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Discrepancy of points coming from Determinantal point processes.

Abstract: Let $\omega_N = \{x_1, \ldots, x_N\}$ be a set of N different points in our favourite space Λ and let us denote by $(\omega_N)_{N\in\mathbb{N}}$ a sequence of configurations of points. Depending on who the space Λ is, we have different definitions of discrepancy. Still, there exists a common problem for all sort of spaces and definitions of discrepancy: given a sequence $(\omega_N)_{N\in\mathbb{N}}$, compute (or bound) the asymptotic expansion of the value of the discrepancy of ω_N as N tends to ∞.

Whenever Λ is a locally compact, Polish topological space endowed with a Radon measure μ, we can define a very particular type of random point process, the so called Determinantal point processes, that are characterized by its intensity joint functions

$$\rho_k(x_1, \ldots, x_k) = \det(K(x_i, x_j)_{1\leq i,j\leq k}), \tag{1}$$

where $K : \Lambda \times \Lambda \longrightarrow \mathbb{C}$ is a measurable function. Points coming from Determinantal point processes exhibit a lot of nice properties for equidistribution.

Here we present some examples of Determinantal point processes that produce points whose discrepancy can be compute and even more, for some cases have been proven to attain the minimum possible discrepancy value.