In Favour of Posting

THE CHINESE UNIVERSITY OF HONG KONG

Department of Information Engineering

Seminar

Large scale linear programming decoding via the alternating direction method of multipliers

By

Prof. Stark Draper

The University of Toronto, Canada

Date : 2 December 2024 (Monday)

Time : 3:00pm – 4:00pm

Venue : Rm 713, William M.W. Mong Engineering Building, CUHK

Abstract

In this talk, we apply the alternating direction method of multipliers (ADMM) to solve the linear programming (LP) relaxation of maximum likelihood decoding for error-correction codes in an efficient and parallelizable manner. The core technical innovation is a novel characterization of the parity polytope, the fundamental convex object of interest in relaxations of the single-parity-constraints used to describe, e.g., low-density parity-check (LDPC) codes. In comparison to state-of-the art techniques based on message passing, our algorithm has significantly stronger theoretical guarantees. These guarantees are especially pertinent to ultra-high-reliability applications such as optical transport networks. As well as the basic theory and results I will detail our fixed-point implementation in a field-programmable gate array (FPGA) and extensions beyond binary linear codes.

Biography

Stark Draper cooks up the math that makes your mobile phone work. His other recipes make your computer more energy-efficient, store your personal biometric data more securely, and determine how to operate astronomical observatories to collect higher-quality scientific data more efficiently. He has held academic, industrial and consulting roles with Arraycomm Inc., a telecommunications start-up in California, the Mitsubishi Electric Research Labs (MERL), UC Berkeley and UW-Madison. He leads his research team in collaborations with Mitsubishi Electric, Huawei Technologies, Disney Research, Bell Labs, HP Labs, ADI, and AMD, among others. He is a Full Professor at the University of Toronto and until 2013 was an Associate Professor at the University of Wisconsin, Madison. His research interests include information theory, optimization, error-correction coding, security, and the application of tools and perspectives from these fields to problems in communications, computing, and learning. Professor Draper spent the 2019-20 academic year on sabbatical visiting the Chinese University of Hong Kong, Shenzhen, China, and visiting the Canada-France-Hawaii Telescope (CFHT) in Hawai'i, USA.

**** ALL ARE WELCOME ****

Host: Prof. NAIR Chandra M. (Tel: 3943-8467, Email: chandra@ie.cuhk.edu.hk)

Enquiries: Information Engineering Dept., CUHK (Tel.: 3943-8385)