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The Generalized Covering Radii of Linear Codes

Motivated by an application to database linear querying, such as private information-retrieval protocols, we suggest a fundamental property of linear codes – the generalized covering radius. The generalized covering-radius hierarchy of a linear code characterizes the trade-off between storage amount, latency, and access complexity, in such database systems. Several equivalent definitions are provided, showing this as a combinatorial, geometric, and algebraic notion. We derive bounds on the code parameters in relation with the generalized covering radii, study the effect of simple code operations, and describe a connection with generalized Hamming weights.