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Amenability and stability for discrete groups

The notion of a representation of a group G on a Hilbert space \mathcal{H} can be generalized to that of an “approximate representation”, in which the usual homomorphism condition $\varphi(xy) = \varphi(x)\varphi(y)$ is replaced by some upper bound on $\|\varphi(xy) - \varphi(x)\varphi(y)\|$. The supremum over all $x, y \in G$ of this quantity is referred to as the “defect” of the map φ and measures how far φ is from being a genuine representation. It is natural to ask about the stability of this class of maps: namely, when the defect of φ is small, under what conditions is it well-approximated by a genuine representation of G ? We discuss the connection between amenability and stability of approximate representations for discrete groups.