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THE CHINESE UNIVERSITY OF HONG KONG

Department of Information Engineering

Seminar

Channel coding and channel simulation: When should we mitigate noise, and when should we generate noise

by

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Date : 28 March 2025 (Friday)

Time : 11:30am – 12:30pm

Venue : Rm 801, Ho Sin Hang Engineering Building, CUHK

Abstract

Channel coding converts a noisy channel to a noiseless channel, whereas channel simulation (as studied by Bennett et al.) converts a noiseless channel to a noisy channel. Among these two dual settings, channel coding is a central research interest in information theory, allowing the creation of noiseless channels that are essential to reliable communication. One might expect channel simulation to be less useful since a noisy channel is often considered undesirable. Nevertheless, an increasing number of applications of channel simulation has been found, showing that noisy channels can actually offer some unique advantages.

In this talk, I will present some recent approaches to channel coding and channel simulation based on techniques such as Poisson processes and dithered quantization, which allow us to construct coding schemes with almost optimal performance and simplified error analysis. I will then discuss practical applications such as short-packet communication, lossy compression and differential privacy. I will also discuss logical aspects and automated theorem proving for channel coding, channel simulation and various multiuser settings in information theory.

Finally, I will summarize my teaching, service and research activities at CUHK, and describe my plans for future research and services.

Biography

Cheuk Ting Li received the B.Sc. degree in Mathematics and B.Eng. degree in Information Engineering from The Chinese University of Hong Kong in 2012, and the M.S. and Ph.D. degree in Electrical Engineering from Stanford University in 2014 and 2018, respectively. He was a postdoctoral scholar at the Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, from 2018 to 2019. He joined the Department of Information Engineering, the Chinese University of Hong Kong in January 2020. He was awarded the 2016 IEEE Jack Keil Wolf ISIT Student Paper Award, and the 2023 Information Theory Society Paper Award.

His research interests include simulation of random sources and channels, one-shot and finite-blocklength schemes in information theory, network information theory, and automated theorem proving.

**** ALL ARE WELCOME ****

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