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Baby Morse Theory in Data Analysis

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(Submitted on 12 May 2011)

A methodology is proposed for inferring the topology underlying point cloud data. The approach employs basic elements of Morse Theory, and is capable of producing not only a point estimate of various topological quantities (e.g., genus), but it can also assess their sampling uncertainty in a probabilistic fashion. Several examples of point cloud data in three dimensions are utilized to demonstrate how the method yields interval estimates for the topology of the data as a 2-dimensional surface embedded in R^3.

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