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Title: Contractivity of Quantum Channels with respect to Quantum State Induced Norms

Abstract: Quantum Channels (QCs) are used to send quantum information in the form of quantum states and are major objects of interest in Quantum Information Theory and Quantum Computing. Some desirable QCs are non-expansive, meaning they don't add superfluous information, or "noise," to the quantum information. This noise can be detected using various metrics, functions which quantify a notion of distance. One specific metric we use is the Bures metric. While it is known that a given QC is Bures-nonexpansive, our study seeks to classify Bures-contractive QCs and estimate their Lipschitz constants. Another way to measure distance between matrices is using norms. We have classified several specific QCs as contractive with respect to the 1-,2-, and infinity-operator norms. We also generated matrix norms using quantum states and found sharp two-sided norm equivalence constants for them, which were computationally tested. A key application of our work is the ability to detect contractivity of QCs with respect to new norms of interest by utilizing our work with these well-established norms and our newfound equivalence constants.

Talk theme(s): Analysis

Audience: Linear Algebra (some analysis knowledge will help)