

Table I: Effectiveness and efficiency evaluation of minibatch LD² and baselines on new datasets. “Acc” is average ROC-AUC for minesweeper and tolokers, and test accuracy (%) for the remaining datasets. “Train” and “Infer” respectively refer to training and inference times (s). “Avg” is the average training time per epoch (ms). “RAM” and “GPU” respectively refer to peak RAM and GPU memory (GB).

Model	Dataset	Acc	Learn	Infer	Avg	RAM	GPU	Dataset	Acc	Learn	Infer	Avg	RAM	GPU
GCNJK-GS	cora	77.73±3.75	4.82	0.008	46.34	4.97	0.15	pubmed	81.93±0.89	10.77	0.011	95.33	5.05	0.99
MixHop-GS		77.09±0.80	12.15	0.008	67.18	4.97	0.30		85.45±0.13	40.31	0.013	120.98	5.09	0.97
LINKX		87.70±0.11	0.82	0.004	4.62	4.86	0.05		85.38±0.20	1.11	0.005	5.72	4.91	0.14
LD ²		85.45±0.42	0.07+0.94	0.001	7.40	5.11	0.09		89.09±0.32	0.04+2.15	0.004	25.33	5.20	0.08
GCNJK-GS	roman-empire	53.49±0.79	9.29	0.010	83.41	5.00	0.91	minesweeper	58.03±0.29	7.83	0.007	59.73	4.86	0.86
MixHop-GS		63.47±1.04	25.02	0.011	109.43	4.97	1.95		60.07±1.11	7.52	0.007	70.50	4.86	1.22
LINKX		49.74±0.56	0.81	0.006	5.31	4.90	0.19		50.96±1.55	0.71	0.004	5.90	4.86	0.07
LD ²		77.30±0.33	0.07+2.07	0.002	13.20	5.22	0.27		77.11±0.47	0.02+0.69	0.002	10.20	5.06	0.25
GCNJK-GS	amazon-ratings	40.58±0.32	31.04	0.010	118.77	5.00	1.98	tolokers	74.41±0.73	39.54	0.008	342.80	5.05	20.13
MixHop-GS		46.79±0.05	36.35	0.010	112.55	4.99	1.35		77.47±0.40	13.64	0.007	115.59	5.03	1.31
LINKX		51.97±0.14	2.34	0.013	9.00	4.91	0.19		77.74±0.13	3.41	0.061	26.59	4.96	0.09
LD ²		52.05±0.27	0.32+1.35	0.003	13.46	5.22	0.47		79.76±0.26	0.07+0.48	0.002	8.83	5.08	0.31

Table II: Effectiveness and efficiency evaluation of minibatch LD² and baselines on new datasets with fixed splits. “OOM” means the model occurs out of RAM memory (192GB) error with applicable hyperparameters.

Dataset	protein-inductive				yelp-inductive				ogbn-papers100m			
Model	Acc	Learn	Infer	RAM	Acc	Learn	Infer	RAM	Acc	Learn	Infer	RAM
GCN-GS	89.15	97.77	2.888	8.94	65.03	799.81	30.732	55.22	(OOM)			
PPRGo	48.33	7.40+33.37	0.816	6.98	26.25	6.29+130.37	18.315	9.88	(OOM)			
LD ²	90.87	0.48+3.86	0.270	5.20	61.63	3.21+2.90	1.908	8.64	49.56	123.15+52.60	4.690	105.32

Table III: Evaluation of new full-batch baselines with hidden dimensions 64 and 512 on datasets in the main experiment. “OOM” means the model occurs out of GPU memory (24GB) error with applicable hyperparameters.

Model	Dataset	Acc	Learn	Infer	Avg	RAM	GPU	Dataset	Acc	Learn	Infer	Avg	RAM	GPU
FSGNN-64	squirrel	60.34±1.19	0.17+5.39	0.00	10.80	5.21	0.81	genius	82.61±0.00	0.08+60.62	0.06	129.33	5.19	6.16
	penn94	74.28±0.10	2.31+16.41	0.05	92.27	7.84	13.55	arxiv-year	42.74±0.04	0.17+47.74	0.06	108.90	5.39	3.26
	twitch-gamers	60.97±0.03	0.19+45.55	0.12	91.10	5.53	2.77	pokec	(OOM)					
	snap-patents	(OOM)						wiki	(OOM)					
FSGNN-512	squirrel	54.34±6.50	0.17+6.45	0.01	16.90	5.22	1.19	genius	(OOM)					
	penn94	74.69±0.07	2.29+20.57	0.07	107.80	7.86	13.55	arxiv-year	42.09±0.12	0.16+46.36	0.07	110.67	5.39	19.84
	twitch-gamers	60.87±0.06	0.19+64.14	0.08	128.30	5.52	18.84	pokec	(OOM)					
	snap-patents	(OOM)						wiki	(OOM)					

Table IV: Performance of LD² with alternative adjacency embeddings on selected datasets. Particularly, $P_A = \text{ASE}(\mathbf{A}^2)$ indicates the proposed LD² model with adjacency spectral embedding denoted in Eq. (2). “OOM” means the model occurs out of RAM memory (192GB) error with applicable hyperparameters. “> 12h” means the model requires more than 12h clock time to produce proper results.

P_A	ASE($\mathbf{A}^2$)			ASE($\mathbf{A}$)			ASE($\mathbf{A}^3$)			node2vec			SPD		
Dataset	Acc	Pre.	RAM	Acc	Pre.	RAM	Acc	Pre.	RAM	Acc	Pre.	RAM	Acc	Pre.	RAM
squirrel	66.87	3.87	0.64	60.95	2.47	0.47	62.26	3594.90	0.61	50.19	1620.58	4.58	54.50	323.30	0.99
penn94	75.52	27.19	0.53	74.09	1.83	0.40	74.36	306.85	0.72	73.15	24654.00	22.82	>12h		
genius	85.31	0.79	0.60	84.68	0.63	0.58	84.56	293.28	0.62	(OOM)			>12h		

Table V: Performance of LD² with different noisy data on selected datasets. Particularly, $\delta_P = 10^{-5}$ is the original LD² model result presented in main experiments.

Noise Dataset	Push Threshold δ_P			Edge Removal			Attribute Noise		
	10^{-5}	10^{-6}	10^{-7}	10%	20%	40%	0.5σ	1σ	2σ
penn94	75.52	75.56	75.57	72.63	72.11	71.53	69.39	67.41	62.57
genius	85.31	85.29	85.16	84.98	84.77	84.30	81.29	81.22	81.18