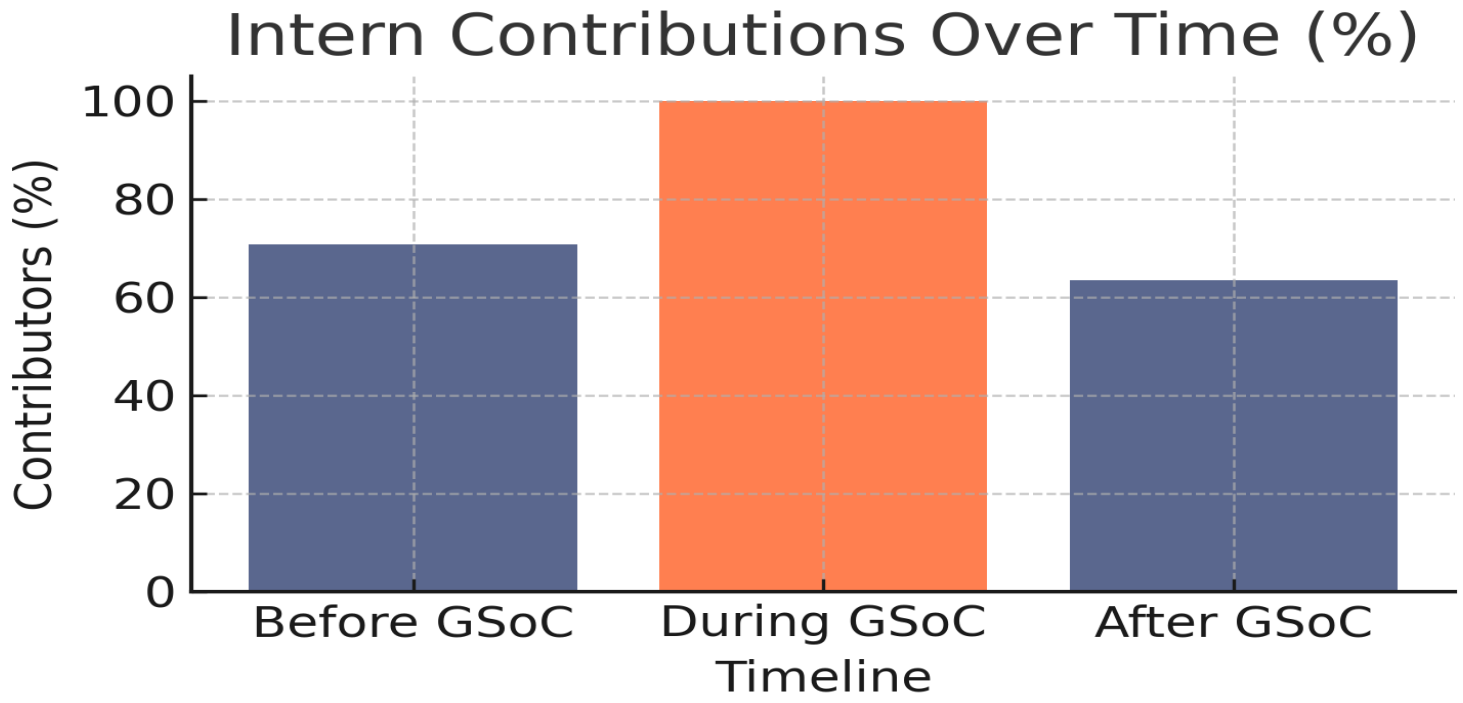
Results

- RQ1: GSoC success in encouraging contributions?
- RQ2: What tasks do interns work on?
- RQ3: What feedback do interns receive?

GSoC Success (RQ1)



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- 85.7% of PRs merged
- 63.5% continued contributing after GSoC

→ GSoC effectively fosters sustained OSS engagement

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RQ2: Tasks & Contributions

- New feature & API development
- Corrective maintenance (bug fixes)
- Project setup & dependencies
- Documentation updates
- Code refactoring

RQ3: Feedback & Review Comments

- Code structure & organization
- Best practices & style
- Functionality & logic
- Testing coverage
- Error handling
- Readability & clarity

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Implications for IT Education

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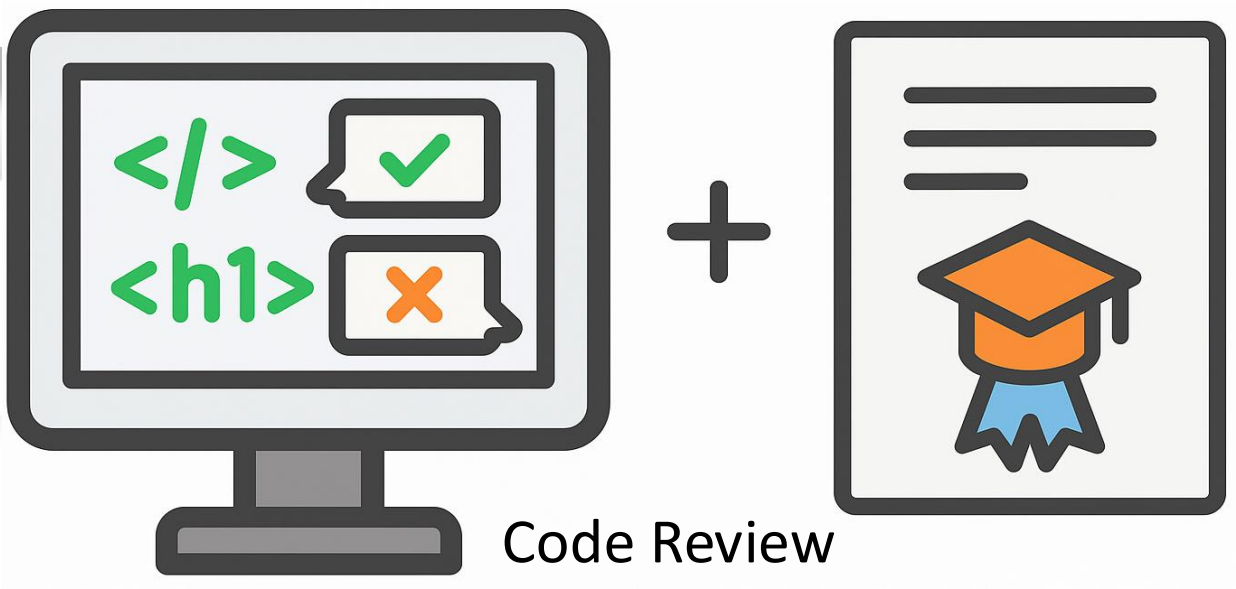
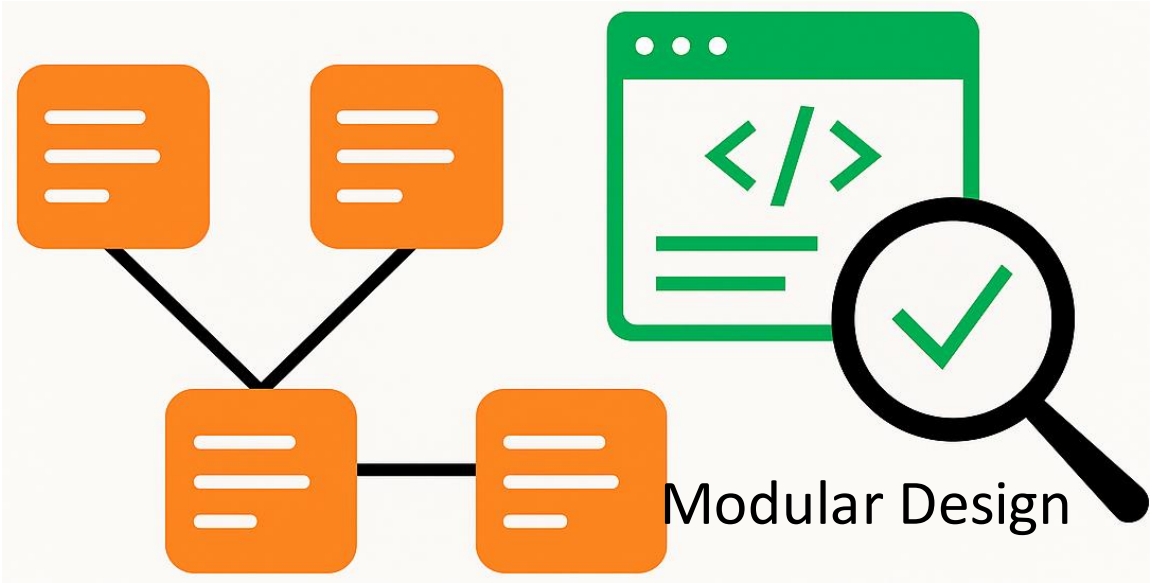
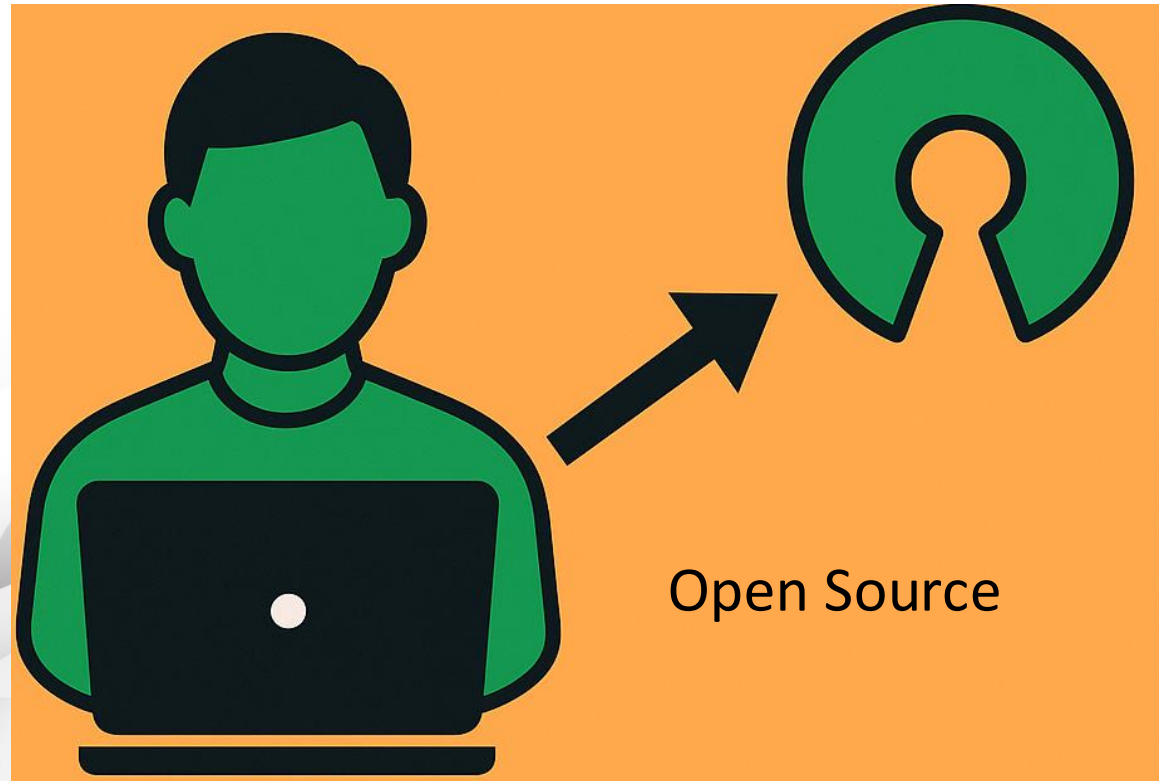


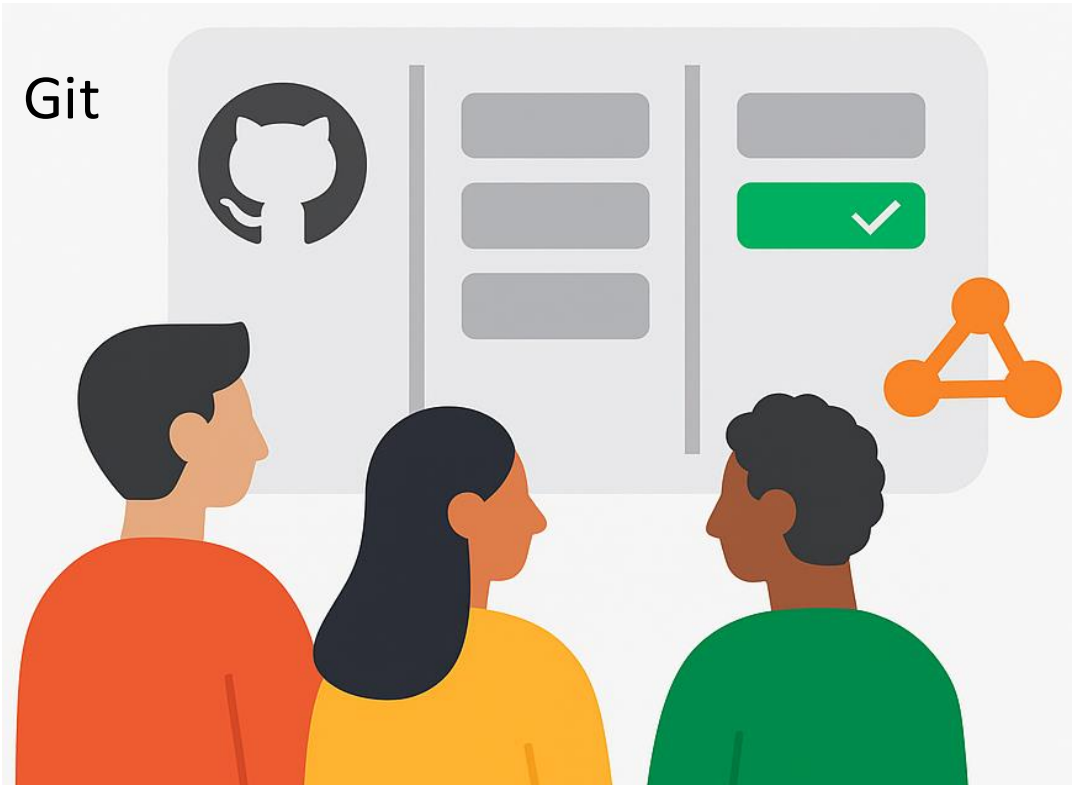
Code Review



Modular Design



Open Source



Git

Conclusion

- 17K PRs analyzed (2020–2023)
- GSoC promotes long-term engagement
- Code and non-code contributions
- Feedback on code organization, additional tests, performance optimizations, and better error handling.
- curriculum emphasis on code review, modular design, testing, and open-source

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