



Moscow-Beijing Topology Seminar

Date & Time: Wedn. 25 May 2022, 15:30-17:00 GMT+8

Speaker: Dr. Naheed Anjum Arafat (School of Computing, National University of Singapore)

Title: ϵ -net Induced Lazy Witness Complexes on Graphs

Abstract: Computation of persistent homology of simplicial representations such as the Rips and the Čech complexes do not efficiently scale to large point clouds. It is, therefore, meaningful to devise approximate representations and evaluate the trade-off between their efficiency and effectiveness. The lazy witness complex economically defines such a representation using only a few selected points, called landmarks. Topological data analysis traditionally considers a point cloud in a Euclidean space. In many situations, however, data is available in the form of a weighted graph. A graph along with the geodesic distance defines a metric space. This metric space of a graph is amenable to topological data analysis. We discuss the computation of persistent homologies on a weighted graph. We present a lazy witness complex approach leveraging the notion of the ϵ -net that we adapt to weighted graphs and their geodesic distance to select landmarks. We show that the value of the parameter of the ϵ -net provides control on the trade-off between choice and number of landmarks and the quality of the approximate simplicial representation. We present three algorithms for constructing an ϵ -net of a graph. We comparatively and empirically evaluate the efficiency and effectiveness of the choice of landmarks that they induce for the topological data analysis of different real-world graphs.

Zoom: 83150200580

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