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KRAKÓW, UL. ŁOJASIEWICZA 6, SALA 1016

http://tcs.uj.edu.pl/sw/

Herbert Edelsbrunner

IST WIEDEN ORAZ DUKE UNIVERSITY

Features and ghosts in Gaussian convolution

Gaussian convolution solves the heat equation in Euclidean spaces. It is popular because it slowly washes out features of the initial function (perhaps an image) and thus gives access to large scale information. In an effort to quantify this phenomenon, I present two results. To state them, let $f : \mathbb{R}^n \to \mathbb{R}$ be a function with compact support, and let $f_t : R^{\rightarrow} R$ be its convolution with the isotropic Gaussian kernel with width t.

A: For every $p \geq 2n + 1$, the p-norm of the persistence diagram of f_t goes to zero like $C/t^{n/2}$.

B: For every $3 <= m <= n$, there exists a function f written as the sum of $m + 1$ Dirac delta functions and an open interval I such that f_t has $m+2$ local maxima whenever $t \in I$.

Result A is a collaboration with Chao Chen. Result B is originally due to Carreira-Perpinan and Williams (2003).