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Constrained Entropy Maximisation

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Abstract—A fundamental problem in designing distributed storage networks is to determine the optimal tradeoffs among various design parameters, including storage cost, repair cost, and reliability. Such a problem can be formulated as an entropy maximisation problem subject to functional a set of dependency constraints. In fact, many problems in network coding and error correcting codes can also be formulated as the same entropy maximisation problem.

Unfortunately, solving such an optimisation problem can be extremely difficult in general. To reduce the complexity, various relaxations have been considered, which are based on techniques in association schemes, information inequalities, and functional dependency bounds (a generalisation of cut-set bounds). This paper compares these relaxations and showed that both linear programming bounds (derived from association schemes and information inequalities) are at least better than the functional dependency bounds.