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THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering

Seminar

Multiple Description Coding: Shannon Meets Wiener and von Neumann

by
Professor Jun Chen
Assistant Professor
Electrical and Computer Engineering
McMaster University
Canada

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Time : 2:30pm – 3:30pm
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

Multiple description coding is a quantization technique for multimedia transmission through unreliable links. A general achievable 2-description rate region was found by El Gamal and Cover, and was shown to be tight for the quadratic Gaussian case by Ozarow. In this talk, I will present a constructive quantization scheme that can achieve the whole Gaussian 2-description rate region. The key idea is that a high dimensional nonlinear quantization system can be converted into a linear system with small nonlinear components. More fundamentally, our scheme reveals an intimate connection between Shannon's theory for digital systems and Wiener's theory for analog systems.

Our scheme also suggests a natural inner bound of the rate region for the general L-description case. It turns out that the inner bound is tight for quadratic Gaussian multiple description coding with individual and central distortion constraints, which solves a longstanding open problem. Our proof is based on von Neumann's game theory. Specifically, it is shown that the inner bound can be interpreted as a min-max game and the corresponding max-min game yields an outer bound; these two bounds coincide due to the existence of a saddle point.

I will also discuss some intriguing connections between multiple description coding and other major problems in network information theory.

Biography

Jun Chen received the B.E. degree with honors in Communication Engineering from Shanghai Jiao Tong University, Shanghai, China, in 2001, and the M.S. and Ph.D. degrees in Electrical and Computer Engineering from Cornell University, Ithaca, NY in 2003 and 2006, respectively. He was a Postdoctoral Research Associate in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign, Urbana, IL from 2005 to 2006, and a Josef Raviv Memorial Postdoctoral Fellow at the IBM Thomas J. Watson Research Center, Yorktown Heights, NY from 2006 to 2007. He is currently an Assistant Professor of Electrical and Computer Engineering at McMaster University, Hamilton, ON, Canada. He holds the Barber-Gennum Chair in Information Technology.

**** ALL ARE WELCOME ****

Host: Professor Raymond W.H. Yeung (Tel: 2609-8375, Email: whyeung@ie.cuhk.edu.hk)
Enquiries: Information Engineering Dept., CUHK (Tel.: 2609-8385)