Link Prediction Results

Results: Link Prediction

- Results with adjacency matrix(w/o node features).

Method	Cora		Citeseer		Pubmed		arXiv-condmat	
	AUC	AP	AUC	AP	AUC	AP	AUC	AP
SC	84.85 ± 1.15	87.69 ± 1.23	77.59 ± 0.76	80.20 ± 1.01	80.27 ± 0.21	80.05 ± 0.37	90.61 ± 0.38	91.17 ± 0.39
DW	81.40 ± 0.86	82.91 ± 1.30	78.11 ± 1.26	81.82 ± 1.05	86.41 ± 0.50	86.02 ± 0.50	92.75 ± 0.24	92.81 ± 0.27
GAE	84.64 ± 0.71	88.39 ± 0.42	78.55 ± 1.52	84.03 ± 1.13	82.03 ± 0.57	87.35 ± 0.41	93.10 ± 0.29	95.27 ± 0.16
VGAE	84.63 ± 1.38	88.24 ± 1.00	78.89 ± 1.58	83.90 ± 1.43	82.73 ± 0.46	87.61 ± 0.33	92.75 ± 0.52	94.93 ± 0.35
GAE-SimDiff	86.66 ± 1.52	**89.76 ± 1.30**	79.91 ± 1.48	84.84 ± 1.20	84.31 ± 0.52	88.79 ± 0.29	**93.28 ± 0.55**	**95.35 ± 0.35**
(n, α)	(3, 0.3)		(5, 0.1)		(5, 0.3)		(5, 0.1)	
VGAE-SimDiff	**86.86 ± 1.13**	89.66 ± 0.75	**80.38 ± 1.14**	**84.95 ± 0.90**	**84.76 ± 0.39**	**89.05 ± 0.31**	92.98 ± 0.28	95.19 ± 0.17
(n, α)	(4, 0.7)		(5, 0.5)		(4, 0.7)		(4, 0.1)	

Results: Link Prediction

- Results with adjacency matrix and node features.

Method	Cora		Citeseer		Pubmed		arXiv-condmat	
	AUC	AP	AUC	AP	AUC	AP	AUC	AP
GAE	91.05 ± 0.75	91.97 ± 0.75	89.44 ± 1.11	90.43 ± 1.43	**96.25 ± 0.27**	**96.41 ± 0.26**	**94.53 ± 0.37**	96.02 ± 0.25
VGAE	**92.11 ± 0.57**	93.08 ± 0.63	90.48 ± 0.97	91.65 ± 0.99	94.48 ± 0.40	94.65 ± 0.45	94.22 ± 0.29	95.73 ± 0.21
GAE-SimDiff	91.76 ± 1.00	92.95 ± 1.07	91.21 ± 0.50	92.08 ± 0.67	96.19 ± 0.27	96.29 ± 0.31	94.48 ± 0.38	**96.06 ± 0.25**
(n, α)	(1, 0.3)		(5, 0.1)		(1, 0.3)		(5, 0.1)	
VGAE-SimDiff	92.00 ± 0.69	**93.15 ± 0.62**	**90.88 ± 0.60**	**92.30 ± 0.40**	94.39 ± 0.57	94.58 ± 0.43	94.50 ± 0.40	95.94 ± 0.22
(n, α)	(1, 0.3)		(1, 0.1)		(1, 0.3)		(4, 0.1)	

GAE-SimDiff Link Prediction Results

(Network information only)

GAE-SimDiff Link Prediction Results

Cora, adjacency matrix only, link prediction										
n	1		2		3		4		5	
α	AUC	AP	AUC	AP	AUC	AP	AUC	AP	AUC	AP
0.1	84.67 ± 0.90	88.37 ± 0.59	84.34 ± 1.54	88.09 ± 1.30	85.46 ± 1.44	89.06 ± 1.06	85.65 ± 1.26	89.24 ± 1.11	85.66 ± 1.30	89.21 ± 0.79
0.3	85.42 ± 1.20	88.88 ± 0.96	85.87 ± 1.38	89.39 ± 1.03	**86.66 ± 1.52**	**89.76 ± 1.30**	86.41 ± 1.00	89.60 ± 0.92	86.31 ± 1.06	89.49 ± 0.93
0.5	84.64 ± 0.71	88.39 ± 0.42	85.44 ± 1.18	88.99 ± 0.95	85.94 ± 1.38	89.20 ± 1.05	86.50 ± 0.84	89.48 ± 0.88	86.65 ± 1.01	89.43 ± 0.87
0.7	84.83 ± 0.77	88.50 ± 0.87	85.85 ± 1.15	88.76 ± 1.03	86.15 ± 1.48	89.20 ± 1.30	86.07 ± 0.95	88.95 ± 0.93	85.92 ± 1.19	88.95 ± 0.80
0.9	84.26 ± 1.03	88.16 ± 0.74	86.09 ± 1.06	89.13 ± 0.79	85.22 ± 1.52	88.46 ± 1.11	86.31 ± 0.97	89.04 ± 0.72	86.63 ± 1.41	89.49 ± 1.12

GAE-SimDiff Link Prediction Results

Citeseer, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	78.51 ± 1.38	83.75 ± 0.83	79.10 ± 1.15	84.45 ± 0.75	78.33 ± 1.31	83.76 ± 1.12	79.40 ± 1.39	84.68 ± 0.89	**79.91 ± 1.48**	**84.84 ± 1.20**
0.3	78.23 ± 1.09	83.63 ± 0.88	77.01 ± 1.34	82.85 ± 1.06	79.47 ± 1.37	84.81 ± 1.02	79.19 ± 1.16	84.66 ± 0.73	79.14 ± 2.30	84.38 ± 1.68
0.5	78.55 ± 1.52	84.03 ± 1.13	78.43 ± 1.16	84.04 ± 0.73	79.03 ± 1.31	84.35 ± 1.15	79.25 ± 1.09	84.63 ± 0.91	79.16 ± 0.99	84.44 ± 1.04
0.7	77.91 ± 1.71	83.47 ± 1.46	78.50 ± 1.56	84.13 ± 1.20	78.41 ± 1.62	83.60 ± 1.38	79.10 ± 1.26	84.55 ± 1.10	79.27 ± 1.68	84.61 ± 1.25
0.9	78.03 ± 1.10	83.51 ± 0.73	78.97 ± 1.55	84.25 ± 1.30	79.36 ± 1.47	84.79 ± 1.10	78.36 ± 2.48	84.01 ± 1.85	79.51 ± 1.20	84.68 ± 1.08

GAE-SimDiff Link Prediction Results

Pubmed, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	81.26 ± 0.65	86.60 ± 0.47	82.53 ± 0.38	87.50 ± 0.24	83.13 ± 0.74	87.93 ± 0.47	83.20 ± 0.35	87.89 ± 0.28	83.77 ± 0.42	88.21 ± 0.23
0.3	82.04 ± 0.41	87.35 ± 0.35	83.23 ± 0.48	88.11 ± 0.32	83.66 ± 0.33	88.45 ± 0.22	84.06 ± 0.38	88.68 ± 0.25	**84.31 ± 0.52**	**88.79 ± 0.29**
0.5	82.03 ± 0.57	87.35 ± 0.41	83.31 ± 0.53	88.34 ± 0.38	83.92 ± 0.88	88.62 ± 0.45	83.70 ± 0.38	88.51 ± 0.33	84.16 ± 0.61	88.70 ± 0.42
0.7	82.57 ± 0.54	87.66 ± 0.48	83.40 ± 0.45	88.49 ± 0.26	83.86 ± 0.39	88.75 ± 0.28	84.15 ± 0.51	88.92 ± 0.33	84.21 ± 0.60	88.86 ± 0.41
0.9	82.47 ± 0.38	87.62 ± 0.25	83.04 ± 0.51	88.12 ± 0.29	83.75 ± 0.71	88.61 ± 0.41	83.87 ± 0.66	88.56 ± 0.46	84.10 ± 0.52	88.74 ± 0.38

GAE-SimDiff Link Prediction Results

arXiv-condmat, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	93.00 ± 0.42	95.13 ± 0.32	93.08 ± 0.43	95.23 ± 0.25	92.63 ± 0.41	94.95 ± 0.24	93.09 ± 0.38	95.20 ± 0.28	**93.28 ± 0.55**	**95.35 ± 0.35**
0.3	93.21 ± 0.51	95.32 ± 0.33	92.81 ± 0.36	95.03 ± 0.23	93.05 ± 0.50	95.15 ± 0.37	93.05 ± 0.32	95.04 ± 0.28	93.03 ± 0.51	95.06 ± 0.34
0.5	93.10 ± 0.29	95.27 ± 0.16	92.81 ± 0.37	94.97 ± 0.25	92.68 ± 0.33	94.85 ± 0.21	93.08 ± 0.45	95.04 ± 0.36	92.84 ± 0.48	94.91 ± 0.37
0.7	92.61 ± 0.50	94.90 ± 0.37	92.97 ± 0.45	95.03 ± 0.29	92.85 ± 0.45	94.91 ± 0.33	92.72 ± 0.45	94.76 ± 0.28	92.76 ± 0.43	94.76 ± 0.38
0.9	92.99 ± 0.46	95.10 ± 0.28	92.86 ± 0.41	94.93 ± 0.31	93.11 ± 0.42	95.06 ± 0.25	92.80 ± 0.31	94.78 ± 0.28	92.94 ± 0.53	94.82 ± 0.42

VGAE-SimDiff Link Prediction Results

(Network information only)

VGAE-SimDiff Link Prediction Results

Cora, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	83.55 ± 0.83	87.18 ± 0.96	84.62 ± 1.21	88.10 ± 0.83	85.33 ± 0.97	88.69 ± 0.97	85.03 ± 1.35	88.37 ± 1.12	86.30 ± 0.96	89.67 ± 0.75
0.3	85.42 ± 0.88	89.01 ± 0.79	85.28 ± 1.02	88.80 ± 0.51	86.42 ± 0.92	89.56 ± 0.86	86.51 ± 1.03	89.31 ± 0.60	86.59 ± 1.14	89.55 ± 0.88
0.5	**84.63 ± 1.38**	**88.24 ± 1.00**	85.56 ± 0.70	88.90 ± 0.47	86.12 ± 1.33	89.15 ± 0.88	86.73 ± 1.02	89.49 ± 0.75	86.10 ± 1.10	88.89 ± 0.95
0.7	84.99 ± 1.22	88.41 ± 0.67	85.74 ± 0.78	89.15 ± 0.55	86.47 ± 1.06	89.41 ± 0.87	**86.86 ± 1.13**	**89.66 ± 0.75**	86.96 ± 0.60	89.44 ± 0.82
0.9	85.19 ± 1.18	88.62 ± 1.06	86.60 ± 1.52	89.60 ± 1.03	86.38 ± 0.98	88.94 ± 1.08	86.55 ± 0.87	89.15 ± 0.85	86.39 ± 1.15	88.91 ± 1.01

VGAE-SimDiff Link Prediction Results

Citeseer, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	77.31 ± 2.11	82.61 ± 1.69	79.13 ± 1.58	84.04 ± 1.24	78.62 ± 1.77	84.06 ± 1.17	79.16 ± 1.40	84.22 ± 1.14	79.19 ± 2.20	84.22 ± 1.51
0.3	79.00 ± 1.72	84.13 ± 1.31	78.90 ± 1.58	84.04 ± 1.14	79.93 ± 1.64	84.88 ± 1.34	78.66 ± 1.51	83.90 ± 1.09	79.72 ± 1.25	84.61 ± 0.72
0.5	**78.89 ± 1.58**	**83.90 ± 1.43**	77.70 ± 1.74	83.07 ± 1.37	79.75 ± 1.16	84.72 ± 0.70	80.20 ± 0.88	85.00 ± 0.83	**80.38 ± 1.14**	**84.95 ± 0.90**
0.7	77.73 ± 1.93	83.08 ± 1.58	79.04 ± 1.77	84.26 ± 1.38	79.22 ± 0.79	84.16 ± 0.73	79.22 ± 1.97	83.97 ± 1.60	79.65 ± 1.54	84.68 ± 0.98
0.9	78.85 ± 1.44	83.86 ± 1.11	77.98 ± 0.86	83.34 ± 0.73	79.27 ± 1.65	84.16 ± 1.22	78.98 ± 1.20	84.18 ± 0.89	78.62 ± 1.31	83.60 ± 0.81

VGAE-SimDiff Link Prediction Results

Pubmed, adjacency matrix only, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	81.43 ± 0.51	86.37 ± 0.41	83.20 ± 0.61	87.54 ± 0.44	83.60 ± 0.43	87.94 ± 0.35	83.86 ± 0.44	87.96 ± 0.38	84.27 ± 0.37	88.26 ± 0.30
0.3	82.52 ± 0.39	87.29 ± 0.30	83.73 ± 0.37	88.21 ± 0.23	84.43 ± 0.60	88.70 ± 0.37	84.54 ± 0.55	88.75 ± 0.38	84.75 ± 0.36	88.81 ± 0.29
0.5	**82.73 ± 0.46**	**87.61 ± 0.33**	83.92 ± 0.64	88.45 ± 0.41	84.39 ± 0.33	88.80 ± 0.25	84.74 ± 0.38	89.04 ± 0.24	84.58 ± 0.63	88.94 ± 0.38
0.7	82.55 ± 0.57	87.50 ± 0.38	83.77 ± 0.37	88.36 ± 0.40	84.29 ± 0.65	88.71 ± 0.43	**84.76 ± 0.39**	**89.05 ± 0.31**	84.55 ± 0.61	88.85 ± 0.49
0.9	82.43 ± 0.47	87.36 ± 0.29	83.88 ± 0.46	88.48 ± 0.24	83.90 ± 0.51	88.52 ± 0.30	84.40 ± 0.58	88.74 ± 0.33	84.27 ± 0.50	88.59 ± 0.40

VGAE-SimDiff Link Prediction Results

arXiv-condmat, adjacency matrix only, link prediction										
n	1		2		3		4		5	
α	AUC	AP	AUC	AP	AUC	AP	AUC	AP	AUC	AP
0.1	92.67 ± 0.49	94.89 ± 0.34	92.94 ± 0.44	95.16 ± 0.29	92.73 ± 0.55	94.93 ± 0.40	**92.98 ± 0.28**	**95.19 ± 0.17**	93.02 ± 0.46	95.13 ± 0.25
0.3	92.89 ± 0.50	95.08 ± 0.33	92.87 ± 0.70	95.03 ± 0.43	92.92 ± 0.39	95.01 ± 0.32	92.83 ± 0.54	94.81 ± 0.44	93.04 ± 0.49	94.97 ± 0.37
0.5	**92.75 ± 0.52**	**94.93 ± 0.35**	93.08 ± 0.39	95.09 ± 0.25	92.99 ± 0.31	94.96 ± 0.26	92.90 ± 0.59	94.85 ± 0.43	92.79 ± 0.52	94.70 ± 0.40
0.7	92.91 ± 0.61	94.98 ± 0.39	92.93 ± 0.31	94.96 ± 0.26	92.61 ± 0.55	94.63 ± 0.42	92.60 ± 0.54	94.52 ± 0.40	92.55 ± 0.42	94.36 ± 0.32
0.9	92.79 ± 0.55	94.96 ± 0.40	92.76 ± 0.33	94.78 ± 0.15	92.77 ± 0.54	94.72 ± 0.37	92.53 ± 0.39	94.56 ± 0.25	92.58 ± 0.73	94.42 ± 0.58

GAE-SimDiff Link Prediction Results

(Network information + node feature)

GAE-SimDiff Link Prediction Results

Cora, adjacency matrix + node feature, link prediction										
n	1		2		3		4		5	
α	AUC	AP	AUC	AP	AUC	AP	AUC	AP	AUC	AP
0.1	90.83 ± 0.65	91.97 ± 0.74	91.48 ± 1.06	92.60 ± 0.70	91.14 ± 0.86	92.62 ± 0.72	90.80 ± 0.80	92.18 ± 0.76	90.13 ± 3.03	91.19 ± 3.22
0.3	**91.76 ± 1.00**	**92.95 ± 1.07**	90.86 ± 0.60	92.06 ± 0.73	90.87 ± 0.69	92.02 ± 0.87	90.49 ± 0.97	91.90 ± 0.60	90.12 ± 0.87	91.67 ± 0.81
0.5	91.05 ± 0.75	91.97 ± 0.75	90.76 ± 0.59	92.46 ± 0.76	90.30 ± 0.76	91.65 ± 0.90	90.06 ± 1.22	91.51 ± 1.53	90.27 ± 0.92	91.47 ± 1.02
0.7	90.93 ± 0.90	92.10 ± 0.90	90.63 ± 1.58	92.03 ± 1.83	89.94 ± 1.49	91.35 ± 1.62	89.85 ± 1.03	91.30 ± 1.17	90.26 ± 1.30	91.33 ± 1.14
0.9	91.40 ± 0.77	92.56 ± 0.67	90.13 ± 0.87	91.61 ± 0.86	89.81 ± 1.03	91.08 ± 1.12	90.26 ± 0.93	91.58 ± 0.95	89.54 ± 0.95	91.05 ± 0.69

GAE-SimDiff Link Prediction Results

Citeseer, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	90.33 ± 1.08	91.06 ± 0.96	90.54 ± 0.95	91.59 ± 1.02	90.98 ± 1.19	91.91 ± 1.24	90.18 ± 1.06	91.06 ± 0.95	**91.21 ± 0.50**	**92.08 ± 0.67**
0.3	90.52 ± 1.16	91.34 ± 1.03	90.52 ± 1.26	91.25 ± 1.31	89.12 ± 0.99	89.60 ± 1.40	89.07 ± 1.43	90.08 ± 1.64	89.44 ± 1.55	90.21 ± 1.50
0.5	89.44 ± 1.11	90.43 ± 1.43	89.85 ± 1.36	90.70 ± 1.68	89.08 ± 1.18	90.24 ± 1.28	89.26 ± 1.23	90.18 ± 1.12	88.85 ± 1.73	89.91 ± 1.79
0.7	89.20 ± 1.54	89.79 ± 1.89	88.78 ± 1.46	89.79 ± 1.28	88.98 ± 1.14	89.93 ± 1.62	88.94 ± 1.43	89.94 ± 1.48	88.51 ± 1.61	89.17 ± 1.85
0.9	89.71 ± 0.87	90.36 ± 1.16	88.65 ± 1.64	89.38 ± 2.13	88.43 ± 1.22	89.61 ± 1.14	88.11 ± 0.80	89.34 ± 0.82	88.87 ± 1.14	89.89 ± 1.06

GAE-SimDiff Link Prediction Results

Pubmed, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	95.60 ± 0.25	95.44 ± 0.26	95.64 ± 0.20	95.57 ± 0.32	95.55 ± 0.25	95.47 ± 0.30	95.32 ± 0.29	95.31 ± 0.31	95.29 ± 0.09	95.23 ± 0.13
0.3	**96.19 ± 0.27**	**96.29 ± 0.31**	95.98 ± 0.20	96.10 ± 0.25	95.79 ± 0.23	95.98 ± 0.20	95.39 ± 0.39	95.63 ± 0.42	95.21 ± 0.29	95.47 ± 0.29
0.5	96.26 ± 0.27	96.41 ± 0.26	95.84 ± 0.18	96.12 ± 0.15	95.83 ± 0.27	96.08 ± 0.24	95.42 ± 0.27	95.74 ± 0.27	94.99 ± 0.25	95.32 ± 0.23
0.7	95.99 ± 0.22	96.15 ± 0.25	95.73 ± 0.30	96.07 ± 0.28	95.41 ± 0.28	95.68 ± 0.28	95.07 ± 0.28	95.43 ± 0.31	94.81 ± 0.34	95.11 ± 0.39
0.9	95.52 ± 0.30	95.68 ± 0.33	95.38 ± 0.27	95.66 ± 0.26	95.12 ± 0.30	95.38 ± 0.22	94.85 ± 0.31	95.20 ± 0.30	94.70 ± 0.39	95.07 ± 0.34

GAE-SimDiff Link Prediction Results

arXiv-condmat, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	94.14 ± 0.59	95.72 ± 0.45	94.32 ± 0.27	95.94 ± 0.23	94.43 ± 0.39	96.04 ± 0.28	94.34 ± 0.47	95.95 ± 0.30	**94.48 ± 0.38**	**96.06 ± 0.25**
0.3	94.34 ± 0.46	95.95 ± 0.32	94.28 ± 0.41	95.85 ± 0.31	94.47 ± 0.46	96.02 ± 0.29	94.18 ± 0.39	95.82 ± 0.28	94.35 ± 0.35	95.87 ± 0.23
0.5	94.53 ± 0.37	96.02 ± 0.25	94.32 ± 0.45	95.90 ± 0.29	94.17 ± 0.34	95.77 ± 0.20	94.14 ± 0.45	95.76 ± 0.34	94.16 ± 0.40	95.67 ± 0.27
0.7	94.52 ± 0.30	96.01 ± 0.24	94.19 ± 0.30	95.76 ± 0.22	94.26 ± 0.42	95.75 ± 0.29	94.08 ± 0.26	95.62 ± 0.22	94.05 ± 0.38	95.47 ± 0.32
0.9	94.23 ± 0.37	95.82 ± 0.29	94.02 ± 0.32	95.62 ± 0.23	94.07 ± 0.38	95.60 ± 0.29	94.07 ± 0.32	95.61 ± 0.21	93.66 ± 0.43	95.22 ± 0.26

VGAE-SimDiff Link Prediction Results

(Network information + node feature)

VGAE-SimDiff Link Prediction Results

Cora, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	91.48 ± 0.48	92.58 ± 0.61	91.28 ± 0.86	92.35 ± 0.78	91.72 ± 0.88	92.76 ± 0.85	91.48 ± 0.95	92.37 ± 0.69	91.50 ± 0.82	92.72 ± 0.80
0.3	**92.00 ± 0.69**	**93.15 ± 0.62**	91.58 ± 0.60	92.82 ± 0.63	90.88 ± 0.73	92.14 ± 0.72	91.17 ± 1.00	92.33 ± 1.05	91.47 ± 0.93	92.62 ± 0.89
0.5	**92.11 ± 0.57**	**93.08 ± 0.63**	91.10 ± 0.77	92.20 ± 0.75	90.68 ± 0.75	91.81 ± 0.83	90.89 ± 1.02	91.95 ± 0.82	90.65 ± 0.84	91.75 ± 0.95
0.7	91.88 ± 1.09	92.58 ± 1.21	90.79 ± 0.75	91.80 ± 0.58	90.09 ± 1.18	91.45 ± 1.26	89.81 ± 1.02	91.02 ± 1.11	90.33 ± 0.88	91.29 ± 0.84
0.9	91.42 ± 0.93	92.29 ± 0.82	90.23 ± 1.15	91.17 ± 1.17	90.75 ± 1.07	91.71 ± 1.06	90.62 ± 0.89	91.62 ± 0.73	89.68 ± 0.69	90.72 ± 0.88

VGAE-SimDiff Link Prediction Results

Citeseer, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	**90.88 ± 0.60**	**92.30 ± 0.40**	90.71 ± 1.06	91.94 ± 0.99	90.35 ± 0.91	91.32 ± 0.84	90.30 ± 1.30	91.43 ± 1.24	90.03 ± 1.26	91.38 ± 1.19
0.3	90.63 ± 1.10	91.87 ± 1.34	90.44 ± 1.12	91.87 ± 0.99	90.65 ± 0.99	91.99 ± 0.76	90.00 ± 0.94	91.53 ± 0.90	89.64 ± 0.81	91.07 ± 0.72
0.5	**90.48 ± 0.97**	**91.65 ± 0.99**	89.96 ± 0.80	91.08 ± 0.99	89.31 ± 0.78	90.72 ± 0.65	89.48 ± 1.37	91.03 ± 1.31	88.82 ± 0.92	90.52 ± 1.06
0.7	90.42 ± 1.07	91.51 ± 1.17	90.58 ± 0.83	91.75 ± 1.02	89.52 ± 1.29	90.73 ± 0.99	89.91 ± 0.85	91.14 ± 0.90	88.63 ± 1.33	90.16 ± 1.31
0.9	90.70 ± 1.10	92.00 ± 1.11	89.44 ± 0.81	90.81 ± 0.75	89.65 ± 1.13	90.96 ± 1.16	89.14 ± 1.01	90.52 ± 1.00	88.38 ± 1.20	89.91 ± 0.99

VGAE-SimDiff Link Prediction Results

Pubmed, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	92.67 ± 0.77	92.37 ± 0.75	92.59 ± 1.29	92.43 ± 1.23	91.93 ± 1.29	91.91 ± 1.25	92.55 ± 0.93	92.57 ± 0.98	91.97 ± 1.18	92.05 ± 1.09
0.3	**94.39 ± 0.57**	**94.58 ± 0.43**	93.48 ± 0.96	93.88 ± 0.85	93.46 ± 0.90	93.80 ± 0.83	93.38 ± 0.96	93.80 ± 0.81	92.28 ± 1.04	92.84 ± 0.97
0.5	**94.48 ± 0.40**	**94.65 ± 0.45**	93.92 ± 0.94	94.22 ± 0.85	93.99 ± 0.83	94.41 ± 0.74	93.45 ± 1.00	93.89 ± 0.80	92.95 ± 1.22	93.45 ± 1.10
0.7	93.94 ± 1.01	94.29 ± 0.92	93.69 ± 1.16	94.07 ± 1.09	93.67 ± 1.18	94.09 ± 1.02	92.88 ± 1.27	93.40 ± 1.16	92.40 ± 1.04	92.99 ± 0.96
0.9	93.02 ± 1.19	93.37 ± 1.07	93.19 ± 1.10	93.53 ± 1.02	93.43 ± 1.13	93.83 ± 1.09	92.69 ± 0.86	93.23 ± 0.78	92.06 ± 0.82	92.61 ± 0.62

VGAE-SimDiff Link Prediction Results

arXiv-condmat, adjacency matrix + node feature, link prediction										
n	**1**		**2**		**3**		**4**		**5**	
α	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**	**AUC**	**AP**
0.1	94.20 ± 0.38	95.68 ± 0.32	94.51 ± 0.35	95.91 ± 0.23	94.46 ± 0.50	95.88 ± 0.38	**94.50 ± 0.40**	**95.94 ± 0.22**	94.35 ± 0.47	95.78 ± 0.41
0.3	94.42 ± 0.29	95.87 ± 0.22	94.28 ± 0.30	95.77 ± 0.24	94.17 ± 0.37	95.66 ± 0.30	94.17 ± 0.37	95.55 ± 0.34	94.05 ± 0.37	95.48 ± 0.31
0.5	**94.22 ± 0.29**	**95.73 ± 0.21**	94.18 ± 0.44	95.71 ± 0.34	93.98 ± 0.49	95.35 ± 0.42	93.88 ± 0.45	95.25 ± 0.34	93.90 ± 0.38	95.26 ± 0.36
0.7	94.16 ± 0.25	95.57 ± 0.19	94.19 ± 0.47	95.61 ± 0.26	93.84 ± 0.36	95.25 ± 0.27	93.85 ± 0.35	95.24 ± 0.32	93.92 ± 0.39	95.24 ± 0.21
0.9	94.30 ± 0.38	95.75 ± 0.27	93.98 ± 0.37	95.49 ± 0.31	94.08 ± 0.39	95.43 ± 0.30	93.80 ± 0.33	95.14 ± 0.32	93.86 ± 0.58	95.09 ± 0.50

Classification Results

Classification Results

Methods	Cora	Citeseer	Pubmed	arXiv-condmat
LogReg	74.73 ± 0.72	71.27 ± 0.95	85.15 ± 0.34	66.88 ± 0.58
MLP	72.94 ± 0.94	69.41 ± 0.77	85.16 ± 0.50	63.58 ± 0.40
GCN	86.25 ± 0.64	72.65 ± 0.93	87.27 ± 0.23	68.78 ± 0.50
GCN-Simdiff	**87.20 ± 0.95**	**73.71 ± 0.95**	**88.77 ± 0.26**	**71.84 ± 0.35**
(n, α)	(3, 0.3)	(1, 0.1)	(2, 0.1)	(1, 0.1)

GCN-SimDiff Classification Results

Cora, Classification					
α \ n	**1**	**2**	**3**	**4**	**5**
0.1	84.80 ± 0.93	86.36 ± 0.77	86.56 ± 0.71	86.76 ± 0.75	86.92 ± 0.75
0.3	86.29 ± 0.34	86.81 ± 0.36	**87.20 ± 0.95**	87.02 ± 0.73	86.97 ± 0.62
0.5	86.25 ± 0.64	86.08 ± 0.71	87.01 ± 1.21	86.97 ± 1.05	86.72 ± 0.80
0.7	86.47 ± 0.81	86.52 ± 0.55	86.64 ± 0.73	86.37 ± 0.89	86.50 ± 0.73
0.9	85.91 ± 0.57	86.75 ± 0.42	86.43 ± 0.93	86.08 ± 1.07	86.22 ± 0.78

GCN-SimDiff Classification Results

Citeseer, Classification					
α \ n	**1**	**2**	**3**	**4**	**5**
0.1	**73.71 ± 0.95**	72.81 ± 0.89	73.02 ± 0.84	72.84 ± 0.71	72.12 ± 0.98
0.3	73.32 ± 0.63	72.46 ± 0.63	72.81 ± 1.22	72.94 ± 0.94	72.36 ± 0.96
0.5	72.65 ± 0.93	72.28 ± 0.66	72.60 ± 0.83	72.70 ± 0.64	72.94 ± 0.75
0.7	73.25 ± 0.69	72.40 ± 0.69	73.10 ± 1.32	73.32 ± 0.83	73.00 ± 0.93
0.9	72.63 ± 0.99	72.01 ± 1.01	72.55 ± 0.60	72.69 ± 1.11	72.68 ± 0.99

GCN-SimDiff Classification Results

Pubmed, Classification					
α \ n	**1**	**2**	**3**	**4**	**5**
0.1	88.56 ± 0.32	**88.77 ± 0.26**	88.48 ± 0.42	87.87 ± 0.26	87.53 ± 0.20
0.3	88.50 ± 0.30	86.98 ± 0.28	85.61 ± 0.32	84.62 ± 0.28	83.71 ± 0.28
0.5	87.27 ± 0.23	85.21 ± 0.22	83.90 ± 0.20	83.35 ± 0.31	82.88 ± 0.36
0.7	85.90 ± 0.22	84.13 ± 0.31	83.40 ± 0.23	82.78 ± 0.38	82.55 ± 0.31
0.9	84.88 ± 0.26	84.18 ± 0.34	83.34 ± 0.25	82.74 ± 0.24	82.17 ± 0.29

GCN-SimDiff Classification Results

arXiv-condmat, Classification					
α \ n	**1**	**2**	**3**	**4**	**5**
0.1	**71.84 ± 0.35**	71.05 ± 0.31	69.80 ± 0.67	69.17 ± 0.34	68.62 ± 0.32
0.3	69.40 ± 0.44	68.19 ± 0.64	67.56 ± 0.43	67.00 ± 0.50	66.70 ± 0.42
0.5	68.78 ± 0.50	67.58 ± 0.71	66.86 ± 0.54	66.11 ± 0.73	65.94 ± 0.58
0.7	69.16 ± 0.50	67.53 ± 0.46	66.67 ± 0.49	65.75 ± 0.63	65.36 ± 0.43
0.9	68.47 ± 0.44	67.45 ± 0.60	66.53 ± 0.52	65.37 ± 0.49	64.71 ± 0.37

Parameters Optimization

- Parameters which showed best result in simplified diffusion experiments.

Task	Link Prediction								Classification	
Method	GAE-SimDiff (w/o node feature)		VGAE-SimDiff (w/o node feature)		GAE-SimDiff		VGAE-SimDiff		GCN-SimDiff	
	n	α	n	α	n	α	n	α	n	α
Cora	5	0.3	4	0.7	3	0.1	1	0.5	3	0.3
Citeseer	4	0.3	5	0.5	4	0.1	1	0.1	1	0.1
Pubmed	5	0.5	4	0.7	1	0.5	1	0.5	2	0.1
arXiv-condmat	5	0.1	4	0.1	3	0.1	4	0.1	1	0.1

n-th Order Expansion Method Results(Appendix)

n-th Order Expansion Method Results(Appendix)

Cora, adjacency matrix + node feature, link prediction, GAE										
n	1		2		3		4		5	
α	AUC	AP	AUC	AP	AUC	AP	AUC	AP	AUC	AP
0.1	84.44 ± 1.15	85.77 ± 1.32	82.91 ± 2.06	82.73 ± 2.09	72.75 ± 8.42	72.74 ± 8.15	63.93 ± 5.10	64.09 ± 5.37	58.78 ± 2.65	59.01 ± 2.30
0.3	87.24 ± 1.31	88.51 ± 1.50	81.38 ± 7.72	82.22 ± 7.03	70.26 ± 7.07	70.76 ± 6.48	57.94 ± 6.14	58.10 ± 6.44	59.29 ± 5.24	59.42 ± 4.86
0.5	87.79 ± 1.17	88.91 ± 0.78	81.88 ± 7.51	82.70 ± 6.58	68.61 ± 8.43	69.53 ± 8.65	60.16 ± 8.14	61.38 ± 7.95	54.14 ± 4.16	54.07 ± 4.22
0.7	87.96 ± 1.16	88.92 ± 1.34	80.22 ± 7.92	80.77 ± 7.39	66.97 ± 11.66	68.61 ± 11.32	59.88 ± 5.53	60.24 ± 5.73	55.66 ± 3.82	56.52 ± 4.68
0.9	88.51 ± 1.39	89.34 ± 1.81	81.69 ± 6.82	82.64 ± 6.04	61.54 ± 9.20	62.35 ± 9.41	61.82 ± 6.03	62.89 ± 6.80	52.96 ± 2.75	53.35 ± 3.41

n-th Order Expansion Method Results(Appendix)

Cora, adjacency matrix + node feature, link prediction, VGAE										
n	1		2		3		4		5	
α	AUC	AP	AUC	AP	AUC	AP	AUC	AP	AUC	AP
0.1	89.74 ± 0.67	90.45 ± 0.73	83.05 ± 3.34	83.09 ± 3.30	71.00 ± 6.81	70.21 ± 6.64	65.42 ± 8.34	64.65 ± 8.15	65.64 ± 8.56	62.39 ± 7.24
0.3	90.12 ± 0.85	91.15 ± 0.84	84.00 ± 3.15	84.47 ± 3.43	77.61 ± 4.48	77.42 ± 5.13	68.07 ± 8.73	67.66 ± 9.08	53.35 ± 4.63	51.88 ± 2.70
0.5	90.43 ± 0.82	91.46 ± 0.67	87.02 ± 2.19	87.67 ± 2.66	76.08 ± 9.63	76.14 ± 9.82	68.27 ± 12.08	66.60 ± 12.89	60.25 ± 11.08	58.23 ± 10.42
0.7	89.46 ± 2.01	90.43 ± 2.31	83.85 ± 3.29	84.48 ± 3.72	77.77 ± 3.32	77.96 ± 3.23	69.27 ± 12.41	69.09 ± 12.50	55.96 ± 9.79	54.72 ± 8.66
0.9	89.77 ± 1.02	90.44 ± 1.02	85.08 ± 2.34	85.88 ± 2.24	75.67 ± 9.38	75.93 ± 9.76	69.04 ± 10.23	67.72 ± 11.31	60.39 ± 12.63	59.03 ± 11.74

n-th Order Expansion Method Results(Appendix)

Cora, Classification, GCN					
α \ n	**1**	**2**	**3**	**4**	**5**
0.1	82.61 ± 0.72	85.83 ± 0.51	85.50 ± 0.69	85.65 ± 1.07	85.78 ± 0.62
0.3	84.94 ± 0.55	85.94 ± 0.75	86.15 ± 1.31	85.82 ± 0.98	85.86 ± 0.83
0.5	85.64 ± 0.92	85.43 ± 1.06	85.66 ± 0.82	86.02 ± 0.74	86.29 ± 0.65
0.7	86.45 ± 0.86	85.40 ± 0.77	85.94 ± 0.87	85.27 ± 0.93	85.83 ± 0.57
0.9	85.81 ± 0.88	86.01 ± 0.75	85.48 ± 0.56	85.87 ± 0.96	85.54 ± 0.89