

Bachelor Thesis Topic

A Configurable IDE Data Collection Tool for Adaptive Programming Education in VS Code

Motivation and Background:

With the rapid advancement of GenAI-supported Software engineering education, there is growing interest in tools that assist students in writing, debugging, and testing programs. However, most existing systems provide generic support and lack adaptation to individual learning needs. Capturing fine-grained interactions within IDEs offers a promising pathway toward more personalized and effective tutoring. This thesis aims to develop a configurable extension for Visual Studio Code that captures students' interactions, such as code edits, execution behavior, and debugging activities. Inspired by KOALA [1] and TaskTracker-tool [2] developed by JetBrains, this work extends the idea to VS Code. The tool will enable researchers to conduct studies on student learning behavior and interaction patterns.

Student Task and Responsibilities:

- Develop a configurable Visual Studio Code extension to capture fine-grained student interactions within the IDE (e.g., code edits, execution, debugging actions).
- Implement a flexible logging system that allows researchers to customize data collection for different educational scenarios.
- A dashboard to facilitate the analysis of the collected data and provide basic statistics and insights.
- Perform evaluation to demonstrate usefulness of extension.

Deliverables:

- An IDE extension
- Dashboard for data visualization and analysis
- Evaluation artifacts (dataset, tools, etc.)
- Documented findings of the conducted experiments

Pre-Requisites: (Programming Languages, OS, Skills, Papers, etc)

Knowledge in Python, TypeScript and LLM prompt engineering is helpful for this project.

[1] Daniil Karol, Elizaveta Artser, Ilya Vlasov, Yaroslav Golubev, Hieke Keuning, and Anastasiia Birillo. 2025. KOALA: A Configurable Tool for Collecting IDE Data When Solving Programming Tasks. In Proceedings of the ACM Global Computing Education Conference 2025 - Volume 1 (CompEd 2025), Vol. 1. Association for Computing Machinery, New York, NY, USA, 183–189. <https://doi.org/10.1145/3736181.3747129>

[2] Elena Lyulina, Anastasiia Birillo, Vladimir Kovalenko, and Timofey Bryksin. 2021. TaskTracker-tool: A toolkit for tracking of code snapshots and activity data during solution of programming tasks. In Proceedings of the 52nd ACM Technical Symposium on Computer Science Education. 495–501

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