**Supplementary Information (Tables S1 to S4) for**

**Computing persistent homology by spanning trees and** **critical simplices**

**Dinghua Shi1, Zhifeng Chen2, Chuang Ma3, Guanrong Chen4**

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

2School 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.

4Department 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](mailto: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 ***B***1 and ***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's30 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 *Uα*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>