

# Supporting Software Evolution through Intelligent Concept location

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## Abstract:

Software systems continuously evolve to accommodate changing requirements, new technologies, and maintenance demands. A fundamental challenge in software evolution is concept location, which is the process of identifying source code elements relevant to a change request, feature enhancement, bug fix, or maintenance task. Because software knowledge is often distributed across large and complex codebases, concept location can be time-consuming, cognitively demanding, and costly when performed manually.

This keynote will examine concept location as a critical activity in software maintenance and evolution, and present major advances in automating and supporting this process through static, dynamic, and hybrid approaches. Techniques such as information retrieval, execution-based analysis, program dependency analysis, and machine learning-assisted methods will be discussed, along with their roles in improving change impact analysis, feature location, program comprehension, and software quality. In addition, the keynote will address emerging challenges posed by large-scale systems, AI-assisted development environments, and evolving software architectures, and outline promising future research directions in intelligent support for software evolution.

## Biography

Dr. Simon Xu is the Interim Dean and Professor in the Faculty of Computer Science and Technology at Algoma University, where he has been a faculty member since 2002. Prior to his tenure at Algoma University, he was working in the School of Computer Science of University of Windsor, Canada. Additionally, he serves as a guest professor at Wuhan University and the adjunct professor at China University of Mining and Technology, China. Dr. Xu earned his Ph.D. degrees from Wayne State University, in the United States, and the University of Liege in Belgium. His research focuses on software evolution, program comprehension, big data, and cognitive process during software development. Dr. Xu has published more than 90 articles in referred journals and conference proceedings and a few authored/co-authored books. He has chaired seven IEEE international conferences and has been invited to deliver keynotes at various IEEE conferences. He is a senior member of IEEE and a member of ACM.