The Department of Electrical and Computer Engineering Presents

A DISTINGUISHED SEMINAR

ANANTHRAM SWAMI

JOINT DATA COMPRESSION AND CACHING: OPTIMIZING LATENCY AND ENERGY CONSUMPTION

ABSTRACT

We consider the problem of compressing and caching data across a communication network, so as to minimize average latency, subject to an energy constraint. The problem is NP-hard in general, with the hardness stemming from the caching problem. We propose a polynomial time algorithm that achieves a $(1 - 1/e)$-approximation solution to the optimum. In a related problem we consider the problem of compressing and caching so as to minimize system-wide energy consumption which meeting quality-of-information requirements. This turns out to be a Mixed Integer Non-Linear Programming (MINLP) problem with non-convex functions, which is NP-hard in general. We propose a variant of spatial branch and bound algorithm (V-SBB) that can provide an \epsilon-optimal solution. We also consider a resource allocation and sharing problem which we formulate in a cooperative game-theoretic framework.

BIOGRAPHY

Ananthram Swami is with the US Army Research Laboratory and is the Army's Senior Research Scientist (ST) for Network Science. Prior to joining ARL, he held positions with Unocal Corporation, USC, CS-3 and Malgudi Systems. He was a Statistical Consultant to the California Lottery, developed a Matlab-based toolbox for non-Gaussian signal processing. He has held visiting faculty positions at INP, Toulouse., and currently at Imperial College. He received the B.Tech. degree from IIT-Bombay; the M.S. degree from Rice University, and the Ph.D. degree from the University of Southern California (USC), all in Electrical Engineering. Swami's work is in the broad area of network science, with emphasis on wireless communication networks. He is an ARL Fellow and a Fellow of the IEEE.

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