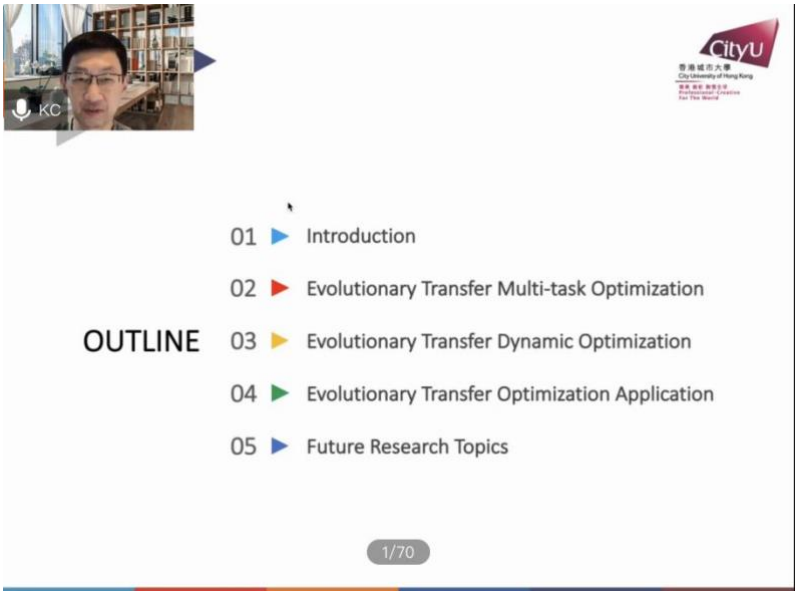
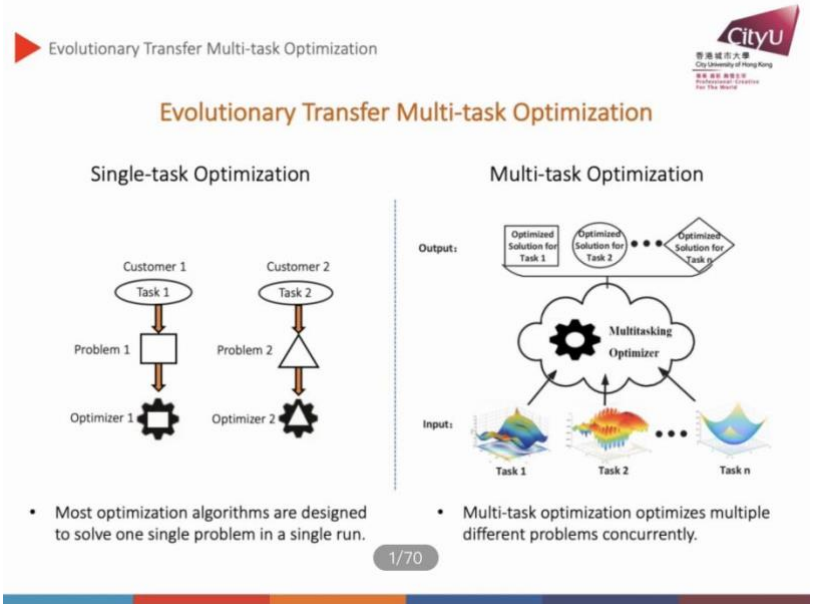
Evolutionary Transfer Optimization

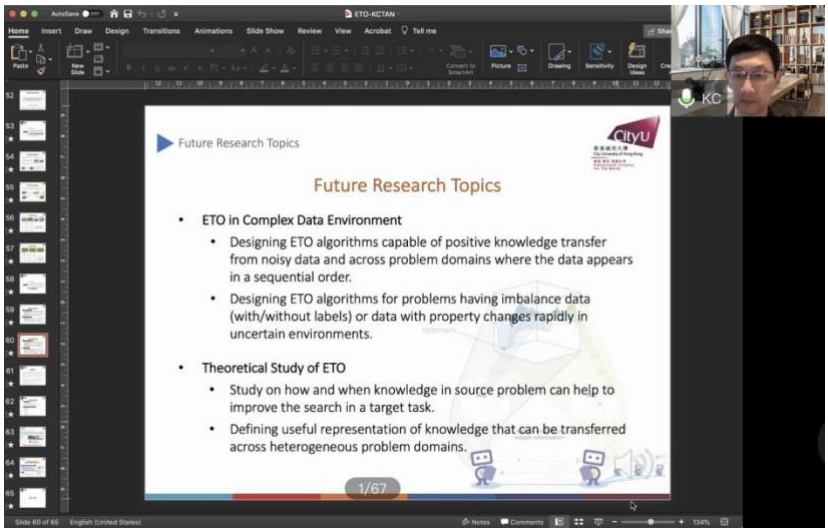
Kay Chen Tan, IEEE DL
(for The Computational Intelligence Society (CIS) Chapter of IEEE Xiamen Section,
Xiamen University, Xiamen, China, 25 Sept 2020)

Report: On 25 Sept 2020, at 4:00-5:00 pm, Kay Chen Tan delivered a DL talk for The Computational Intelligence Society (CIS) Chapter of IEEE Xiamen Section, at Xiamen University, Xiamen, China, chaired by Professor Min Jiang. Kay Chen Tan discussed the overview of evolutionary transfer optimization(ETO), his work on ETO for evolutionary multitasking and solving dynamic multi-objective optimization problems, and the future of ETO research. Over 200 IEEE members and non-members attended the talk and discussions.

Abstract: It is known that the processes of learning and the transfer of what has been learned are central to humans in problem-solving. Within the context of computational intelligence, several core learning technologies in neural and cognitive systems, fuzzy systems, probabilistic reasoning have been notable for their ability in emulating some of human's cultural and generalization capabilities. In spite of the accomplishments made in computational intelligence, the attempts to emulate the cultural intelligence of human in search, evolutionary optimization in particular, have to date received less attention. Particularly, the study of optimization methodology which learns from the problem solved and transfer what have been learned to help problem-solving on unseen problems, has been under-explored in the context of evolutionary computation. However, it is believed that real-world problems seldom exist in isolation, and related problems encountered may yield useful information for more effective and efficient problem-solving on new problems encountered, when properly harnessed. This talk will touch upon the topic of evolutionary transfer optimization (ETO), which focuses on knowledge learning and transfer across problems for enhanced evolutionary optimization performance. In particular, I will first present an overview of existing ETO approaches for problem-solving in evolutionary computation. I will then introduce our work on ETO for evolutionary multitasking which is an emerging search paradigm in the realm of evolutionary computation that conducts evolutionary search concurrently on multiple search spaces corresponding to different tasks or optimization problems. Next, I will present our recent work on ETO for solving dynamic multi-objective optimization problems. As problems at two consecutive time instances of a given dynamical problem often share certain similarity, the optimized solutions obtained at a time instance may thus be used to provide a better prediction of the moving optima for the next time instance. I will end my talk with a discussion of future ETO research directions covering various topics ranging from theoretical analysis to real-world complex applications.





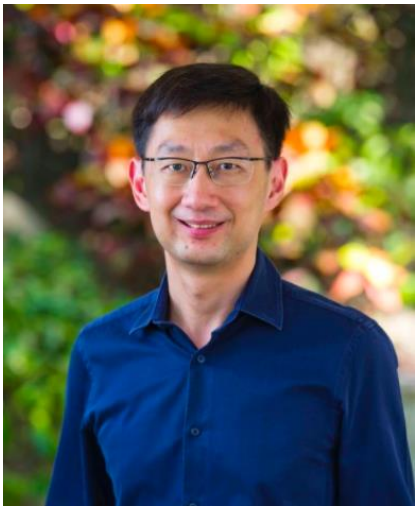


Professor Kay Chen Tan during his talk

Participant list

Professor Kay Chen Tan

Brief Resume



Kay Chen Tan is currently a Professor with the Department of Computer Science, City University of Hong Kong. His research interests include computational intelligence and its applications, such as in data analytics, healthcare, evolutionary transfer learning, and multi-objective optimization. Prof. Tan has co-authored 7 books and published over 300 peer-reviewed articles (including over 80 articles in IEEE Transactions). He holds one U.S. patent on surface defect detection, and another one is pending approval. His current h-index is 61 according to Google Scholar citations.

Prof. Tan is currently the Editor-in-Chief of IEEE Transactions on Evolutionary Computation (IF: 11.169). He was also the Editor-in-Chief of IEEE Computational Intelligence Magazine from 2010-2013 (IF: 9.083). Prof. Tan currently serves as an Associate Editor for over 10 international journals, such as IEEE Transactions on AI, IEEE Transactions on Cybernetics, and IEEE Transactions on Games etc. Prof. Tan has received a number of research awards, such as the 2019 IEEE Computational Intelligence Magazine Outstanding Paper Awards, the 2016 IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Awards, the 2012 Outstanding Early Career Award presented by the IEEE Computational Intelligence Society, and the 2008 Recognition Award given by the International Network for Engineering Education & Research.

Prof. Tan has been invited as a Plenary/Keynote speaker for over 70 international conferences, including the 2020 IEEE World Congress on Computational Intelligence (WCCI), the 2016 IEEE Symposium Series on Computational Intelligence etc. He has served as an organizing committee Chair/Co-Chair for over 50 international conferences, such as the General Chair of 2019 IEEE Congress on Evolutionary Computation (CEC), and the General Chair of 2016 IEEE World Congress on Computational Intelligence.

Prof. Tan is an IEEE Fellow, IEEE Distinguished Lecturer Program (DLP) speaker since 2012, and elected member of IEEE CIS AdCom from 2014-2019.