



Mathematics > Probability

# Distance Functions, Critical Points, and Topology for Some Random Complexes

Omer Bobrowski, Robert J. Adler

(Submitted on 24 Jul 2011)

For a finite set of points  $P$  in  $\mathbb{R}^d$ , the function  $d_P: \mathbb{R}^d \rightarrow \mathbb{R}_+$  measures Euclidean distance to the set  $P$ . We study the number of critical points of  $d_P$  when  $P$  is random. In particular, we study the limit behavior of  $N_k$  - the number of critical points of  $d_P$  with Morse index  $k$  - as the number of points in  $P$  goes to infinity. We present explicit computations for the normalized, limiting, expectations and variances of the  $N_k$ , as well as distributional limit theorems. We link these results to recent results in Kahle (2009), and Kahle and Meckes (2011), in which the Betti numbers of the random Čech complex based on  $P$  were studied.

Comments: 50 pages, 3 figures

Subjects: **Probability (math.PR)**; Algebraic Topology (math.AT)

MSC classes: 60D05, 60F05, 60G55 (Primary) 55U10, 58K05 (Secondary)

Cite as: **arXiv:1107.4775v1 [math.PR]**

## Submission history

From: Omer Bobrowski [view email]

[v1] Sun, 24 Jul 2011 17:39:13 GMT (235kb)

*Which authors of this paper are endorsers?*

## Download:

- PDF
- PostScript
- Other formats

## Current browse context:

math.PR

< prev | next >

new | recent | 1107

## Change to browse by:

math

math.AT

## References & Citations

- NASA ADS

## Bookmark (what is this?)

