Measuring Program Comprehension: A Large-Scale Field Study with Professionals

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ABSTRACT

During software development and maintenance, developers spend a considerable amount of time on program comprehension. Previous studies show that program comprehension takes up as much as half of a developer's time. However, most of these studies are performed in a controlled setting, or with a small number of participants, and investigate the program comprehension activities only within the IDEs. However, developers' program comprehension activities go well beyond their IDE interactions.

In this paper [1], we perform a more realistic investigation of program comprehension activities. To do this, we extend our ActivitySpace framework to collect and analyze Human-Computer Interaction (HCI) data across many applications (not just the IDEs). We collect 3,148 working hour data from 78 professional developers in a field study. We follow Minelli et al.'s approach to assign developers' activities into four categories: navigation, editing, comprehension, and other. Then we measure comprehension time by calculating the time that developers spend on program comprehension. We find that on average developers spend $\sim 58\%$ of their time on program comprehension activities, and that they frequently use web browsers and document editors to perform program comprehension activities. We also investigate the impact of programming language, developers' experience, and project phase on the time that is spent on program comprehension.

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CCS CONCEPTS

• **Software and its engineering** → *Software libraries and repositories*; *Maintaining software*;

KEYWORDS

Program Comprehension, Field Study, Inference Model

REFERENCES

[1] Xin Xia, Lingfeng Bao, David Lo, Zhenchang Xing, Ahmed E. Hassan, and Shanping Li. 2017. Measuring Program Comprehension: A Large-Scale Field Study with Professionals. *IEEE Transactions on Software Engineering* PP, 99 (2017), 1–1.