

Random ε -nets and embeddings in ℓ_∞^N

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We show that, given an n -dimensional normed space X , a sequence of $N = (8/\varepsilon)^{2n}$ independent random vectors $(X_i)_{i=1}^N$, uniformly distributed in the unit ball of X^* , with high probability forms an ε -net for this unit ball. Thus the random linear map $\Gamma : \mathbb{R}^n \rightarrow \mathbb{R}^N$ defined by $\Gamma x = (\langle x, X_i \rangle)_{i=1}^N$ embeds X in ℓ_∞^N with at most $(1 + \varepsilon)$ -norm distortion. In the case $X = \ell_2^n$ we obtain a random $(1 + \varepsilon)$ -embedding into ℓ_∞^N with asymptotically best possible relation between N , n , and ε .

This is joint work with Y. Gordon, A. Pajor, and N. Tomczak-Jaegermann.