Supplementary Material

1 Predicting Co-complex Edges

The tables below show the performance evaluation metrics computed for the 19 weighting methods.

Method	Log Loss	Brier Score Loss	PR AUC
XGW	0.02744	0.006955	0.797384
SWC	0.085146	0.014308	0.39444
ALL	0.139878	0.026541	0.660414
TOPO_GO	0.140777	0.028024	0.712152
TOPO_GO_CO_EXP	0.168007	0.035798	0.677468
ASSOC	0.17164	0.042429	0.198766
GO_SS	0.180751	0.041467	0.658824
GO_CC	0.226645	0.05338	0.758071
TOPOS	0.229428	0.01683	0.32518
TOPO_CO_EXP	0.233329	0.0488	0.186731
CO_OCCUR	0.237458	0.01683	0.159465
TOPO	0.331643	0.018078	0.316941
GO_BP	0.375237	0.076654	0.148543
REL	0.48032	0.024176	0.142142
CO_EXP	0.566154	0.150734	0.044101
TOPO_L2	0.582889	0.026566	0.026484
STRING	0.665964	0.181944	0.301557
GO_MF	0.9611	0.046348	0.47878
UNWEIGHTED	7.098596	0.196944	0.302852

Table 1: Log loss, Brier score loss, and PR AUC in terms of co-complex edge classification of all the weighting methods for the Original composite network. This is the average over all the 10 cross-validation rounds.

Method	Log Loss	Brier Score Loss	PR AUC
XGW	0.040133	0.010696	0.770311
SWC	0.128472	0.022852	0.387718
TOPO_GO	0.14338	0.030899	0.694562
ALL	0.162951	0.034397	0.651494
TOPO_GO_CO_EXP	0.177856	0.040875	0.669927
GO_SS	0.188856	0.046512	0.663025
ASSOC	0.227489	0.060787	0.203106
GO_CC	0.231554	0.055402	0.796105
CO_OCCUR	0.346168	0.025149	0.161996
TOPO_CO_EXP	0.364348	0.057876	0.094823
GO_BP	0.434749	0.084665	0.170081
TOPOS	0.674619	0.025016	0.169141
REL	0.706276	0.034006	0.162623
CO_EXP	0.712146	0.179367	0.052318
TOPO	0.799929	0.025107	0.178668
TOPO_L2	0.84948	0.02905	0.062754
STRING	0.999322	0.276635	0.305434
GO_MF	1.314695	0.056948	0.490258
UNWEIGHTED	1.861188	0.051637	0.175425

Table 2: Log loss, Brier score loss, and PR AUC in terms of co-complex edge classification of all the weighting methods for the DIP composite network. This is the average over all the 10 cross-validation rounds.

The following figures represent the same information as the tables above, in visual form.

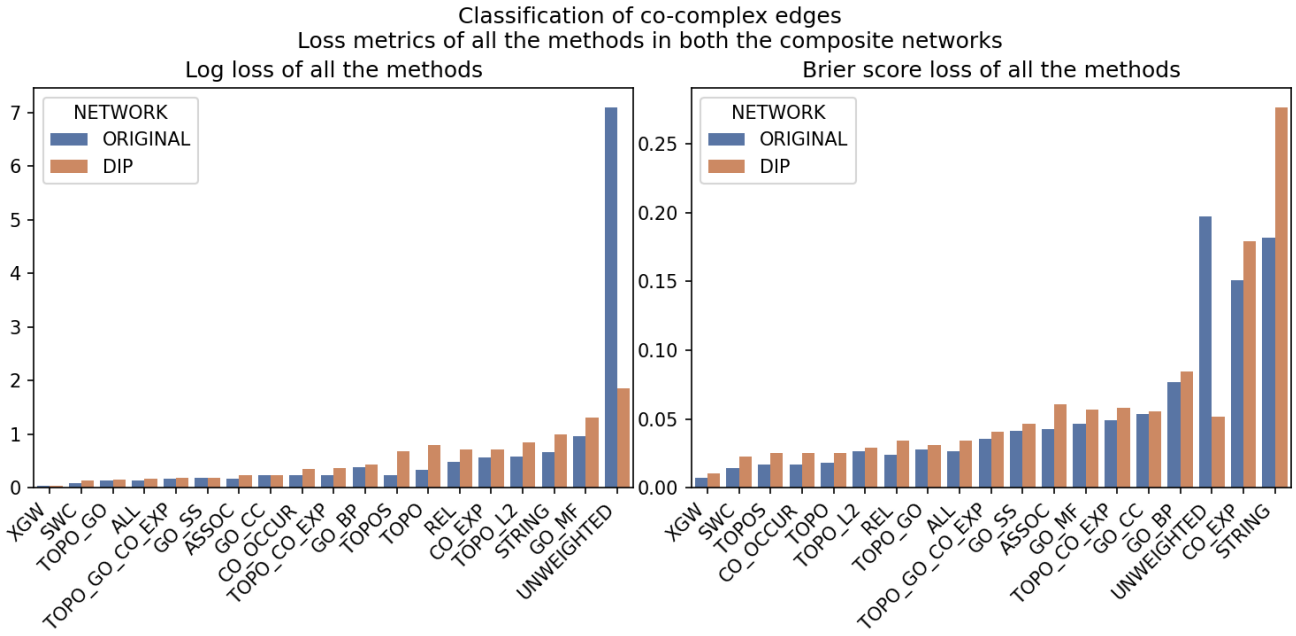

Figure 1: Log loss and Brier score loss in terms of co-complex edge classification of all the weighting methods for both the composite networks.

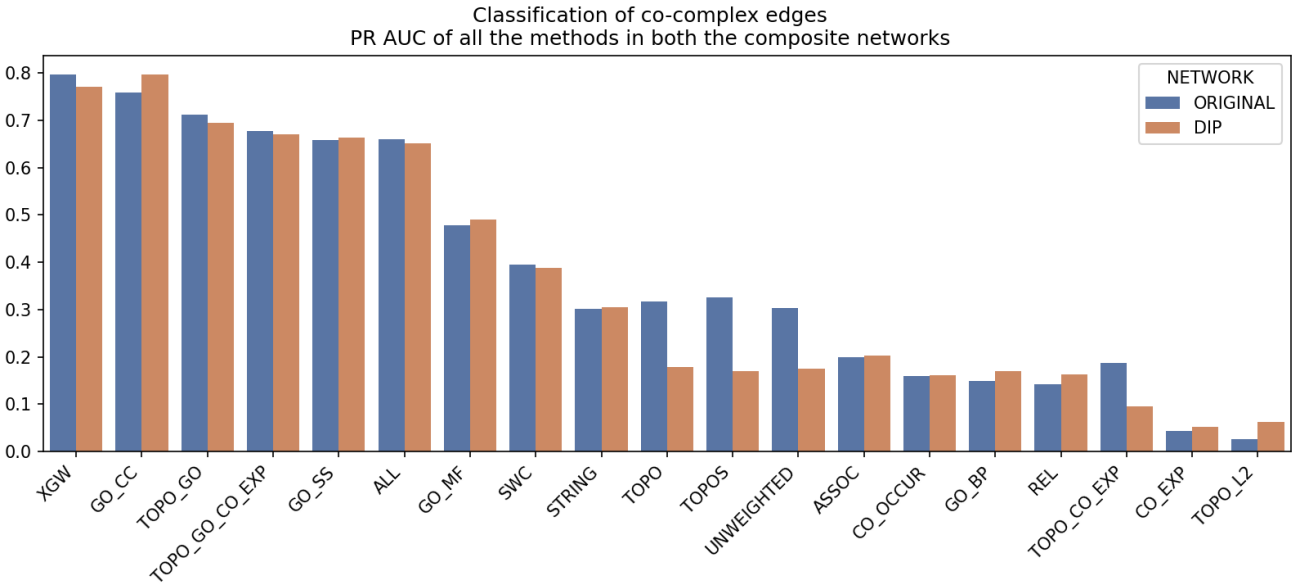

Figure 2: PR AUC in terms of co-complex edge classification of all the weighting methods for both the composite networks.

2 Predicting Protein Complexes

The precision-recall AUC was computed on four different scenarios:

- Using only the top 20,000 edges and with a $match\_thresh = 0.5$ (which is labeled as `20k_050` on the following tables and graphs)
- Using all the edges and with a $match\_thresh = 0.5$ (which is labeled as `all_050`)
- Using only the top 20,000 edges and with a $match\_thresh = 0.75$ (which is labeled as `20k_075`)
- Using all the edges and with a $match\_thresh = 0.75$ (which is labeled as `all_075`

The table below is for the Original composite network.

Method	20k_050	all_050	20k_075	all_075	Average PR AUC
XGW	0.564289	0.395487	0.304114	0.16273	0.356655
SWC	0.467077	0.352057	0.17576	0.106091	0.275246
ALL	0.425446	0.137824	0.227692	0.032936	0.205975
TOPO	0.340094	0.208123	0.138871	0.058823	0.186478
GO_CC	0.408002	0.075122	0.200898	0.028458	0.17812
TOPO_GO	0.380295	0.123212	0.182184	0.02421	0.177475
REL	0.296588	0.223923	0.10697	0.056461	0.170986
TOPO_GO_CO_EXP	0.321996	0.117246	0.164866	0.032179	0.159072
ASSOC	0.327108	0.099619	0.11802	0.02172	0.141617
TOPOS	0.254049	0.123872	0.085706	0.012537	0.119041
GO_SS	0.203038	0.080125	0.107233	0.024593	0.103747
STRING	0.187432	0.032827	0.076521	0.00193	0.074678
CO_OCCUR	0.132089	0.096246	0.037926	0.024022	0.072571
TOPO_CO_EXP	0.107748	0.046919	0.013709	0.012419	0.045199
GO_BP	0.042128	0.028931	0.009631	0.003659	0.021087
GO_MF	0.017482	0.029251	0.004526	0.002482	0.013435
UNWEIGHTED	0.009751	0.009751	0.003186	0.003186	0.006469
CO_EXP	0.0	0.002516	0.0	0.000014	0.000632
TOPO_L2	0.000405	0.000344	0.0	0.0	0.000187

Table 3: PR AUC of all the weighting methods in terms of predicting protein complexes on the Original composite network. This is the average over all the 10 cross-validation rounds and all the MCL inflation parameter settings.

The table below is for the DIP composite network.

Method	20k_050	all_050	20k_075	all_075	Average PR AUC
XGW	0.554903	0.408734	0.289238	0.175527	0.3571
SWC	0.424436	0.343329	0.164007	0.103815	0.258897
ALL	0.426124	0.162875	0.216814	0.032531	0.209586
REL	0.300828	0.245617	0.092446	0.076254	0.178786
GO_CC	0.356329	0.121791	0.200851	0.02053	0.174875
TOPO	0.252282	0.252282	0.076782	0.076782	0.164532
TOPO_GO_CO_EXP	0.309711	0.130596	0.14024	0.016769	0.149329
TOPO_GO	0.287989	0.137878	0.136231	0.019249	0.145337
ASSOC	0.323907	0.107954	0.116183	0.026464	0.143627
GO_SS	0.241409	0.109417	0.112664	0.016685	0.120044
TOPOS	0.179816	0.090441	0.034759	0.000378	0.076348
STRING	0.187012	0.032794	0.076369	0.00193	0.074526
CO_OCCUR	0.130482	0.096181	0.037492	0.024037	0.072048
UNWEIGHTED	0.094573	0.094573	0.02409	0.02409	0.059331
TOPO_CO_EXP	0.077152	0.035229	0.01718	0.00733	0.034223
GO_BP	0.058214	0.046297	0.017941	0.008684	0.032784
GO_MF	0.02551	0.041034	0.007128	0.007174	0.020211
TOPO_L2	0.009999	0.005127	0.000012	0.000003	0.003785
CO_EXP	0.0	0.001225	0.0	0.000006	0.000308

Table 4: PR AUC of all the weighting methods in terms of predicting protein complexes on the DIP composite network. This is the average over all the 10 cross-validation rounds and all the MCL inflation parameter settings.

The figure below represent the same information as the tables above, in visual form.

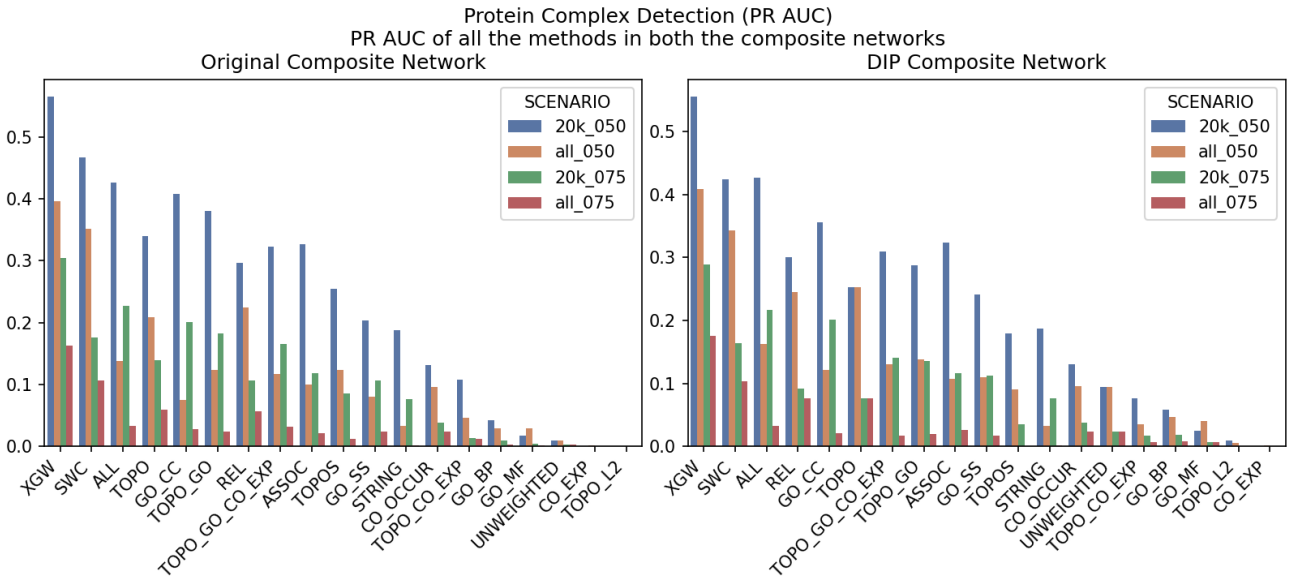

Figure 3: PR AUC of all the weighting methods in terms of predicting protein complexes on both the composite networks.