β-GNN: A Robust Ensemble Approach Against Graph Structure Perturbation

Can we help GNNs recover from edge perturbations, without data cleaning?

Can we do it while assessing level of cleanliness/perturbance?

Yes! (but not as effective for all cases)

Model	MLP	GCN		GAT		GPRGNN	
	Vanilla	Vanilla	β-GNN	Vanilla	β-GNN	Vanilla	β-GNN
Cora-0	59.28 ± 2.03	80.36 ± 1.71	+1.57	80.00 ± 1.90	+1.45	82.41 ± 2.14	-1.21
Cora-1	60.72 ± 4.72	75.42 ± 1.90	+3.86	78.31 ± 1.50	-0.96	78.80 ± 2.62	+1.44
Cora-2	59.88 ± 2.61	69.64 ± 1.37	+4.82	72.29 ± 2.60	-2.05	74.22 ± 2.21	+1.68
Cora-3	59.76 ± 4.06	64.70 ± 1.80	+5.66	66.14 ± 2.87	+1.81	71.20 ± 2.98	+1.21
Cora-4	58.67 ± 3.11	60.12 ± 1.84	+3.37	60.24 ± 4.13	+0.84	66.39 ± 2.00	+3.37
Cora-5	60.24 ± 3.77	52.77 ± 1.68	+11.21	55.06 ± 3.73	+3.98	60.48 ± 3.63	+4.58
Pubmed-0	85.91 ± 0.42	90.22 ± 0.34	+2.31	89.95 ± 0.72	-0.65	91.40 ± 0.91	+0.48
Pubmed-1	85.59 ± 0.34	86.99 ± 0.87	+3.66	87.80 ± 0.72	+0.21	88.60 ± 0.83	+1.02
Pubmed-2	85.65 ± 0.36	85.38 ± 0.49	+3.38	85.00 ± 0.78	+1.45	86.40 ± 0.62	+1.25
Pubmed-3	85.54 ± 0.40	83.12 ± 0.58	+3.65	82.10 ± 1.60	+4.78	83.87 ± 0.95	+1.94
Pubmed-4	85.91 ± 0.34	76.45 ± 0.91	+8.55	79.35 ± 1.05	+5.92	80.81 ± 1.13	+2.25
Pubmed-5	85.75 ± 0.28	68.87 ± 1.23	+14.25	71.67 ± 1.43	+12.63	77.31 ± 0.71	+6.56

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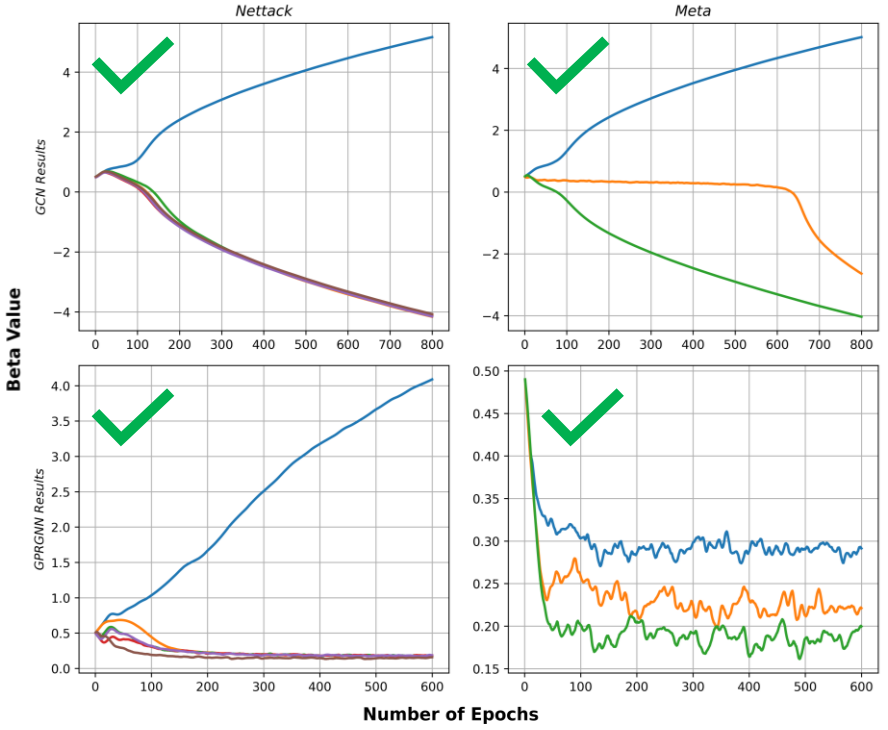

Failure case, the clean data is not distinguishable