

# DEPARTMENT OF CIVIL ENGINEERING

## SEMINAR

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## HONG KONG SOCIETY FOR TRANSPORTATION STUDIES and INSTITUTE OF TRANSPORT STUDIES at HKU

New Evolutionary Algorithms to Solve the Competitive Maximal Covering Location Problem

Prof. Abdullah Konak Distinguished Professor of Information Sciences and Technology the Pennsylvania State University, Berks, USA

Date: July 28, 2023 (Friday) Time: 5:00 pm – 6:00 pm Venue: Room 612B, 6/F Haking Wong Building, The University of Hong Kong

#### Abstract

This presentation introduces two evolutionary algorithms called the Game-Theoretic Genetic Algorithm (GTGA) and Regret-Based Nash Equilibrium Sorting Genetic Algorithm (RNESGA) for analyzing combinatorial optimization game theory problems where it is computationally infeasible to enumerate all decision options of the players involved in the game. Although evolutionary algorithms are widely used to solve combinatorial optimization programs, their applications to game theory have been limited to specific types of games. The GTGA and RNESGA can solve different types of game theory problems using multiple populations and alternating fitness evaluation methods. We will demonstrate how these algorithms can be applied to solve various versions of the Competitive Maximal Covering Location Problem as well as other game theory problems such as Cournot's Model, Pricing Games, Numerical game, Hotelling Game, etc. Computational experiments demonstrate their performance in terms of converging equilibria in Nash and Stackelberg games.

#### About the Speaker

Dr. Abdullah Konak is a Distinguished Professor of Information Sciences and Technology at the Pennsylvania State University, Berks. Dr. Konak also teaches graduate courses in the Master of Science in Cybersecurity Analytics and Operations program at the College of Information Sciences and Technology, Penn State World Campus. Dr. Konak's primary research focuses on modeling, analyzing, and optimizing complex systems using computational intelligence combined with probability, statistics, data sciences, and operations research. His research also involves active learning, entrepreneurship education, and the innovation mindset. Dr. Konak published numerous academic papers on a broad range of topics, including network design, system reliability, sustainability, cybersecurity, facilities design, green logistics, production management, and predictive analytics. Dr. Konak held visiting positions at Lehigh University and Cornell University, as well as at the Chinese University of Hong Kong, where he taught engineering innovation for over a decade. He has been a principal investigator in sponsored projects from the National Science Foundation, the National Security Agency, the U.S. Department of Labor, and Venture Well. He is a member of INFORMS, IISE, and ASEE.

- ALL ARE WELCOME -