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Tempered representations on stationary spaces

Let G be a countable discrete group, and let μ be a probability measure on G with finite Shannon entropy. We use ideas from harmonic analysis to generalize Shannon and Avez entropies, taking into account the given weight ω on G, and investigate their relations together as well as to the actions of G on measurable stationary spaces. We apply our approach to show that for a large class of groups (e.g. groups with rapid decay) and probability measures on them, tempered representations on a μ-stationary space (X, ξ) are precisely those satisfying

$$h(G, \mu) = h_\mu(X, \xi),$$

where $h(G, \mu)$ is the Avez entopy of μ and $h_\mu(X, \xi)$ is the Furstenberg entropy of (X, ξ). This implies that these types of stationary spaces are precisely measure-preserving extension of the Poisson boundary of (G, μ). In particular, (X, ξ) is an amenable (G, μ)-space if and only if it is a measure-preserving extension of the Poisson boundary of (G, μ).

This is a join work with Benjamin Anderson-Sackaney, Tim de Laat, and Matthew Wiersma.