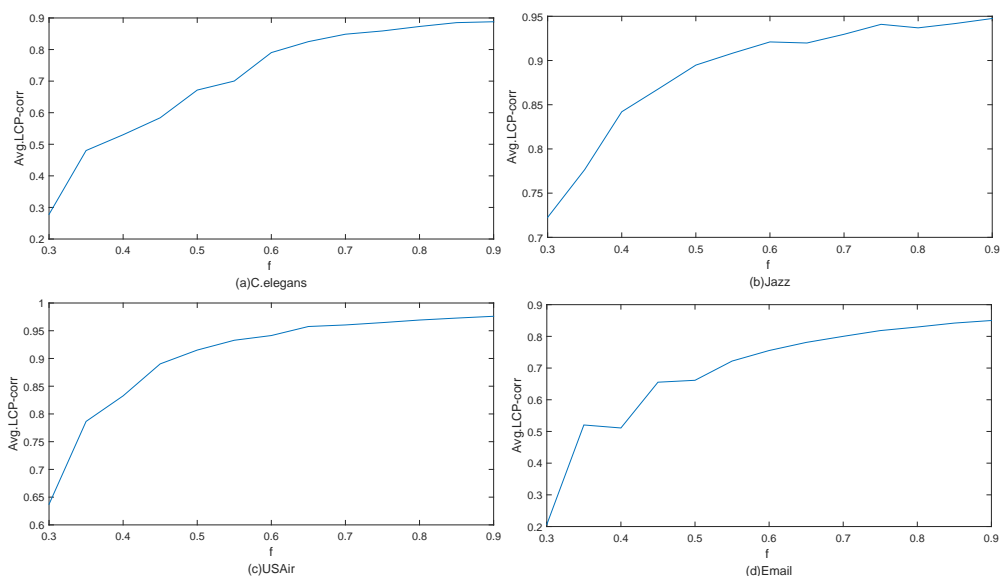
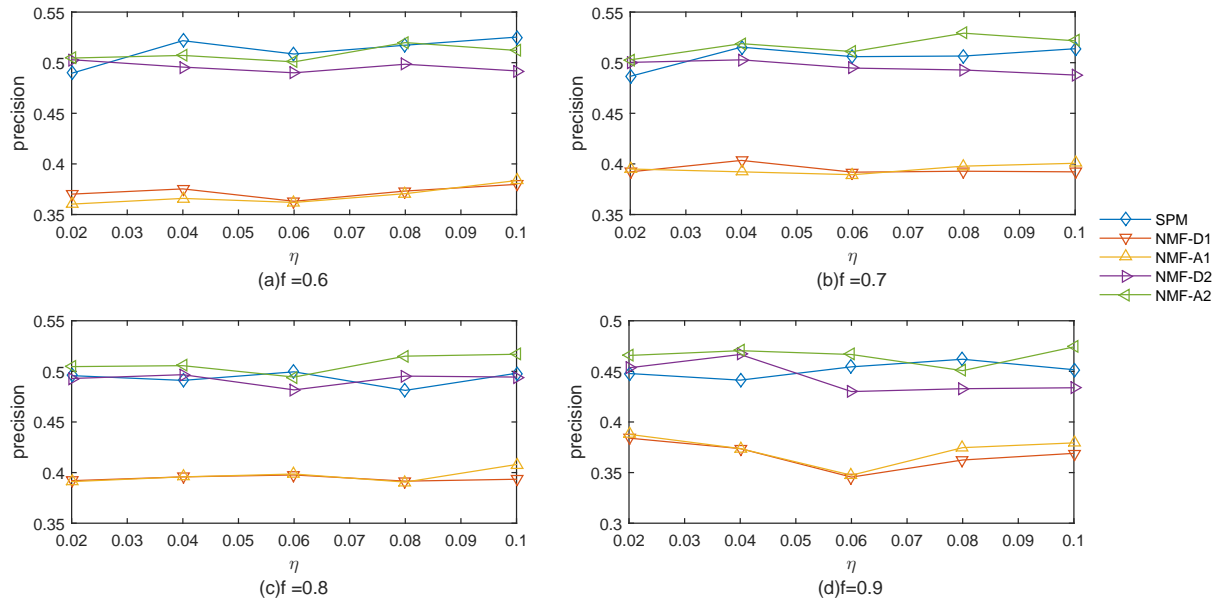


## Supplementary Information

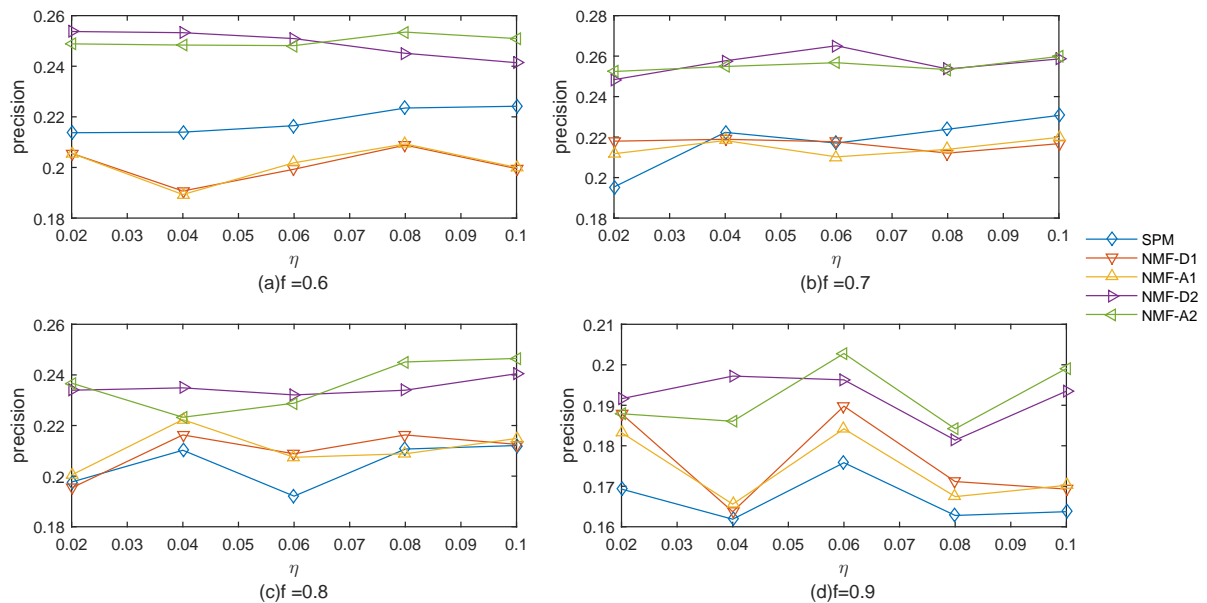
### 1 Supplement Figures



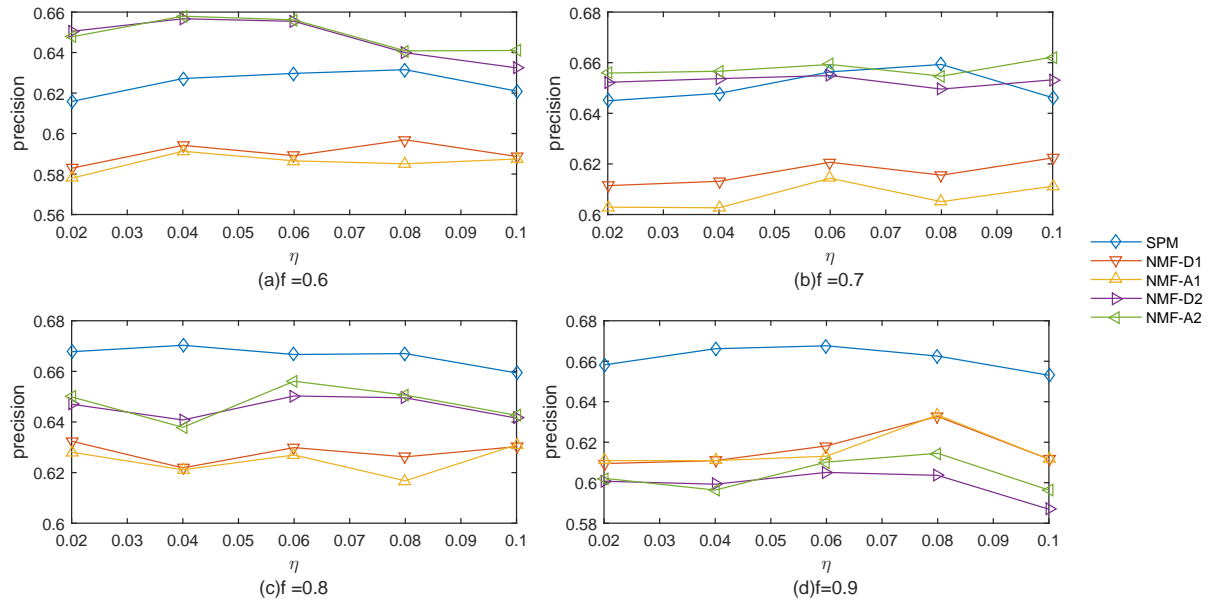
**Figure S1. Average LCP-corr under different fractions of training sets on four real networks.** The four real networks are C.elegans, Jazz, USAir and Email. The x-axis is the fraction of training set varied from 0.3 to 0.9. The y-axis is the LCP-corr averaged over 100 independent runs.



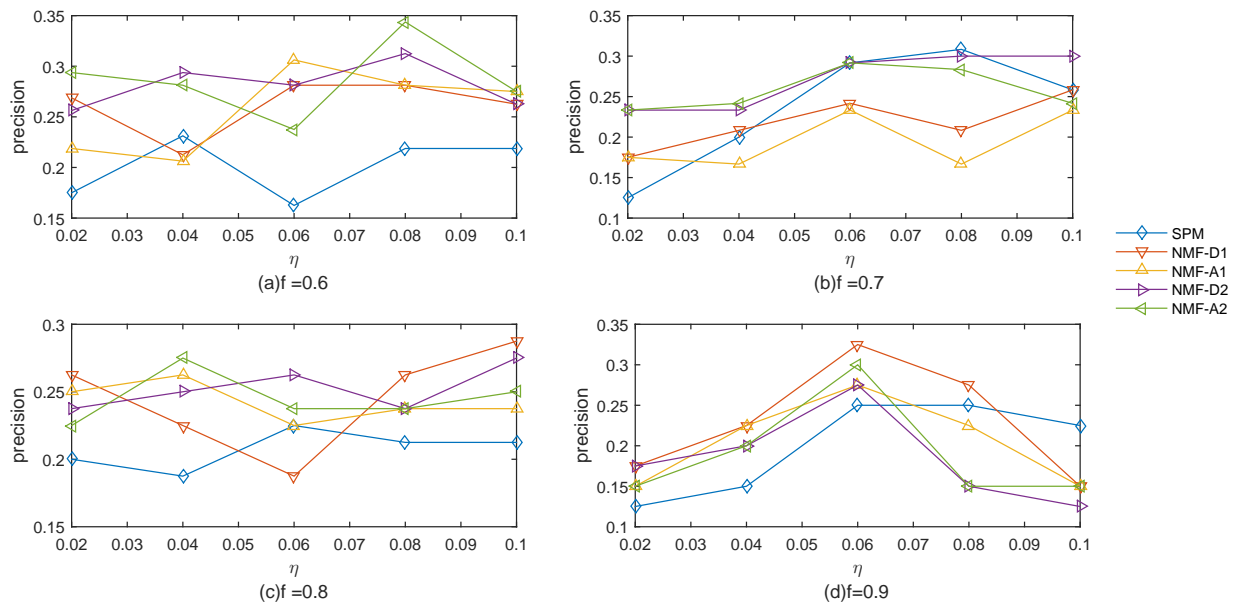
**Figure S2. Comparison of precisions of five methods under different perturbation ratios and the different fractions of training sets on USAir network.** We compared precisions of all indices with perturbation on Email, which are *SPM*, *NMF – D1*, *NMF – A1*, *NMF – D2* and *NMF – A2*. different fractions of training set  $f$  are 0.6, 0.7, 0.8 and 0.9. The x-axis is perturbation ratio  $\eta$  varied from 0.02 to 0.1. The y-axis is the precision averaged over 100 independent runs.



**Figure S3. Comparison of precisions of five methods under different perturbation ratios and the different fractions of training sets on C.elegant network.** We compared precisions of all indices with perturbation on Email, which are *SPM*, *NMF – D1*, *NMF – A1*, *NMF – D2* and *NMF – A2*. The different fractions of training set  $f$  are 0.6, 0.7, 0.8 and 0.9. The x-axis is perturbation ratio  $\eta$  varied from 0.02 to 0.1. The y-axis is the precision averaged over 100 independent runs.



**Figure S4. Comparison of precisions of five methods under different perturbation ratios and the different fractions of training sets on Jazz network.** We compared precisions of all indices with perturbation on Email, which are *SPM*, *NMF – D1*, *NMF – A1*, *NMF – D2* and *NMF – A2*. The different fractions of training set  $f$  are 0.6, 0.7, 0.8 and 0.9. The x-axis is perturbation ratio  $\eta$  varied from 0.02 to 0.1. The y-axis is the precision averaged over 100 independent runs.



**Figure S5. Comparison of precisions of five methods under different perturbation ratios and the different fractions of training sets on Karate network.** We compared precisions of all indices with perturbation on Email, which are *SPM*, *NMF – D1*, *NMF – A1*, *NMF – D2* and *NMF – A2*. The different fractions of training set  $f$  are 0.6, 0.7, 0.8 and 0.9. The x-axis is perturbation ratio  $\eta$  varied from 0.02 to 0.1. The y-axis is the precision averaged over 100 independent runs.

## 2 Link for Code Download

We have provided the MATLAB code to compute the our proposed four methods, which are  $NMF - D1$ ,  $NMF - A1$ ,  $NMF - D2$  and  $NMF - A2$ , respectively. MATLAB code is submitted as supplementary data file and also is provided at the following link: <http://www.pedsurgcn.com/data/PerturbProgram.zip>.