

Lower estimates for L_1 -distortion of transportation cost spaces

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The degree of dissimilarity between two finite metric spaces (images) is a natural object of study in Computer Science. The usual names for one of such degrees are earth-mover distance, transportation cost, and Wasserstein distance. One of the tools for studying it (Charikar (2002) and Indyk-Thaper (2003)) is low-distortion embeddings of the corresponding spaces into L_1 . The optimal upper bound for distortion of an embedding of a transportation cost space on a metric space of cardinality n into L_1 is $O(\log n)$; it is proved by combining results of Charikar (2002) and Fakcharoenphol-Rao-Talwar (2004). It is easy to see that expanders achieve the lower bound $\Omega(\log n)$ for L_1 -distortion. An interesting problem is to find nontrivial lower bounds for L_1 -distortions of transportation cost spaces on subsets of L_1 (or metric spaces admitting low-distortion embeddings into L_1). Such estimates are known for Hamming cubes (Khot-Naor (2006)), planar grids (Naor-Schechtman (2007)), and diamond graphs (Baudier-Gartland-Schlumprecht (2023)). The goal of the talk is to present new estimates of this type. Joint work with Chris Gartland.

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