Pliable Index Coding

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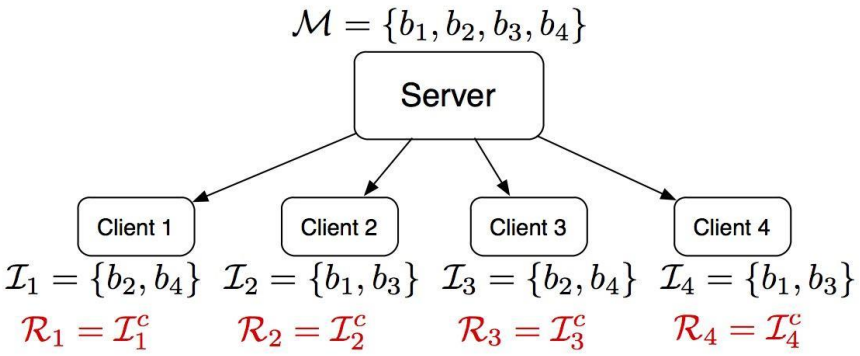

Problem Statement and Motivation

- Index coding problem is a simplified version of broadcasting with side information at each receiver.
  - Broadcasting with side information is a common scenario of transmission in today's internet. Due to the rapidly decreasing cost of data storage, the side information at receivers becomes more relevant in the performance.
- Pliable index coding, where receivers request a type of information instead of a specific desired message, is a variant of index coding.
  - Motivated by the observation that in some services the user does not ask for a specific message, but any message satisfying certain properties.
  - Transmitter has some freedom to choose the desired messages. Thus there are more network coding opportunities.

Technical Approach

- Directed bipartite graph model for (linear) achievability analysis.
  - Graph theoretical \ Combinatorial approach.
- Converse based on submodularity property of entropy function.
  - Classical information theoretical approach.

Key Achievements and Future Goals

- We showed that for the case where side information at each user are almost the same, the best linear scheme satisfies a constraint fraction of the existing users.
  - Tang Liu, Daniela Tuninetti, "Pliable Index Coding: Novel Lower bound on the Fraction of Satisfied Clients with a Single Transmission and its Application", ITW 2016

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