Distributed Hypothesis Testing Over AWGN Channels

SPEAKER **Prof. Shao-Lun Huang**

Associate Professor
Tsinghua-Berkeley Shenzhen Institute

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ABSTRACT

Distributed learning is an important topic in information theory, and is recently an active research area in machine learning. However, it is challenging to characterize the fundamental limit of distributed learning problems with communication constraint. Most of the current information theoretical works focused on applying random coding to obtain achievability results, where the optimality is hardly to be verified. Moreover, random coding schemes are computationally difficult to be applied in real federated learning scenarios. In this talk, we investigate the distributed hypothesis testing problem in AWGN channels. To address the computational issue, we propose to focus on coding schemes based on the empirical distributions instead of the original data. Under such formulation, we further propose a coding strategy based on the mixture of decode-and-forward and amplify-and-forward, where the achievable detection error exponent can be characterized and interpreted by information geometry. Moreover, we demonstrate the optimality of such an achievable error exponent by a genie-aided approach. Finally, we characterize the necessary amount of power to achieve the optimal error exponent.

BIOGRAPHY

Shao-Lun Huang received the B.S. degree with honor in 2008 from the Department of Electronic Engineering, National Taiwan University, Taiwan, and the M.S. and Ph.D. degree in 2010 and 2013 from the Department of Electronic Engineering and Computer Sciences, Massachusetts Institute of Technology. From 2013 to 2016, he was working as a postdoctoral researcher jointly in the Department of Electrical Engineering at the National Taiwan University and the Department of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. Since 2016, he has joined Tsinghua-Berkeley Shenzhen Institute, where he is currently a tenured associate professor. His research interests include information theory, communication theory, machine learning, and social networks.

All are welcome!