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AI-assisted Programming: From Intelligent Code Completion to Foundation Models - A Twenty-Year Journey

Thursday 27 February 2025 14:00 (1 hour)

Abstract

From pioneering work on intelligent code completion to large language models, AI has have significant impact on software engineering over the past two decades. This keynote presentation traces the evolution of AI-assisted programming, highlighting advancements and outlining future directions.

The talk is structured in three parts. First, we'll journey back to 2000-2010, exploring pioneering applications of machine learning methods to coding tasks, in particular, the groundbreaking work from my lab on intelligent code completion, which was honored with the ACM SIGSOFT Impact Paper Award in 2024, showcasing the software engineering community's early contributions. The second part examines the current landscape dominated by modern large language models (LLMs) in coding. While primarily driven by the ML community, these tools are being rapidly adapted by the software engineers for various tasks. This part of the talk will highlight the pressing need for our community to actively engage in designing more reliable and specialized foundation models for software engineering tasks. Subsequently, I'll present some ongoing work from our lab focused on developing robust foundation models for coding with the specific needs of software engineering in mind. This retrospective not only celebrates past achievements but also critically examines the present landscape, emphasizing the vital role of software engineering expertise in shaping the future of AI-assisted programming.

Bio

Mira Mezini is a Professor of Computer Science at TU Darmstadt, where she leads the Software Technology Lab. She serves as TUDa's representative on the board of the National Research Center for Applied Cybersecurity ATHENE and co-directs hessian.AI, the Hessian Center for Artificial Intelligence. Mezini has held several roles in research funding and governing bodies. She has been elected in the Computer Science Panel of the German Research Foundation (DFG), appointed on the Computer Science Consolidator Grant Panel of the European Research Council (ERC), and elected in the Executive Committee of ACM SIGPLAN. Currently, she is a member of the ERC Scientific Council's selection committee and the DFG Senate. Mezini's research focuses on three main areas: programming systems for reliable distributed software and AI, automated software analysis, and foundational code models. With over 200 frequently cited peer-reviewed publications in top venues in software engineering and programming languages, her work has gained significant recognition. She has served or is serving as program chair for major in software engineering and programming languages conferences, including ECOOP, OOPSLA, FSE, and ICSE. Her awards include two IBM Eclipse Innovation Awards (2005 and 2006), a Google Research Award (2017), and the second prize in the Horst Görtz Foundation's IT Security Award (2014). In 2012, Mezini received an ERC Advanced Grant, the EU's most prestigious research funding award. A member of the German Academy of Engineering Sciences and the Academia Europaea, Mezini was recently named an ACM Fellow, further cementing her status as a leader in the field of computer science.

I want to participate in the youngRSE prize

Presenter: Prof. MEZINI, Mira (TU Darmstadt)

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