University of Utah
School of Computing

CS 6170 Mini Project #1 Spring 2017

Due March 21, 2017 at the start of class

This is a mini class project, with a total of 10 possible points (10% of the final grade).

Project description: Using TDA-R package to compute persistent homology of simple point cloud datasets under Rips filtration.

To start, install TDA-R package by following information on:
`https://cran.r-project.org/web/packages/TDA/index.html`.
Get familiar with the reference manual and the vignettes at:

`https://cran.r-project.org/web/packages/TDA/vignettes/article.pdf`

Generate the persistence diagrams of the following two provided point cloud datasets:

- sample1.txt: contains points sampled from a circle without noise
- sample2.txt: contains points sampled from a circle with noise

Your tasks are described below:

- You are to compute persistent homology of the two point clouds using **ripsDiag** command based on Rips complex of the point cloud (please pay attention to your choice of **maxscale** parameter so that important topological feature in dimension 0 and dimension 1 are captured, e.g. the circular structure). Compute dimension-0 and dimension-1 persistent diagrams to be visualized using **plot** (4 points for each dataset). Discuss in a couple of sentences the similarities and differences between their diagrams (at dimension-0 and dimension-1), respectively 2 points).

Please provide a PDF print out of the R code you used to generate your results as well as the visualization of the persistent diagrams (to be submitted via Canvas).