Supplementary Information (Tables S1 to S4) for Computing persistent homology by spanning trees and critical simplices

Dinghua Shi[1], Zhifeng Chen[2], Chuang Ma[3], Guanrong Chen[4]

[1]Department of Mathematics, College of Science, Shanghai University, Shanghai, China.

[2]School of Big Data, Fuzhou University of International Studies and Trade, Fuzhou, China.

[3] Department of Data Science and Big Data Technology, School of Internet, Anhui University, Hefei, China.

[4]Department of Electrical Engineering, City University of Hong Kong, Hong Kong, China.

Email: shidh2012@sina.com; 920978196@qq.com; chuang_m@126.com; eegchen@cityu.edu.hk

Table S1: Torus triangulation network

This table lists the Morse function values of all simplices, the spanning trees of the boundary matrixes $\boldsymbol{B}_1$ and $\boldsymbol{B}_2$, and the simplices composed of 1- and 2-cavities for the network.

Table S2: C. elegans neural network[33]

This table lists the Morse function values of all simplices, the simplices composed of 1-, 2- and 3-cavities, the iterative process of 2-cavities, and an iterative example for the network.

Table S3: BA scale-free model network[30]

This table lists the Morse function values of all simplices, the simplices composed of 1-order cavities, and the results obtained by Kannan's[30] method for the network which is simulated here.

Variables in Kannan's method are as follows:

DFM==Discrete Morse function values;

Flag==To keep track with the size of the set U_α for each simplex α;

IsCritical==To indicate if a given simplex is critical;

FiltrationWeight==To store the filtration weight corresponding to each simplex.

Table S4: Stanford dragon graphic network[34]

This table lists the points in the (x, y, z)-coordinates, the present thresholds of all simplices, the persistence barcodes of 1- and 2-cavities calculated by **javaplex** in Ref. [34], the representative cycles with two lengths of the only 2-cavity, and the Morse function values of all simplices obtained by the new method for the network.

Data of **Tables S1 to S4** are available

https://github.com/ChuangMa1900/Supplementary-Information-Tables-S1-to-S4.git