A LIMIT THEOREM FOR PERSISTENCE DIAGRAMS OF RANDOM COMPLEXES BUILT OVER MARKED POINT PROCESSES

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A persistence diagram is an expression of a persistent homology, which is an important tool to understand topological features (connected components, rings, cavities, etc) of data. A standard way to convert input data into a filtered simplicial complex with parameter $t \geq 0$ is to use the Čech complexes, i.e., the family of nerves of the t-balls centered at each data point.

In this talk, a filtration of simplicial complexes is constructed from finite marked data points in Euclidean space. Examples of our construction include a family of nerves of sets with various sizes, growths, and shapes. In addition, we consider the case when input data are marked point processes (randomly distributed marked points). We then discuss a strong law of large numbers of these persistence diagrams as the size of the window observing random data tends to infinity.

This talk is based on a joint work with Tomoyuki Shirai (Kyushu University).

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This work is supported by JST CREST Mathematics (15656429).