Gabin An

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Research Interests

I am currently focusing my research efforts on enhancing the efficiency of testing and debugging large-scale industrial software. To accomplish this objective, I've been actively exploring the following research areas:

- **BIC Identification**: Finding the Bug Inducing Commit (BIC) responsible for observed failures to efficiently assign and fix bugs in software systems involving numerous developers [6, 11]
- **Failure Clustering**: Clustering failures based on their root causes to support the utilisation of automated debugging techniques developed under the single fault assumption [8, 9]
- **Fault Localisation with an Insufficient Test Suite**: Augmenting a test suite with additional test cases that can improve the precision of automated fault localisation techniques [7], Pinpointing the faulty location with just a *single* failed execution using the code understanding capabilities of Large Language Model (LLM) [2]
- **Flaky Failure Detection**: Automatically detecting flaky failures to expedite the continuous integration process and optimise the utilisation of both human and computational resources [3]

Education

Mar 2020 – Present — **PhD Candidate, Computer Science, KAIST**
- Advisor: Prof. Shin Yoo

Mar 2018 – Feb 2020 — **MSc, Computer Science, KAIST**
- Advisor: Prof. Shin Yoo
- Thesis title: *Localising Software Faults by Learning Patterns of Failing Executions*
- GPA: 4.15/4.3

Feb 2012 – Feb 2018 — **BSc, Computer Science, KAIST**
- Major GPA: 4.06/4.3
- Minor: Business and Technology Management
- Honor: Summa Cum Laude

Mar 2016 — Aug 2016 — **Exchange Student, Informatik, TUM**

Selected Publications

* indicates equal contributions

[1] J. Choi, **G. An**, and S. Yoo, "Iterative Refactoring of Real-World Open-Source Programs with Large Language Models," in *16th International Symposium on Search-Based Software Engineering*, Jul. 2024, to appear.

[2] S. Kang *, **G. An** *, and S. Yoo, "A Quantitative and Qualitative Evaluation of LLM-based Explainable Fault Localization," in *Inaugural Proceedings of the ACM on Software Engineering (PACMSE), Issue FSE 2024 (FSE'24)*, Jul. 2024, to appear.

[3] **G. An**, J. Yoon, T. Bach, J. Hong, and S. Yoo, "Just-in-Time Flaky Test Detection via Abstracted Failure Symptom Matching," Oct. 2023. arXiv: 2310.06298 [cs.SE].

[4] **G. An**, M. Kwon, K. Choi, J. Yi, and S. Yoo, "BUGSC++: A Highly Usable Real World Defect Benchmark for C/C++," in *Proceedings of the 38th IEEE/ACM International Conference on Automated Software Engineering (ASE'23)*, Sep. 2023, Tool Demos.

[5] J. Kim, **G. An**, R. Feldt, and S. Yoo, "Learning Test-Mutant Relationship for Accurate Fault Localisation," in *Information and Software Technology*, Jun. 2023.

[6] **G. An**, J. Hong, N. Kim, and S. Yoo, "Fonte: Finding Bug Inducing Commits from Failures," in *Proceedings of the 45th IEEE/ACM International Conference on Software Engineering (ICSE'23)*, May 2023, Technical Track.

[7] **G. An** and S. Yoo, "FDG: A Precise Measurement of Fault Diagnosability Gain of Test Cases," in *Proceedings of the 31st ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA'22)*, Jul. 2022, Technical Track.

[8] **G. An** *, J. Yoon *, J. Sohn, J. Hong, D. Hwang, and S. Yoo, "Automatically Identifying Shared Root Causes of Test Breakages in SAP HANA," in *Proceedings of the 44th IEEE/ACM International Conference on Software Engineering (ICSE'22)*, May 2022, SEIP Track.

[9] **G. An**, J. Yoon, and S. Yoo, "Searching for Multi-Fault Programs in Defects4J," in *Proceedings of the 13th International Symposium on Search Based Software Engineering (SSBSE'21)*, Oct. 2021, Challenge Track.

[10] J. Kim, **G. An**, R. Feldt, and S. Yoo, "Ahead of Time Mutation Based Fault Localisation using Statistical Inference," in *Proceedings of the 32nd International Symposium on Software Reliability Engineering (ISSRE'21)*, Oct. 2021, Research Track.

[11] **G. An** and S. Yoo, "Reducing the Search Space of Bug Inducing Commits using Failure Coverage," in *Proceedings of the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'21)*, Aug. 2021, Ideas, Visions, and Reflections Track.

[12] J. Sohn *, **G. An** *, J. Hong, D. Hwang, and S. Yoo, "Assisting Bug Report Assignment Using Automated Fault Localisation: An Industrial Case Study," in *Proceedings of the 14th IEEE International Conference on Software Testing, Verification and Validation (ICST'21)*, Apr. 2021, Industry Track.

[13] **G. An**, A. Blot, J. Petke, and S. Yoo, "PyGGI 2.0: Language Independent Genetic Improvement Framework," in *Proceedings of the 2019 27th ACM Joint Meeting on European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE'19)*, Aug. 2019, Tool Demos.

[14] **G. An**, J. Kim, and S. Yoo, "Comparing Line and AST Granularity Level for Program Repair using PyGGI," in *Proceedings of the 4th Genetic Improvement Workshop (GI@ICSE'18)*, May 2018.

Awards and Achievements

2022 — Korea Software Congress (KSC 2022)
- **Best Paper Award**
- Paper: An, G., Kwon, M., Choi, K. and Yoo, S., "A Collection of Reproducible Bugs in C/C++ Programs"

Microsoft Research Asia PhD Fellowship
- **Nomination Award**

2019 — Korea Conference on Software Engineering (KCSE 2019)
- **Best Short Paper Award**
- Paper: An, G., Yoo, S., "Search Space Reduction for Automated Program Repair Using Lexical Features"

2018 — CodRep'18: A machine learning competition on source code data
- **Rank: 2nd (official track)**
- Organised by KTH Royal Institute of Technology, Stockholm, Sweden
- Web: `https://github.com/KTH/CodRep-competition`

2017 — Korea Software Congress (KSC 2017)
- **Best Presentation Award**
- Paper: An, G., Kim, J., Lee, S. and Yoo, S., "PyGGI: Python General framework for Genetic Improvement"

Selected Research Experience as Research Assistant

Industry-Funded Projects

2022 – Present — **Identifying Test Flakiness and Predicting Actionable Test Failures**
w/ SAP and SAP Labs Korea

2021 — **Identifying Shared Root Causes between Test Breakages**
w/ SAP Labs Korea

2020 — **Assisting Bug Report Assignment using Automated Fault Localisation**
w/ SAP Labs Korea

Selected Research Experience as Research Assistant (continued)

2019 **Assessing the Quality of Test Suite using Mutation Testing**
w/ Samsung Research

Government-Funded Projects

2021 – Present **Development of Automatic Software Error Repair Technology that Combines Code Analysis and Error Mining**
Funded by Institute for Information & Communication Technology Planning & Evaluation (IITP)

Miscellaneous Experience

Academic Services

2025 **Program Committee Member**, Research Track, the 47th International Conference on Software Engineering (ICSE 2025)

2024 **Program Co-Chair**, RENE/NIER Track, the 16th Symposium on Search Based Software Engineering (SSBSE 2024)

Organising Committee Member, the 13th Genetic Improvement Workshop @ ICSE 2024

2023 **Program Committee Member**, RENE/NIER Track, the 15th Symposium on Search Based Software Engineering (SSBSE 2023)

Program Committee Member, Joint Artifact Evaluation Track and ROSE Festival, the 39th International Conference on Software Maintenance and Evolution (ICSME 2023)

Organising Committee Member, the 12th Genetic Improvement Workshop @ ICSE 2023

Other Reviewing Activities, IEEE Transactions on Software Engineering (1), Automated Software Engineering (2), ACM Transactions on Software Engineering and Methodology (1)

2022 **Web Chair**, the 14th Symposium on Search Based Software Engineering (SSBSE 2022)

Program Committee Member, the 11th Genetic Improvement Workshop @ GECCO 2022

Program Committee Member, Joint Artifact Evaluation Track and ROSE Festival, the 38th International Conference on Software Maintenance and Evolution (ICSME 2022)

2021 **Program Committee Member**, the 10th Genetic Improvement Workshop @ ICSE 2021

Program Committee Member, Artifact Evaluation Track, the 37th International Conference on Software Maintenance and Evolution (ICSME 2021)

2020 **Web Chair**, the 8th Genetic Improvement Workshop @ ICSE 2020

Invited Talks

2023 Korea Computer Congress (Jun, KCC 2023)
○ *Fonte: Finding Bug Inducing Commits from Failures*

Korea Conference on Software Engineering (Feb, KCSE 2023)
○ *Fonte: Finding Bug Inducing Commits from Failures*

2022 Korea Software Congress (Dec, KSC 2022)
○ *FDG: A Precise Measurement of Fault Diagnosability Gain of Test Cases*

Teaching & Counselling Experience

2023 TA, Introduction to Software Engineering (CS350), School of Computing, KAIST, Spring 2023

2021 TA, Computer Ethics and Social Issues (CS489), School of Computing, KAIST, Autumn 2021

TA, Operating Systems and Lab (CS330), School of Computing, KAIST, Spring 2021

2020 TA, Computer Ethics and Social Issues (CS489), School of Computing, KAIST, Autumn 2020

TA, Automated Software Testing (CS453), School of Computing, KAIST, Spring 2020

2019 Head CA (Academic Counseling Assistant), School of Computing, KAIST, Spring 2019

2018 CA (Academic Counseling Assistant), School of Computing, KAIST, Fall 2018

TA, Programming Practice (CS109), KAIST, Spring 2018

2017 Undergraduate TA, Programming Practice (CS109), KAIST, Spring 2017

Employment History

Jan 2015 – Nov 2015

Developer, Jobplanet, Seoul, Republic of Korea
- Web development (Ruby on Rails)
- API design

References

Available on Request