Singla, Adish

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Invited Talk: AI-driven Educational Technology for Computational Thinking and Programming

Adish Singla

Machine Teaching Group, Max Planck Institute for Software Systems, Saarbrücken, Germany
adishs@mpi-sws.org

Abstract

Computational thinking and basic programming skills are essential for everyone in the 21st century, both for students and adults, to thrive in the digital society. Consequently, there is an increasing emphasis on introducing computing and programming education at an early age, starting at elementary-level grades. However, given the conceptual and open-ended nature of programming tasks, novice learners often struggle when solving programming tasks by themselves. Given the scarcity of human tutoring resources to provide individualized assistance, AI-driven educational technology has the potential to provide scalable and automated assistance to struggling learners. In this talk, I will present our work on AI-driven programming education empowered by automated techniques for synthesizing new practice tasks, generating personalized feedback, and modeling learners' knowledge. I will describe unique challenges and opportunities in the programming domain, which can also drive the next scientific breakthroughs in AI-driven education for other subject domains. I will conclude with a discussion of crucial ingredients to succeed in making programming education easier and accessible for all.