

A Separation Algorithm for Improved LP-Decoding of Linear Block Codes

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We present improvements in linear programming decoding introduced by Feldman et al. with the help of generic integer programming methods. We propose a new IP formulation of the maximum likelihood decoding problem. This formulation makes use of indicator variables which help in detecting violated parity checks immediately. We derive Gomory cuts from our formulation and use them in a separation algorithm to find maximum likelihood codewords. We further propose a novel method of finding cuts induced by redundant parity checks. Under certain circumstances we can guarantee that these RPC cuts are valid and cut off the fractional optimal solutions of LP decoding. We demonstrate the performance of our separation algorithm on two LDPC codes and one BCH code.

Literatur

- [1] J. Feldman, M. J. Wainwright and D. R. Karger, *Using linear programming to Decode Binary linear codes*. IEEE Transactions on Information Theory, 51:954-972, March 2005.