Thesis defense

Discrete Morse Theory for Random Complexes

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Host:

The main objects considered in the present work are simplicial and CW-complexes with vertices forming a random point cloud. In particular, we consider Poisson point process inRn and study Delaunay and Voronoi complexes of the first and higher orders and weighted Delaunay complexes obtained as sections of Delaunay complexes, as well as the Cech complex.Further, we examine the Delaunay complex of a Poisson point process on the sphere Sn, as well as of a uniform point cloud, which is equivalent to the convex hull, providing a connection to the theory of random polytopes. Each of the complexes in question can be endowed with a radius function, which maps its cells to the radii of appropriately chosen circumspheres, called the circumradius of the cell. Applying and developing discrete Morse theory for these functions, joining it together with probabilistic and sometimes analytic machinery and developing several integral geometric tools, in all cases we are able to obtain up to constants the distribution of radii of typical intervals of all types, which also provides the distribution of circumradii of a typical cell of the complex. In low dimensions the constants can be computed explicitly, thus providing the explicit expressions for the expected numbers of cells. In particular, it allows to find the expected density of simplices of every dimension for a Poisson point process on R4, whereas the result for R3 was known already in 1970s

Thursday, October 19, 2017 01:45pm - 02:45pm
Mondi Seminar Room 2, Central Building

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