



THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
Faculty Seminar

Non-convex optimization and multiuser information theory
by
Professor Chandra NAIR

Department of Information Engineering, The Chinese University of Hong Kong

Date : 15th October, 2018 (Mon)
Time : 4:30pm – 5:30pm
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

Capacity regions in multiuser information theory were traditionally established using an achievability argument and converses to corresponding rate regions. Recently, however, capacity regions have been established, for non-trivial and important classes of channels (such as additive Gaussian noise models and others), by optimizing functionals on probability spaces generated from inner or outer bounds and showing that the bounds match for these channels. Optimization ideas have also been used to determine if certain achievable regions proposed in the literature are optimal or sub-optimal in general. The study of these non-convex optimization problems required developing new insights and techniques. In this talk, I will outline the ideas involved in obtaining the results, as well as illustrate the relationship of these problems to hypercontractivity and related notions studied primarily outside information theory. I will present some unifying observations across the family of optimization problems that we have managed to solve, and state some elementary instances of similar problems whose solutions would be of immense interest.

Biography

Chandra Nair is an Associate Professor with the Information Engineering department at The Chinese University of Hong Kong. His research interests and contributions have been in developing ideas, tools, and techniques to tackle families of combinatorial and non-convex optimization problems arising primarily in the information sciences.

His recent research focus has been on studying the optimality of certain inner and outer bounds to capacity regions for fundamental problems in multiuser information theory. He, along with his doctoral student Yanlin Geng, received the 2016 Information Theory Society paper award for developing a novel way to establish the optimality of Gaussian distributions. A proof of the Parisi and Coppersmith-Sorkin conjectures in the Random Assignment Problem constituted his doctoral dissertation; and he resolved some conjectures related to Random Energy model approximation of the Number Partition Problem during his post-doctoral years.

Chandra Nair got his Bachelor's degree, B.Tech(EE), from IIT Madras (India) where he was the Philips (India) and Siemens (India) award winner for the best academic performance. Subsequently he was a Stanford graduate fellow (00-04) and a Microsoft graduate fellow (04-05) during his graduate studies at the EE department of Stanford University. Later, he became a post-doctoral researcher (05-07) with the theory group at Microsoft Research, Redmond. He has been a faculty member of the information engineering department at The Chinese university of Hong Kong since Fall 2007. He was an associate editor for the IEEE Transactions on Information Theory (2014-2016) and is currently a distinguished lecturer of the IEEE Information theory society. He is a fellow of the IEEE.

He serves as the Programme Director of the undergraduate program on Mathematics and Information Engineering and the Director of the Institute of Theoretical Computer Science and Communications.

**** ALL ARE WELCOME ****