Table 1 The statistics of the datasets.

Dataset	Nodes	Edges	Features	Classes	Imb-ratio	Edge Hom.
chameleon	2277	31421	2325	5	0.74	0.23
squirrel	5201	198493	2089	5	0.43	0.22
snap-patents	2923922	13975788	269	5	0.9	0.07

Table 2 Node classification performance (Macro-F1, Micro-F1), The best and 2nd best are noted in red and blue, respectively.

	Chameleon		Squirrel		Snap-patents	
	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1
GPA	32.11 ± 2.60	29.71 ± 2.85	23.83 ± 0.61	15.30 ± 1.26	20.07 ± 0.20	19.12 ± 0.33
ALLIE	31.67 ± 2.76	29.07 ± 3.19	22.95 ± 0.60	14.95 ± 1.21	20.61± 0.25	19.87 ± 0.28
GraphCBAL	39.47 ± 2.30	37.65 ± 2.43	24.00 ± 0.68	16.02 ± 1.14	26.04 ± 0.55	22.59 ± 0.61
GraphCBAL++	40.72 ± 1.82	38.87 ± 2.34	23.09 ± 0.83	14.64 ± 1.35	25.17 ± 0.53	20.11 ± 1.05

Table 3 Imb-ratio and standard deviation of labeled nodes. The best and 2nd best are noted in red and blue, respectively.

	Chameleon		Squirrel		Snap-patents	
	Imb_ratio	Label_STD	Imb_ratio	Label_STD	Imb_ratio	Label_STD
GPA	0.41 ±0.08	6.8	0.02 ± 0.0	20.29	0.11 ± 0.0	117.15
ALLIE	0.41 ± 0.06	6.73	0.02 ± 0.0	20.04	0.10 ± 0.0	113.57
GraphCBAL	0.60 ± 0.09	3.37	0.21± 0.02	11.67	0.38± 0.06	69.15
GraphCBAL++	0.59 ±0.12	3.5	0.23± 0.02	10.49	0.28± 0.03	93.73

Table 4 Node classification performance (Macro-F1, Micro-F1), The best and 2nd best are noted in red and blue, respectively.

	Citeseer		Pubmed		Reddit		Co_CS		Co_Phy	
	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1	Micro-F1	Macro-F1
Random	70.96± 1.61	64.39± 1.69	77.55± 2.10	76.78 ± 2.03	92.35± 1.34	92.17± 1.31	90.27± 1.42	77.35± 5.21	90.76± 2.03	82.82± 4.86
AGE	72.21± 0.97	67.72± 1.14	80.13± 1.56	79.23 ± 1.64	92.66± 0.70	92.58± 0.70	92.87± 0.62	91.62± 1.03	92.82± 1.00	88.11± 1.69
ANRMA	70.74± 1.41	64.83± 2.20	77.14± 2.35	75.88 ± 2.50	91.10± 0.88	91.02± 0.86	92.55± 0.89	89.92± 3.15	90.79± 1.65	82.95± 4.02
ALG	70.63± 1.34	65.73± 1.41	79.09± 1.24	78.29 ± 2.47	91.92± 1.50	90.18± 2.09	90.92± 1.31	91.30± 1.51	89.57± 3.89	87.18± 2.73
Grain	70.50± 1.09	65.74± 1.13	78.33± 1.38	75.67 ± 2.05	92.39± 0.72	92.25± 0.76	90.45± 0.99	83.38± 2.24	92.17± 1.19	84.88± 2.43
GPA	72.16± 0.65	67.19± 0.98	80.13± 0.84	78.89 ± 0.85	92.81± 0.65	92.70± 0.66	92.93± 0.25	81.74± 1.01	91.99± 0.43	86.18± 0.75
ALLIE	72.74± 0.75	67.19± 1.04	79.2 ± 0.85	78.29 ± 0.88	92.73± 0.71	92.62± 0.73	93.28± 0.21	83.42± 0.87	89.87± 0.34	71.72± 0.47
GraphCBAL	72.50± 0.84	67.51± 1.14	81.76± 0.65	80.46 ± 0.86	93.64± 0.59	93.51± 0.64	94.32± 0.37	93.69± 0.44	94.59± 0.23	90.47± 0.41
GraphCBAL++	72.22± 0.90	67.11± 1.13	81.24± 0.65	80.11 ± 0.74	93.49± 0.52	93.33± 0.57	93.57± 0.42	93.19± 0.37	94.36± 0.27	90.26± 0.45

Table 5 Imb-ratio and standard deviation of labeled nodes. The best and 2nd best are noted in red and blue, respectively.

	Citeseer		Pubmed		Reddit		Co_CS		Co_Phy	
	Imb_ratio	Label_STD	Imb_ratio	Label_STD	Imb_ratio	Label_STD	Imb_ratio	Label_STD	Imb_ratio	Label_STD
Random	0.27± 0.10	5.46	0.50± 0.13	4.98	0.47± 0.1	1.99	0.03± 0.02	16.27	0.14± 0.05	15.51
AGE	0.46± 0.08	5.04	0.61± 0.13	2.93	0.26± 0.06	6.88	0.14± 0.04	7.72	0.50± 0.11	1.74
ANRMA	0.34± 0.11	5.24	0.47± 0.13	5.48	0.39± 0.09	4.72	0.08± 0.02	16.71	0.14± 0.06	15.52
ALG	0.61± 0.22	3.32	0.95± 5.54	1.33	0.73± 0.17	0.42	0.89± 0.04	0.28	0.90± 0.07	0.62
Grain	0.25± 0.07	7.61	0.43± 0.05	7.85	0.38± 0.35	5.79	0.06± 0.43	18.06	0.20± 0.01	12.57
GPA	0.34± 0.06	5.78	0.36± 0.03	7.47	0.47± 0.03	5.11	0.02± 0.01	13.51	0.06± 0.00	24.12
ALLIE	0.28± 0.06	6.12	0.45± 0.05	6.08	0.35± 0.04	6.52	0.02± 0.00	12.49	0.01± 0.00	25.47
GraphCBAL	0.45± 0.05	4.42	0.66± 0.06	3.31	0.47± 0.04	4.33	0.52± 0.03	3.6	0.61± 0.04	3.04
GraphCBAL++	0.57± 0.10	2.96	0.82± 0.05	1.72	0.66± 0.06	2.22	0.69± 0.04	2.08	0.81± 0.03	1.53

Table 6 The p-values between GraphCBAL and the comparing methods, including ALLIE and ALG.

	ALLIE					ALG				
	Citeseer	Pubmed	Reddit	Co-CS	Co-Phy	Citeseer	Pubmed	Reddit	Co-CS	Co-Phy
Micro-F1	1.50E-03	2.36E-30	2.36E-08	5.22E-36	1.81E-91	2.33E-11	3.52E-24	1.93E-11	3.10E-33	2.02E-14
Macro-F1	5.21E-01	1.33E-21	3.90E-07	1.53E-88	3.46E-132	2.73E-09	3.17E-15	2.27E-18	9.06E-19	2.50E-13
Imb_ratio	5.58E-30	3.54E-34	9.51E-04	3.22E-102	1.16E-100	9.13E-06	1.08E-43	8.22E-16	5.29E-74	1.96E-42