A Analysis of Sequential flipping + SLN

For a given dataset having K **classes**, we are interested in finding the probability with which the label of a node of **degree** n is changed. We assumed that the probability of transitioning between any two classes is uniform. So, when ρ is the probability of calling an edge noisy, the transition probability matrix due to an edge is given by

$$Q = \begin{bmatrix} 1-\rho & \frac{\rho}{K-1} & \frac{\rho}{K-1} & \cdots & \frac{\rho}{K-1} \\ \frac{\rho}{K-1} & 1-\rho & \frac{\rho}{K-1} & & \frac{\rho}{K-1} \\ \vdots & & \ddots & \ddots & \vdots \\ \frac{\rho}{K-1} & & & 1-\rho & \frac{\rho}{K-1} \\ \frac{\rho}{K-1} & \frac{\rho}{K-1} & \cdots & \frac{\rho}{K-1} & 1-\rho \end{bmatrix}$$

For ease of notation let $p = \frac{\rho}{K-1}$, the matrix get modified to

$$Q = \begin{bmatrix} 1-(K-1)p & p & p & \cdots & p \\ p & 1-(K-1)p & p & & p \\ \vdots & & \ddots & \ddots & \vdots \\ p & & & 1-(K-1)p & p \\ p & p & \cdots & p & 1-(K-1)p \end{bmatrix}$$

As the label is getting sequentially updated for every incident edge, the transition probability matrix for a node with degree n is Q^n. As Q is a symmetric matrix, we will try to diagonalize the matrix in order to find a closed-form solution for Q^n. Observe that the sum of every row of the matrix Q is the same, and they sum up to 1. This means one of the eigenvectors is $v_1 = \frac{1}{\sqrt{K}}[1, 1, \ldots, 1]$ for eigenvalue $\lambda_1 = 1$. To find other eigenvalues, let $v = [x_1, \ldots, x_K]$ be an eigenvector of Q, then it satisfies

$$(1-(K-1)p)x_i + p(x_1 + x_2 + \ldots + x_k - x_i) = \lambda x_i, \qquad i = 1, \ldots, k$$

As Q is a symmetric matrix, so all other eigenvectors must be orthogonal to v_1. Hence, $x_1 + \ldots + x_K = 0$, and

$$(1-Kp)x_i = \lambda x_i, \qquad i = 1, \ldots, k$$

This means $(1-Kp)$ is an eigenvalue for Q. Eigenvector corresponding to this eigenvalue satisfies $Q - (1-Kp)I = 0$, that is

$$Q - (1-Kp)I = \begin{bmatrix} p & p & p & \ldots & p \\ p & p & p & & p \\ \vdots & & \ddots & \ddots & \vdots \\ p & & & p & p \\ p & p & \ldots & p & p \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_{K-1} \\ x_K \end{bmatrix} = 0$$

As the solution space of given system of equation have $k-1$ dimension, so we obtain $k-1$ linearly independent eigenvectors given by
$v_2 = \frac{1}{\sqrt{2}}[1,-1,0,0,\ldots,0,0]$,
$v_3 = \frac{1}{\sqrt{6}}[1,1,-2,0,\ldots,0,0]$,
$v_4 = \frac{1}{\sqrt{12}}[1,1,1,-3,0,\ldots,0,0]$,
$\vdots$
$v_K = \frac{1}{\sqrt{(K-1)K}}[1,1,1,1,\ldots,1,-(K-1)]$

Again, as Q is a symmetric matrix using eigen decomposition of a symmetric matrix, assuming eigenvectors are row vectors

$$Q^n = \sum_{i=1}^{K} \lambda_i^n v_i^\top v_i$$

Separating the term corresponding to $\lambda = 1$ gives

$$\begin{aligned}
Q^n &= \frac{1}{K}\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ 1 & 1 & 1 & & 1 \\ \vdots & & \ddots & \ddots & \vdots \\ 1 & & & 1 & 1 \\ 1 & 1 & \ldots & 1 & 1 \end{bmatrix} + \sum_{i=2}^{K} \lambda_i^n v_i^\top v_i \\
&= \frac{1}{K}\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ 1 & 1 & 1 & & 1 \\ \vdots & & \ddots & \ddots & \vdots \\ 1 & & & 1 & 1 \\ 1 & 1 & \ldots & 1 & 1 \end{bmatrix} + (1-Kp)^n \begin{bmatrix} | & | & \cdots & | \\ v_2 & v_3 & \ldots & v_K \\ | & | & \cdots & | \end{bmatrix} \begin{bmatrix} -v_2- \\ -v_3- \\ \vdots \\ -v_K- \end{bmatrix} \\
&= \frac{1}{K}\begin{bmatrix} 1 & 1 & 1 & \ldots & 1 \\ 1 & 1 & 1 & & 1 \\ \vdots & & \ddots & \ddots & \vdots \\ 1 & & & 1 & 1 \\ 1 & 1 & \ldots & 1 & 1 \end{bmatrix} + (1-Kp)^n \begin{bmatrix} \frac{K-1}{K} & -\frac{1}{K} & -\frac{1}{K} & \cdots & -\frac{1}{K} \\ -\frac{1}{K} & \frac{K-1}{K} & -\frac{1}{K} & & -\frac{1}{K} \\ \vdots & & \ddots & \ddots & \vdots \\ -\frac{1}{K} & & & \frac{K-1}{K} & -\frac{1}{K} \\ -\frac{1}{K} & -\frac{1}{K} & \ldots & -\frac{1}{K} & \frac{K-1}{K} \end{bmatrix}
\end{aligned}$$

Now, using our original notation $\rho = (K-1)p$. Using Q^n, starting with the true label y_i, the probability of the label being changed to a specific class is given by

$$s\_sc(n) = \frac{1}{K}\left(1 - \left(1 - \frac{K\rho}{K-1}\right)^n\right).$$

For a node of degree n, the probability of its label being flipped is $(K-1) \times s\_sc(n)$ and is hence given by

$$s(n) = \frac{K-1}{K}\left(1 - \left(1 - \frac{K\rho}{K-1}\right)^n\right).$$

B Analysis of Sequential flipping + PWN model

Lemma 1. *The eigenvectors for a circulant matrix*

$$A = \begin{bmatrix} c_0 & c_1 & \dots & c_{K-1} \\ c_{K-1} & c_0 & \dots & c_{K-2} \\ \vdots & \vdots & \vdots\vdots & \vdots \\ c_1 & c_2 & \dots & c_0 \end{bmatrix}$$

are the columns of the matrix

$$F = \frac{1}{\sqrt{K}} \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ 1 & \omega_K & \omega_K^2 & \dots & \omega_K^{K-1} \\ 1 & \omega_K^2 & \omega_K^4 & \dots & \omega_K^{2(K-1)} \\ \vdots & \vdots & \vdots & \vdots\vdots & \vdots \\ 1 & \omega_K^{(K-1)} & \omega_K^{2(K-1)} & \dots & \omega_K^{(K-1)(K-1)} \end{bmatrix}$$

*Where ω_K is the K-th root of unity. The vector of corresponding eigenvalues is given by $\lambda = [\lambda_0, \dots, \lambda_{K-1}]' = \sqrt{K}F[c_0, c_1, \dots, c_{K-1}]'$. F is a unitary matrix ($FF^* = F^*F = I$, where * denotes conjugate transpose). Let Λ =daig$(\lambda_0, \dots, \lambda_{K-1})$, then the eigen decomposition of A is given by $A = F\Lambda F^*$.*

Again for a given dataset having K classes, we are interested in finding the probability with which the label of degree n is changed. For sequential flipping + Pairwise noise, transition probability matrix due to a single edge is given by

$$Q_{pwn} = \begin{bmatrix} 1-\rho & \rho & 0 & \dots & 0 \\ 0 & 1-\rho & \rho & & 0 \\ \vdots & & \ddots & \ddots & \vdots \\ 0 & & & 1-\rho & \rho \\ \rho & 0 & \dots & 0 & 1-\rho \end{bmatrix}$$

Similar to the Sequential flipping + SLN case, we need to calculate Q_{pwn}^n. As Q_{pwn} is a circulant matrix, so using Lemma 1 vector of its eigen values is given by

$$\lambda = \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ 1 & \omega_K & \omega_K^2 & \dots & \omega_K^{K-1} \\ 1 & \omega_K^2 & \omega_K^4 & \dots & \omega_K^{2(K-1)} \\ \vdots & \vdots & \vdots & \vdots\vdots & \vdots \\ 1 & \omega_K^{(K-1)} & \omega_K^{2(K-1)} & \dots & \omega_K^{(K-1)(K-1)} \end{bmatrix} \begin{bmatrix} 1-\rho \\ \rho \\ 0 \\ \vdots \\ 0 \end{bmatrix} = \begin{bmatrix} 1-\rho+\rho\times\omega_K^0 \\ 1-\rho+\rho\times\omega_K^1 \\ 1-\rho+\rho\times\omega_K^2 \\ \vdots \\ 1-\rho+\rho\times\omega_K^{(K-1)} \end{bmatrix} \tag{7}$$

As Q_{pwn} is circulant, and product of circulant matrix is circulant, finding first row Q_{pwn}^n is sufficient. Using Lemma 1 and Equation 7

$$Q^n_{pwn} = F \begin{bmatrix} (1-\rho+\rho\times\omega_K^0)^n & 0 & 0 & \dots & 0 \\ 0 & (1-\rho+\rho\times\omega_K^1)^n & 0 & \dots & 0 \\ 0 & 0 & (1-\rho+\rho\times\omega_K^2)^n & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots\vdots & \vdots \\ 0 & 0 & 0 & \dots & (1-\rho+\rho\times\omega_K^{K-1})^n \end{bmatrix} F^* \\ = FDiag(\lambda)F^* \tag{8}$$

First row of Q^n_{pwn} (denoted by $Q^n_{pwn}[0,:]$)is given by

$$Q^n_{pwn}[0,:] = \frac{1}{K}[1,1,1,\dots,1] \times Diag(\lambda) \times \begin{bmatrix} 1 & 1 & 1 & \dots & 1 \\ 1 & \omega_K^{*} & \omega_K^{2*} & \dots & \omega_K^{K-1*} \\ 1 & \omega_K^{2*} & \omega_K^{4*} & \dots & \omega_K^{2(K-1)*} \\ \vdots & \vdots & \vdots & \vdots\vdots & \vdots \\ 1 & \omega_K^{(K-1)^*} & \omega_K^{2(K-1)^*} & \dots & \omega_K^{(K-1)(K-1)*} \end{bmatrix} \\ = \frac{1}{K}[1,1,1,\dots,1] \times \begin{bmatrix} \lambda_0^n & \lambda_0^n & \lambda_0^n & \dots & \lambda_0^n \\ \lambda_1^n & \lambda_1^n\omega_K^{*} & \lambda_1^n\omega_K^{2*} & \dots & \lambda_1^n\omega_K^{K-1*} \\ \lambda_2^n & \lambda_2^n\omega_K^{2*} & \lambda_2^n\omega_K^{4*} & \dots & \lambda_2^n\omega_K^{2(K-1)*} \\ \vdots & \vdots & \vdots & \vdots\vdots & \vdots \\ \lambda_{K-1}^n & \lambda_{K-1}^n\omega_K^{(K-1)^*} & \lambda_{K-1}^n\omega_K^{2(K-1)^*} & \dots & \lambda_{K-1}^n\omega_K^{(K-1)(K-1)*} \end{bmatrix} \tag{9}$$

This gives

$$\begin{aligned} Q^n_{pwn}[0,j] &= \frac{1}{K}\sum_{i=0}^{K-1} \lambda_i^n(\omega_K^{i\times j})^* \\ &= \frac{1}{K}\sum_{i=0}^{K-1} \lambda_i^n\omega_K^{-i\times j} \\ &= \frac{1}{K}\sum_{i=0}^{K-1} \omega_K^{-i\times j}\sum_{m=0}^{n}\binom{n}{m}\rho^m\omega_K^{i\times m}(1-\rho)^{n-m} \\ &= \sum_{m=0}^{n}\binom{n}{m}\rho^m(1-\rho)^{n-m}\frac{1}{K}\sum_{i=0}^{K-1}\omega_K^{i(m-j)} \end{aligned} \tag{10}$$

See that,

$$\frac{1}{K}\sum_{i=0}^{K-1}\omega_K^{i(m-j)} = \begin{cases} 1 \; if \; m-j \equiv 0 \mod K \\ 0 \qquad otherwise \end{cases}$$

We denote $\frac{1}{K}\sum_{i=0}^{K-1}\omega_K^{i(m-j)}$ by $\delta_{m-j \mod K}$. This gives

$$Q^n_{pwn}[0,j] = \sum_{m=0}^{n} \binom{n}{m} \rho^m (1-\rho)^{n-m} \delta_{m-j \mod K}$$

.

Consider an example where each node belongs to one of 3 classes and then the first row of circulant matrix Q^2_{pwn}, can be calculated as follows. For $j = 0$, and $K = 3$ and $0 \leq m \leq n = 2$, $\delta_{m-j \mod K} = 1$ only when $m = 0$. So, $Q^2_{pwn}[0,0] = (1-\rho)^2$. Similarly $Q^2_{pwn}[0,1] = 2\rho(1-\rho)$ and $Q^2_{pwn}[0,2] = \rho^2$.

C Proof of Theorem 1

Proof. As n denotes the degree of node, and hence can take only natural numbers, so we will prove all property only for natural values of n.

1. $r(n)$ and $s(n)$ are increasing function of n. $q(2n)$ and $q(2n+1)$ are decreasing function of n.
   For $r(n)$: Let $m > n$ be two natural numbers, as $(1-\rho) \leq 1$ for $\rho \in [0,1]$, so, $(1-\rho)^m < (1-\rho)^n$. Hence, $1-(1-\rho)^m > 1-(1-\rho)^n$. Hence, $r(n)$ is an increasing function of n.
   For $s(n)$: If $\rho > \frac{K-1}{K}$, then for a single flip the probability with which a node with original label i remains in i is $1-\rho < \frac{1}{K}$. Also, the probability with which it gets reassigned as K is $\frac{\rho}{K-1} > \frac{1}{K}$. This means the probability of moving to any specific class is more than the probability of retaining the label, which completely changes the distribution of the data, and hence is not a desirable situation. From the perspective of label noise, we are interested in only $r < \frac{K-1}{K}$. with $\rho < \frac{K-1}{K}$, $\left(1 - \frac{K\rho}{K-1}\right) < 1$, and proof similar to $s(n)$ follows.
2. $r(n) \geq q(n) \forall n$.
   We can see

$$r(n) = \sum_{k=1}^{n} \binom{n}{k} p^k (1-p)^{n-k} \geq \sum_{k=\lceil \frac{n}{2} \rceil}^{n} \binom{n}{k} p^k (1-p)^{n-k} = q(n)$$

3. If $\rho < \frac{K-1}{K}$, then $s(n) < \frac{K-1}{K}$ and $s(n) = \frac{K-1}{K}$ iff $\rho = \frac{K-1}{K}$
   If $\rho < \frac{K-1}{K}$, then $\left(1 - \frac{K\rho}{K-1}\right)^n < 1$, and hence $1 - \left(1 - \frac{K\rho}{K-1}\right)^n < 1$. Which finally means $s(n) < \frac{K-1}{K}$.

   Now, to prove the second part of the statement, let $\rho = \frac{K-1}{K}$,
   $\Leftrightarrow s(n) = \frac{K-1}{K}\left(1 - \left(1 - \frac{K \times (K-1)}{(K-1) \times K}\right)^n\right) = \frac{K-1}{K}$

D Detailed Results

D.1 ρ values for various noise levels

Ready to refer ρ values for Citeseer, Cora and Amazon Photo datasets for various noise levels are available in Table 6. We compare different noise models across eight noise-robust algorithms. Many of these algorithms are not computationally feasible for large graphs, so our analysis is limited to relatively smaller graphs. EDN-based noise models assign different flipping probabilities based on node degree, requiring the calculation of distinct probabilities for each degree up to the maximum degree n of the graph. These individual computations are not expensive; therefore, injecting EDN noise remains computationally efficient even for graphs with a large number of nodes.

D.2 Comparison of EDN with existing noise model

Comparison of EDN with existing noise models for Citeseer, Cora and Amazon Photo datasets for different GNN architectures and Noise robust algorithms are in Tables 7, 8, 9, 10, 11, 12.

Table 6: ρ values for different noise levels for Cora, Citeseer and Amazon Photo datasets.

Dataset	Noise Level	Majority Vote	Veto Power	Sequential Flipping+SLN	Sequential Flipping+PW
Citeseer	5%	0.05481096	0.01920384	0.01940388	0.019204
	10%	0.10622124	0.04020804	0.0410082	0.040208
	15%	0.15423085	0.06321264	0.06481296	0.063213
	20%	0.19983997	0.0880176	0.09121824	0.088018
	25%	0.24324865	0.115023	0.12022404	0.115223
	30%	0.28505701	0.14422885	0.15223045	0.144629
	35%	0.32526505	0.17603521	0.18783757	0.176835
	40%	0.36467293	0.21064213	0.22704541	0.211842
	45%	0.4034807	0.24824965	0.27065413	0.25005
	50%	0.44188838	0.28925785	0.31926385	0.292058
Cora	5%	0.07121424	0.01360272	0.01360272	0.013603
	10%	0.12862573	0.02840568	0.02880576	0.028406
	15%	0.17803561	0.04460892	0.04540908	0.044609
	20%	0.22224445	0.0620124	0.06381276	0.062012
	25%	0.26265253	0.08081616	0.08381676	0.081016
	30%	0.30046009	0.10122024	0.10582116	0.10142
	35%	0.33626725	0.12342468	0.13002601	0.123625
	40%	0.37087417	0.14742949	0.15703141	0.14783
	45%	0.4044809	0.17383477	0.18723745	0.174435
	50%	0.43768754	0.20284057	0.22144429	0.203841
Amazon Photo	5%	0.24724945	0.00180036	0.00180036	0.0018
	10%	0.32086417	0.00380076	0.00380076	0.003801
	15%	0.36227245	0.0060012	0.00620124	0.006001
	20%	0.39087818	0.00840168	0.00880176	0.008402
	25%	0.41308262	0.01120224	0.01180236	0.011402
	30%	0.43168634	0.01440288	0.01540308	0.014603
	35%	0.44788958	0.01820364	0.01960392	0.018204
	40%	0.46269254	0.02240448	0.02460492	0.022404
	45%	0.47629526	0.02720544	0.03040608	0.027405
	50%	0.48929786	0.0330066	0.03780756	0.033407

Table 7: Comparison of noise model variants across GNN architecture for Citeseer dataset. Reported values are accuracy±std of 10 repetitions.

GNN Architecture	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	73.92±1.1	72.64±0.5	72.27±0.7	72.34±0.6	73.99±1	72.91±0.6	72.24±0.6	72.23±0.58
	10%	72.23±1.4	71.47±1	70.39±0.8	70.19±0.9	72.18±1.2	71.35±1.00	69.99±0.90	69.91± 0.73
	15%	70.17±1.47	71.50±0.99	70.42±0.81	70.23±0.90	70.04±1.51	71.36±1.00	69.98±0.87	69.91±0.72
	20%	68.09±1.59	67.59±1.39	65.07±1.12	65.02±1.32	67.15±1.74	66.84±1.45	63.04±1.60	62.82±1.51
	25%	65.55±1.74	65.34±1.20	61.64±1.43	61.79±1.42	64.29±1.91	63.93±1.22	58.42±1.76	58.17±2.43
	30%	62.49±2.06	65.34±1.17	61.63±1.47	61.81±1.41	60.43±2.21	63.90±1.23	58.41±1.76	58.18± 2.47
	35%	59.34±2.76	62.38±1.46	57.69±1.72	58.03±1.50	56.44±2.60	60.74±1.73	53.31±2.30	53.45±2.29
	40%	56.17±2.28	55.76±1.70	48.50±2.58	49.65±2.46	51.85±2.21	52.48±1.66	42.91±2.22	43.19±2.41
	45%	52.47±2.39	52.33±1.55	43.86±2.21	45.57±2.21	47.30±2.34	47.36±1.25	37.93±2.02	38.05±2.56
	50%	48.81±2.58	48.33±1.63	38.71±1.81	41.39±2.54	41.89±2.28	41.93±1.80	33.23±2.08	33.39±2.12
GIN	5%	71.92±4.50	69.52±1.93	68.59±2.76	67.76±3.35	67.99±3.27	68.56±3.01	68.78±2.22	68.58±1.95
	10%	66.94±2.70	68.34±2.73	65.13±3.81	63.48±8.73	66.69±4.17	66.29±4.12	61.95±9.74	65.52±2.98
	15%	66.22±3.43	68.34±2.73	65.13±3.81	63.48±8.73	63.60±3.12	66.86±3.55	62.92±9.88	65.52±2.98
	20%	64.82±3.76	64.42±2.45	56.81±5.62	56.84±4.40	59.31±3.31	62.91±3.28	56.77±5.64	53.34±8.04
	25%	60.12±5.71	63.39±3.58	54.51±4.01	55.42±6.26	54.22±9.29	61.47±3.51	49.34±7.72	49.98±4.16
	30%	55.98±3.94	63.39±3.58	53.78±5.67	55.69±6.13	53.14±6.02	61.67±3.13	49.34±7.72	49.98±4.16
	35%	55.28±5.92	61.74±2.73	46.11±5.54	49.90±6.51	48.10±3.36	56.05±5.91	45.41±7.25	45.22±4.81
	40%	51.04±6.90	54.35±3.15	40.40±7.99	41.89±6.24	44.71±7.95	46.04±4.67	37.49±5.99	36.70±10.03
	45%	42.29±8.80	47.87±7.42	37.98±5.40	39.28±5.53	39.19±3.55	46.07±6.53	34.25±5.86	33.50±1.65
	50%	42.18±9.75	42.64±11.5	31.57±3.23	33.92±6.21	36.21±6.22	38.58±5.08	28.98±5.36	29.08±1.983
GraphSAGE	5%	75.95±0.96	74.96±0.51	74.69±0.49	74.61±0.62	75.97±0.88	75.07±0.56	74.00±0.53	75.69±1.30
	10%	74.75±0.99	74.13±0.82	73.53±0.74	73.61±0.79	74.82±0.99	74.20±0.68	72.76±0.76	74.66±1.65
	15%	73.87±1.10	74.18±0.83	73.55±0.76	73.57±0.75	73.35±1.36	74.15±0.72	72.71±0.78	74.64±1.66
	20%	72.78±1.21	72.20±1.10	70.95±1.11	70.95±1.03	71.45±1.44	70.93±1.20	67.41±1.19	69.74±1.97
	25%	70.96±1.49	70.70±1.07	68.42±1.36	68.99±0.91	68.93±1.92	68.33±1.07	63.27±1.43	65.70±2.16
	30%	68.82±1.64	70.75±1.11	68.34±1.29	68.97±0.85	65.25±2.39	68.34±1.14	63.33±1.38	65.76±2.13
	35%	66.26±2.10	68.77±1.30	66.03±1.49	66.43±0.83	60.78±3.35	64.72±1.42	58.59±1.77	60.93±2.53
	40%	63.58±1.99	63.62±1.31	57.76±1.89	58.64±1.72	55.92±3.13	55.35±1.78	47.32±2.22	49.19±3.59
	45%	59.61±1.99	59.97±1.79	52.89±2.11	54.17±2.08	49.71±2.85	49.19±1.56	41.19±2.29	44.32±4.10
	50%	55.60±2.01	55.31±2.26	47.49±2.23	49.52±2.86	43.99±2.57	42.40±2.33	35.28±2.33	38.75±3.75
GAT	5%	76.46±1.53	74.75±0.67	74.33±0.89	74.36±0.67	76.62±1.49	74.93±0.85	74.39±0.66	76.61±1.39
	10%	75.65±1.56	74.29±0.82	73.88±1.12	73.93±0.88	76.22±1.46	74.39±0.83	73.75±0.74	76.19±1.35
	15%	75.38±1.66	74.18±0.77	73.84±1.09	73.88±0.92	75.77±1.45	74.36±0.79	73.76±0.69	76.14±1.46
	20%	75.10±1.46	73.59±1.13	72.88±1.38	72.77±1.16	74.72±1.39	72.96±1.10	71.84±0.99	74.10±2.25
	25%	74.59±1.61	73.06±1.04	71.81±1.06	72.16±1.39	73.31±1.84	71.32±1.50	68.13±1.45	71.42±2.64
	30%	73.71±1.60	73.15±1.13	71.87±1.16	72.16±1.40	71.04±2.33	71.40±1.53	68.18±1.41	71.44±2.72
	35%	73.15±1.51	72.88±1.50	71.47±1.04	71.30±1.37	67.48±2.75	68.86±2.02	64.05±2.02	67.73±3.77
	40%	72.47±1.46	71.82±2.04	68.75±2.25	69.10±1.42	62.03±3.60	60.98±3.01	50.85±2.81	54.47±4.91
	45%	70.88±1.64	70.45±1.81	66.60±2.33	67.51±1.87	55.00±3.75	53.93±2.64	43.41±3.18	45.97±6.50
	50%	70.25±2.67	69.21±1.72	63.27±3.02	65.30±3.78	45.96±3.47	45.14±3.37	35.28±3.14	38.19±6.87
Graph Transformer	5%	76.28±0.86	75.64±0.52	76.28±0.50	76.54±0.54	76.10±1.40	75.50±0.14	76.16±0.35	75.50±0.95
	10%	74.68±0.74	74.34±0.63	74.92±0.72	74.54±1.13	75.18±0.34	74.56±0.40	74.76±0.65	74.42±1.24
	15%	73.78±1.29	74.34±0.78	74.98±0.64	74.56±0.96	73.60±0.86	74.72±0.54	74.64±0.55	74.49±1.17
	20%	72.48±1.80	71.52±0.75	71.02±1.33	71.58±1.28	70.92±0.90	70.70±0.97	69.24±1.16	69.16±1.72
	25%	70.24±1.63	70.36±0.60	68.84±0.68	68.68±0.86	68.86±1.03	67.48±1.12	64.94±0.68	65.45±2.00
	30%	67.68±1.06	70.40±0.51	69.14±1.06	68.56±0.72	64.62±2.29	67.56±0.99	64.92±0.91	65.42±1.98
	35%	65.40±1.00	68.06±1.22	66.96±1.55	67.48±1.55	58.90±1.81	63.78±1.55	60.06±1.62	61.23±2.33
	40%	61.62±0.64	63.44±0.81	57.02±0.80	58.02±1.03	54.64±2.01	54.70±2.89	47.72±0.43	50.34±3.17
	45%	58.10±1.24	59.22±1.42	52.38±0.60	53.58±0.94	49.04±2.25	48.94±2.43	43.00±1.01	44.09±2.77
	50%	52.88±0.35	53.68±2.05	46.20±0.72	47.94±1.25	43.32±0.77	42.36±2.06	35.64±1.04	38.58±2.97

Table 8: Comparison of noise model variants across GNN architecture for Cora dataset. Reported values are accuracy±std of 10 repetitions.

GNN Architecture	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	84.73±0.94	85.00±0.44	85.19±0.74	85.09±0.73	84.27±0.98	85.36±0.48	85.36±0.50	84.58±0.54
	10%	83.03±1.14	83.90±0.69	83.46±0.69	83.44±0.80	82.08±1.53	83.60±1.00	82.41±1.09	83.69±0.76
	15%	81.08±1.48	83.92±0.71	83.51±0.63	83.47±0.76	79.21±1.82	83.62±1.00	82.40±1.07	83.68±0.77
	20%	79.06±1.46	80.38±1.32	78.37±1.58	78.49±1.47	75.76±1.75	78.38±2.04	74.45±1.68	79.89±1.45
	25%	76.46±1.48	77.46±1.99	74.49±2.09	74.65±2.03	71.97±1.77	74.84±2.58	68.85±2.30	76.35±1.44
	30%	73.68±1.50	77.51±1.99	74.50±2.01	74.64±2.04	67.67±1.98	74.90±2.57	68.81±2.29	76.34±1.48
	35%	70.41±1.76	74.79±2.24	71.08±1.97	71.36±1.95	62.22±2.47	70.45±2.73	63.18±2.46	71.77±2.11
	40%	66.90±2.24	67.84±2.88	62.05±2.52	62.76±2.53	56.91±2.77	60.07±3.21	50.62±2.73	58.63±3.65
	45%	62.29±2.29	63.16±2.94	57.12±2.54	58.06±2.54	50.52±2.76	52.86±3.87	44.28±2.62	50.18±3.92
	50%	57.76±2.36	57.87±2.98	51.78±2.76	52.64±2.61	44.28±2.77	46.56±3.77	38.45±2.82	39.99±5.43
GIN	5%	80.95±2.01	81.11±0.88	80.45±2.63	82.11±2.60	80.35±2.38	83.34±1.55	80.77±2.21	79.36±1.99
	10%	81.81±2.46	81.74±2.96	78.94±1.74	79.86±2.21	80.49±2.32	80.64±2.21	76.93±2.55	77.98±1.38
	15%	80.48±3.17	82.24±2.21	78.94±1.74	78.97±2.68	78.35±3.00	80.64±2.21	76.95±2.56	77.98±1.38
	20%	76.14±3.79	81.77±2.53	75.71±4.33	76.91±4.93	75.87±3.46	75.86±4.51	71.21±3.29	71.80±1.37
	25%	79.02±2.77	77.87±5.65	74.90±2.73	76.57±2.59	73.66±3.74	73.32±4.28	64.84±3.21	67.62±2.51
	30%	76.63±4.38	77.86±5.67	74.90±2.73	76.57±2.59	68.97±6.19	73.32±4.28	64.46±3.97	67.62±2.51
	35%	75.32±3.96	76.85±7.28	74.70±4.44	75.47±4.78	64.09±4.61	68.90±3.99	58.04±8.27	63.14±3.09
	40%	73.82±2.89	77.07±4.45	71.50±5.96	69.71±9.40	64.09±4.41	59.54±5.84	51.36±3.94	51.84±4.15
	45%	71.02±4.38	75.17±2.36	66.79±9.06	65.95±11.8	48.40±5.01	53.90±4.37	42.55±10.1	48.36±3.33
	50%	63.94±10.7	74.26±3.11	59.52±10.9	64.11±9.59	45.16±5.17	45.77±9.01	34.73±10.6	40.46±3.88
GraphSAGE	5%	83.10±1.19	83.38±0.68	83.37±1.18	83.41±1.09	82.84±1.31	83.56±0.46	83.22±1.13	84.43±0.81
	10%	80.39±1.51	81.55±0.97	79.97±1.08	79.92±1.01	79.54±1.72	81.12±1.15	79.70±1.24	82.3±0.85
	15%	77.81±1.74	81.54±0.97	79.95±1.08	79.89±1.00	76.22±2.20	81.09±1.17	79.70±1.25	82.31±0.96
	20%	74.34±1.74	75.61±1.71	73.41±1.87	73.50±1.71	72.25±2.13	74.45±1.84	71.64±1.91	75.25±1.85
	25%	70.72±1.85	72.39±2.37	68.83±1.91	69.02±2.12	67.69±2.50	69.64±2.76	66.53±1.93	71.6±2.48
	30%	67.71±2.36	72.41±2.39	68.89±1.90	69.06±2.17	63.08±2.71	69.67±2.79	66.54±1.93	71.67±2.53
	35%	63.46±1.99	67.89±2.18	64.37±1.93	64.76±1.57	57.97±2.99	64.52±2.94	61.74±2.46	66.47±3.91
	40%	59.70±2.91	58.83±2.77	55.69±2.70	55.86±2.80	52.71±3.32	54.79±2.91	51.43±2.56	54.14±5.24
	45%	55.27±2.50	53.93±3.23	51.14±2.74	51.35±2.62	47.20±3.15	49.40±3.33	46.21±2.12	47.77±5.17
	50%	49.93±2.09	49.75±3.12	46.37±2.51	46.75±2.68	41.97±3.32	44.09±3.29	41.15±2.13	41.34±5.36
GAT	5%	79.50±1.80	80.05±1.02	80.39±1.14	80.45±1.20	79.35±1.67	79.43±1.51	79.45±1.37	79.06±1.5
	10%	77.63±2.14	77.89±1.39	78.23±1.32	77.89±1.47	76.38±1.95	77.39±1.21	76.11±2.22	76.49±1.91
	15%	75.26±1.76	77.71±1.37	77.87±1.55	77.81±1.66	73.47±2.42	77.37±1.19	76.57±2.09	76.35±2.08
	20%	72.70±2.76	73.07±2.48	73.87±1.80	73.58±2.62	68.99±3.07	70.27±2.81	69.94±2.52	70.12±2.43
	25%	70.33±2.16	69.58±2.69	70.77±2.57	70.48±1.44	65.87±3.48	65.64±2.34	64.80±2.47	66.09±2.37
	30%	67.73±2.38	69.91±2.39	70.44±2.82	70.01±1.73	61.14±2.79	65.79±2.57	64.93±2.63	66.21±2.0
	35%	64.98±2.73	67.51±2.90	68.04±2.14	67.76±2.31	55.89±2.96	62.11±3.75	60.69±2.28	62.76±3.2
	40%	61.17±2.76	61.25±3.38	60.39±3.33	60.51±3.23	50.89±3.38	52.90±3.04	50.40±2.70	51.55±4.5
	45%	57.46±3.68	57.14±3.53	55.49±2.94	55.56±3.14	44.76±3.42	46.71±3.98	43.82±3.07	45.25±5.46
	50%	51.73±2.34	51.24±3.76	51.31±3.41	51.88±3.22	40.33±3.41	40.99±4.48	39.22±2.83	39.62±4.73
Graph Transformer	5%	84.42±0.84	84.78±0.29	84.70±0.41	84.64±0.67	84.06±0.71	84.70±0.14	84.96±0.54	84.12±0.99
	10%	82.86±1.11	83.84±0.44	83.68±0.79	83.32±0.70	82.52±1.04	83.94±0.26	83.42±0.99	82.25±1.32
	15%	81.30±1.20	83.60±0.32	83.28±0.86	83.54±0.77	80.10±0.97	84.14±0.34	83.50±1.00	82.17±1.28
	20%	77.56±0.69	79.66±1.04	78.90±0.81	78.94±0.82	76.18±0.79	77.36±0.69	76.70±2.15	75.28±1.78
	25%	75.30±0.91	76.56±0.70	77.18±0.67	77.50±0.87	72.12±1.05	72.18±1.08	72.88±0.95	70.33±2.01
	30%	73.08±1.92	76.66±0.86	77.56±0.56	77.58±1.02	67.56±1.87	71.96±1.14	73.24±1.28	70.56±2.0
	35%	69.66±0.48	74.26±1.18	74.00±0.81	74.74±0.51	61.80±1.84	68.90±1.51	69.20±1.50	65.81±2.28
	40%	66.36±1.57	66.36±1.93	65.90±0.78	65.74±0.42	56.54±1.84	57.40±2.12	57.76±1.69	54.38±2.36
	45%	61.16±1.75	62.16±1.86	61.32±1.56	60.62±2.15	50.08±2.15	51.32±0.92	51.28±1.44	48.11±2.4
	50%	55.70±2.32	55.88±1.59	55.60±1.59	55.78±2.14	43.44±2.76	44.28±1.50	44.86±1.65	41.66±2.85

Table 9: Comparison of noise model variants across GNN architecture for Amazon Photo dataset. Reported values are accuracy±std of 10 repetitions.

GNN Architecture	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	86.78±1.43	83.65±6.28	85.05±4.56	83.55±6.18	86.66±1.46	84.65±5.59	85.35±4.21	84.85±2.89
	10%	86.45±1.16	82.29±12.38	84.14±3.82	83.54±4.67	85.58±1.32	84.38±5.67	83.60±3.27	80.91±5.22
	15%	85.49±1.21	82.30±12.38	84.16±3.85	83.55±4.67	83.53±1.19	84.39±5.69	83.58±3.26	80.92±5.18
	20%	82.83±3.66	82.86±6.06	83.05±3.65	80.82±5.00	79.72±4.84	77.60±10.34	77.68±6.76	72.0±6.66
	25%	83.96±2.99	78.28±9.38	81.87±4.08	80.58±7.92	77.00±5.47	74.15±9.42	70.81±7.69	66.82±8.03
	30%	81.15±9.72	78.26±9.39	81.88±4.03	80.66±7.91	70.94±12.13	74.16±9.41	70.82±7.69	66.83±8.05
	35%	83.01±3.82	76.80±11.90	77.65±7.65	78.01±9.09	62.77±7.32	69.21±9.21	63.43±4.89	61.85±12.71
	40%	78.75±4.02	76.00±10.41	71.06±12.34	70.89±9.41	54.20±7.31	56.45±8.28	49.66±3.14	45.15±6.21
	45%	73.45±5.67	75.36±8.82	66.92±11.98	67.85±11.36	44.15±4.85	49.57±7.92	40.74±2.65	40.03±5.61
	50%	72.71±4.76	71.59±6.88	64.10±8.61	66.44±7.91	36.19±4.19	42.51±7.34	33.15±3.93	33.98±6.6
GIN	5%	80.24±4.32	81.32±2.95	67.86±17.91	64.96±15.31	66.24±17.36	78.02±3.71	77.10±5.15	34.24±6.73
	10%	67.88±12.96	76.66±7.74	56.66±13.40	50.70±20.65	69.98±16.78	73.40±9.67	63.00±15.79	35.82±6.21
	15%	56.42±19.08	76.76±7.82	56.58±12.77	52.92±23.29	58.96±13.60	73.42±9.68	63.08±15.79	35.82±6.21
	20%	50.32±10.53	68.50±9.65	43.04±10.86	31.88±8.94	58.22±14.88	73.46±6.61	48.64±12.52	32.14±7.05
	25%	50.58±19.81	67.24±16.88	35.04±2.90	33.62±8.99	50.16±10.96	69.38±14.52	41.78±10.62	33.94±7.74
	30%	59.58±15.97	68.20±17.34	35.30±3.04	34.12±9.61	57.52±6.68	69.86±14.56	42.00±10.78	33.94±7.74
	35%	43.02±9.76	53.28±13.74	32.54±3.71	30.80±5.63	50.94±19.75	54.24±17.36	34.76±10.25	24.00±5.93
	40%	38.20±7.31	47.32±10.51	23.80±6.83	25.54±5.70	41.90±10.70	49.56±7.88	30.10±9.24	25.28±5.34
	45%	34.38±7.71	40.28±4.80	24.74±4.46	27.04±7.18	33.52±17.39	48.84±17.31	25.14±3.94	22.58±7.66
	50%	31.00±8.10	36.98±8.71	21.14±2.03	28.56±1.88	33.00±12.67	36.12±17.27	21.78±3.86	23.58±2.76
GraphSAGE	5%	90.56±0.86	90.41±0.61	90.29±0.82	90.20±0.64	90.39±1.01	90.64±0.50	90.29±0.79	89.93±1.16
	10%	88.49±0.84	89.26±0.44	89.32±0.78	89.35±1.14	87.76±1.17	89.26±0.49	88.71±0.88	87.6±1.46
	15%	85.86±1.99	89.28±0.43	89.32±0.77	89.35±1.15	84.68±2.27	89.25±0.48	88.70±0.87	87.6±1.48
	20%	84.10±1.48	85.14±1.06	85.38±1.30	85.42±1.22	81.63±2.54	83.38±2.46	82.79±2.36	79.14±3.13
	25%	81.73±2.29	84.06±1.34	82.15±1.89	82.15±2.09	77.96±2.87	80.25±2.78	77.73±3.13	74.08±4.06
	30%	77.97±2.17	84.06±1.33	82.15±1.88	82.16±2.08	72.25±2.84	80.04±2.82	77.73±3.13	74.08±4.06
	35%	75.72±1.59	80.37±2.55	78.16±1.69	78.29±2.20	65.55±3.68	75.51±3.75	70.94±3.25	66.42±4.38
	40%	70.79±2.14	73.37±1.66	66.77±3.97	68.63±3.74	58.99±2.38	63.46±4.19	54.94±4.07	51.58±4.72
	45%	65.88±3.47	68.72±2.34	61.36±4.87	62.66±4.42	50.78±4.01	55.60±4.85	47.78±4.23	43.61±6.1
	50%	60.79±3.71	64.32±2.99	53.65±5.30	56.09±5.07	44.42±4.67	47.71±3.86	39.13±4.36	36.25±5.77
GAT	5%	78.20±1.79	79.07±1.89	77.75±1.95	77.29±1.60	77.36±2.45	78.79±1.52	76.30±1.64	76.81±1.79
	10%	73.70±2.73	75.99±1.53	74.40±2.02	74.36±1.77	73.07±2.49	76.18±2.21	73.34±2.27	72.51±1.99
	15%	69.35±2.71	75.97±1.72	74.26±1.98	74.30±1.79	69.57±2.85	76.06±2.10	73.59±2.80	72.67±2.21
	20%	66.41±2.89	69.95±1.86	66.82±1.90	66.32±1.99	65.73±3.21	68.28±2.92	65.38±2.00	63.31±3.42
	25%	63.20±3.03	66.08±2.52	63.13±2.32	62.52±2.51	61.62±3.64	63.45±3.42	61.21±1.97	58.14±3.82
	30%	59.29±3.91	65.89±2.65	63.02±2.24	62.88±2.70	56.64±4.11	63.72±3.37	61.14±2.08	58.25±4.07
	35%	55.32±3.37	61.61±3.37	59.03±2.54	58.43±3.53	52.45±3.48	58.66±3.67	56.92±2.47	54.62±3.04
	40%	51.17±4.30	53.19±2.79	50.46±2.77	50.45±3.31	48.67±4.03	50.72±3.03	47.93±2.76	44.76±2.35
	45%	47.79±3.67	48.55±3.52	46.59±3.19	46.70±3.37	45.01±2.82	47.40±4.53	42.69±3.05	40.29±4.36
	50%	44.12±4.35	45.68±2.85	41.16±3.31	40.56±3.59	39.93±2.99	43.33±3.73	38.03±3.27	36.2±3.08
Graph Transformer	5%	85.57±0.83	80.87±8.55	84.13±1.88	84.25±1.36	85.48±0.95	85.80±0.72	84.32±1.22	84.94±0.61
	10%	83.17±1.89	83.60±1.08	81.84±1.88	82.17±2.25	82.45±1.06	83.58±1.47	81.83±2.44	81.27±1.17
	15%	79.73±1.42	83.58±1.03	82.15±1.43	81.91±2.07	78.93±1.54	83.65±1.40	81.94±2.45	81.45±1.05
	20%	77.52±2.20	78.81±1.16	73.40±5.65	76.66±2.37	74.06±3.01	76.04±2.76	75.76±2.32	74.48±3.05
	25%	74.34±3.35	76.04±2.34	71.73±2.25	72.54±3.45	71.27±4.41	73.05±2.94	72.28±1.72	69.8±1.86
	30%	69.06±2.85	76.65±2.27	72.27±1.56	74.51±2.07	67.01±4.39	73.39±2.96	72.35±1.29	69.63±2.03
	35%	64.24±2.99	72.60±2.20	69.80±2.56	68.63±2.74	62.16±2.99	69.08±4.08	68.73±2.45	65.13±2.87
	40%	62.37±0.45	62.00±3.18	63.27±2.03	62.32±2.40	58.16±3.18	55.05±6.65	60.63±2.46	55.33±4.81
	45%	58.77±2.13	58.33±4.13	57.54±2.01	57.76±1.11	54.38±2.85	49.03±6.71	54.25±3.26	49.8±4.64
	50%	52.70±1.47	51.94±4.08	52.50±2.53	50.93±6.66	45.96±2.73	44.23±5.22	48.08±2.30	44.65±5.19

Table 10: Comparison of noise model variants across graph label noise robust algorithms for Citeseer dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	73.92±1.07	72.64±0.47	72.27±0.70	72.34±0.58	73.99±0.99	72.91±0.60	72.24±0.63	72.23±0.58
	10%	72.23±1.35	71.47±0.97	70.39±0.84	70.19±0.92	72.18±1.18	71.35±1.00	69.99±0.90	69.91± 0.73
	15%	70.17±1.47	71.50±0.99	70.42±0.81	70.23±0.90	70.04±1.51	71.36±1.00	69.98±0.87	69.91±0.72
	20%	68.09±1.59	67.59±1.39	65.07±1.12	65.02±1.32	67.15±1.74	66.84±1.45	63.04±1.60	62.82±1.51
	25%	65.55±1.74	65.34±1.20	61.64±1.43	61.79±1.42	64.29±1.91	63.93±1.22	58.42±1.76	58.17±2.43
	30%	62.49±2.06	65.34±1.17	61.63±1.47	61.81±1.41	60.43±2.21	63.90±1.23	58.41±1.76	58.18± 2.47
	35%	59.34±2.76	62.38±1.46	57.69±1.72	58.03±1.50	56.44±2.60	60.74±1.73	53.31±2.30	53.45±2.29
	40%	56.17±2.28	55.76±1.70	48.50±2.58	49.65±2.46	51.85±2.21	52.48±1.66	42.91±2.22	43.19±2.41
	45%	52.47±2.39	52.33±1.55	43.86±2.21	45.57±2.21	47.30±2.34	47.36±1.25	37.93±2.02	38.05±2.56
	50%	48.81±2.58	48.33±1.63	38.71±1.81	41.39±2.54	41.89±2.28	41.93±1.80	33.23±2.08	33.39±2.12
DGNN	5%	66.46±2.84	65.15±2.37	62.17±2.41	60.28±3.58	64.04±2.22	66.06±1.90	61.92±8.79	58.12±13.30
	10%	62.08±2.91	61.30±4.17	55.61±5.64	58.73±4.48	60.92±4.72	63.10±1.94	55.62±8.30	54.98±6.40
	15%	59.88±2.93	61.19±2.74	57.88±5.52	57.58±4.74	56.64±7.73	62.80±2.37	58.64±5.10	55.54±12.57
	20%	56.10±3.77	57.35±4.33	43.57±8.98	49.19±5.13	52.83±4.43	56.86±4.57	51.18±4.23	54.04±7.09
	25%	53.07±4.92	51.18±10.06	45.02±6.99	44.70±6.52	49.78±5.92	53.62±6.91	46.24±6.07	42.28±12.04
	30%	46.85±8.87	56.83±2.33	42.69±7.29	43.90±8.80	49.27±8.32	56.55±3.89	41.69±8.40	43.96±9.00
	35%	45.47±6.33	49.32±7.73	39.64±8.64	40.65±5.40	40.58±8.96	53.42±4.70	41.64±7.89	44.70±3.35
	40%	38.74±8.89	44.01±7.75	31.46±6.04	32.28±8.11	36.76±7.34	44.09±8.14	37.44±7.27	33.96±7.38
	45%	41.89±6.73	43.71±4.72	29.48±6.39	27.27±9.29	32.62±6.84	44.71±5.86	32.83±4.41	34.20±7.13
	50%	33.25±8.00	39.23±6.73	25.96±5.42	27.17±5.13	29.62±7.02	38.66±6.20	31.26±4.34	27.48±5.88
PIGNN	5%	76.58±2.04	72.83±3.60	71.34±5.36	71.61±5.36	74.02±2.20	73.60±1.74	71.63±5.38	73.14±2.17
	10%	73.19±5.30	72.03±2.89	71.88±5.81	70.48±6.23	72.95±2.72	73.01±2.05	71.47±3.29	71.68±3.91
	15%	72.26±5.23	72.03±2.89	71.88±5.81	70.48±6.23	71.10±4.76	72.98±2.10	71.47±3.29	71.68±3.91
	20%	70.80±4.83	68.48±5.68	68.15±4.52	66.71±7.75	68.83±4.37	69.45±3.38	66.47±5.45	68.42±3.21
	25%	71.61±3.67	69.62±3.46	66.79±6.75	66.11±8.15	66.19±5.57	68.11±4.49	62.79±4.89	63.62±7.72
	30%	71.02±4.71	69.62±3.46	66.79±6.75	66.11±8.15	62.67±5.16	68.10±4.51	62.79±4.89	63.62±7.72
	35%	66.62±5.84	64.72±7.16	64.76±8.13	67.66±5.28	57.74±7.03	64.68±4.45	55.45±7.81	59.72±2.61
	40%	67.42±4.07	61.92±8.26	57.63±8.84	58.49±10.92	51.33±6.57	56.83±5.93	44.39±6.45	45.52±10.72
	45%	60.79±11.05	56.18±9.03	56.32±3.70	58.49±7.80	44.47±7.21	49.97±7.33	38.14±4.95	44.48±9.20
	50%	60.54±7.37	57.45±7.71	50.13±7.12	52.20±9.57	40.65±5.59	39.72±5.44	33.82±5.40	40.40±7.91
RNCGLN	5%	72.15±3.13	69.00±3.88	68.33±1.98	67.54±1.51	69.86±3.23	68.05±2.46	68.87±2.75	72.08±3.06
	10%	69.37±2.64	67.06±3.44	66.86±3.28	67.05±2.75	68.25±3.19	66.03±1.75	67.41±3.08	68.42±2.53
	15%	67.73±3.53	67.06±3.44	66.86±3.28	67.05±2.75	66.06±2.11	66.03±1.75	67.41±3.08	68.42±2.53
	20%	66.08±3.83	65.52±4.33	64.77±4.65	64.59±4.42	62.36±3.81	63.95±3.71	62.77±3.67	66.16±3.22
	25%	65.09±4.12	62.51±2.37	64.76±4.86	62.41±4.41	58.22±2.80	61.01±2.82	56.50±2.01	58.88±3.38
	30%	63.75±4.67	62.51±2.37	64.76±4.86	62.41±4.41	55.84±3.24	61.01±2.82	56.50±2.01	58.88±3.38
	35%	58.27±4.05	61.52±3.32	59.26±5.01	60.25±4.37	53.61±2.80	58.91±2.37	51.61±2.90	52.02±1.05
	40%	57.78±4.86	54.80±2.29	50.66±5.56	50.33±3.87	47.61±3.65	51.35±2.41	41.07±2.31	44.72±4.01
	45%	51.68±5.01	51.01±3.35	44.24±4.52	45.94±4.38	41.87±2.96	46.81±3.73	37.95±3.20	40.72±1.63
	50%	47.35±2.63	48.06±3.17	42.58±4.59	42.43±4.39	37.87±2.92	40.29±3.17	32.19±3.05	38.62±4.42
RTGNN	5%	73.98±4.38	74.31±1.04	74.26±1.53	73.95±1.35	74.18±0.80	74.07±1.15	74.12±0.97	75.08±1.32
	10%	73.39±1.50	73.57±1.55	74.67±0.55	74.22±0.90	72.50±2.82	73.67±1.25	73.39±1.27	72.37±1.90
	15%	72.92±1.32	73.88±1.69	74.75±0.97	74.25±0.86	71.71±2.08	73.77±1.20	73.86±1.13	72.40±1.98
	20%	71.28±2.51	73.74±1.61	73.81±1.17	73.66±1.69	69.66±2.11	72.21±2.05	69.41±2.21	71.47±3.00
	25%	72.47±1.78	72.81±1.55	72.82±1.97	71.95±3.23	65.87±2.81	71.07±2.65	66.09±2.46	70.22±3.38
	30%	71.77±1.99	73.09±1.69	72.73±2.21	72.00±3.37	62.01±2.56	70.67±2.37	67.34±2.81	69.03±2.47
	35%	71.14±2.49	72.77±1.38	72.53±1.59	72.07±1.54	58.38±3.08	68.53±3.11	63.19±1.92	64.50±1.33
	40%	72.50±1.45	73.10±1.29	69.53±3.85	71.21±2.24	53.08±2.38	59.80±4.92	51.65±2.83	54.23±4.27
	45%	70.25±1.97	71.09±2.30	64.59±5.95	69.16±2.81	42.61±4.55	53.90±3.99	45.36±3.73	54.05±3.09
	50%	67.93±3.38	68.45±3.17	61.55±5.86	65.08±4.54	36.68±4.00	44.48±3.88	37.79±5.15	44.22±8.49
NRGNN	5%	75.76±0.99	74.19±1.47	74.22±1.19	74.14±1.15	71.69±3.75	73.56±2.35	74.53±1.63	76.58±3.30
	10%	73.12±2.92	73.30±1.69	73.71±2.23	72.94±3.14	70.34±4.61	73.72±1.86	73.62±2.95	73.44±2.69
	15%	72.88±2.25	73.30±1.69	73.71±2.23	72.94±3.14	69.84±3.25	73.72±1.86	73.62±2.95	73.44±2.69
	20%	71.97±3.18	73.73±1.77	70.95±3.54	71.44±2.62	69.74±3.94	72.42±2.80	69.37±5.16	66.66±5.61
	25%	73.78±1.02	72.68±2.15	70.86±4.00	70.40±4.18	67.06±2.90	72.08±2.89	66.07±6.16	69.92±1.67
	30%	72.02±2.94	72.68±2.15	70.86±4.00	70.40±4.18	64.49±5.70	72.08±2.89	66.07±6.16	69.92±1.67
	35%	70.75±3.18	72.57±2.98	71.54±2.60	71.35±3.99	58.90±5.68	71.68±2.69	61.20±3.92	66.36±5.41
	40%	68.24±10.15	70.00±5.80	67.28±5.79	68.48±5.03	57.15±5.37	64.95±6.39	48.13±4.68	63.52±5.09
	45%	70.80±2.43	70.73±5.18	65.17±6.89	64.09±8.24	46.98±3.99	55.79±5.34	40.30±5.00	49.60±10.83
	50%	68.73±6.74	70.84±3.20	65.90±6.15	67.39±4.83	40.58±6.03	43.34±6.42	32.92±5.02	40.16±7.06

Table 10: **Continued:** comparison of noise model variants across graph label noise robust algorithms for Citeseer dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
CRGNN	5%	76.34±2.41	74.74±1.86	74.64±1.79	74.24±2.41	75.09±1.07	74.78±2.31	74.30±1.48	74.88±3.26
	10%	74.75±1.85	73.73±2.19	73.90±2.22	74.16±1.71	72.93±1.98	73.47±2.12	72.53±2.97	72.34±5.26
	15%	72.65±3.76	74.18±0.99	73.87±2.05	74.04±1.84	68.46±4.22	73.28±2.26	72.27±3.01	72.64±4.89
	20%	73.16±3.11	72.61±3.61	71.57±2.74	71.29±3.06	67.57±4.26	72.31±2.21	65.18±3.82	66.80±2.54
	25%	73.22±1.63	70.35±6.12	71.21±3.16	72.50±1.97	65.98±4.25	70.15±1.75	58.29±9.09	65.34±3.45
	30%	66.57±8.42	72.85±1.59	71.32±3.09	72.48±1.96	58.30±3.59	69.26±3.68	58.08±9.21	65.18±3.21
	35%	70.30±2.01	71.13±4.37	69.48±3.92	69.83±3.81	55.05±4.78	67.03±2.64	52.26±8.92	57.52±3.56
	40%	67.04±8.01	70.09±1.42	59.55±9.25	62.90±11.23	51.98±2.71	54.97±8.59	44.16±7.27	50.08±7.07
	45%	64.84±4.24	64.16±8.81	57.43±7.86	63.37±5.93	45.19±3.63	52.46±3.34	40.44±3.00	42.56±6.28
	50%	58.61±10.66	60.17±9.69	48.89±9.34	56.31±9.96	39.24±2.95	44.35±7.17	31.72±4.61	39.62±4.48
CGNN	5%	77.80±0.83	74.20±1.74	73.69±1.85	73.11±3.40	72.67±4.49	73.51±2.24	74.21±1.59	76.60±4.10
	10%	68.26±7.61	72.25±4.08	73.21±2.53	71.24±4.68	70.31±5.93	73.15±2.19	72.30±2.85	71.56±5.94
	15%	69.00±6.46	72.24±4.10	73.21±2.53	71.24±4.68	70.54±4.92	73.15±2.19	72.67±2.14	71.58±5.86
	20%	67.20±9.02	72.26±1.97	70.18±3.51	69.19±2.38	65.47±8.13	71.48±1.92	64.10±4.91	67.00±8.75
	25%	69.86±4.46	70.54±3.82	69.04±5.15	70.09±4.03	61.63±9.43	67.52±6.32	60.02±7.17	63.08±9.39
	30%	68.08±5.78	70.52±3.80	69.04±5.15	70.11±4.02	60.42±8.46	67.50±6.31	60.02±7.17	63.08±9.39
	35%	64.80±8.75	67.83±5.76	63.80±7.97	62.36±8.36	51.63±7.13	66.05±5.01	54.83±3.89	57.58±10.76
	40%	60.94±10.82	60.79±7.18	53.98±10.53	54.99±8.00	50.20±8.70	56.50±5.54	46.61±3.00	47.64±7.87
	45%	58.62±8.03	55.96±11.66	50.57±11.89	50.62±10.95	44.70±6.39	50.49±6.26	41.45±3.50	46.02±4.30
	50%	50.79±7.70	53.76±10.94	44.16±8.14	46.03±7.97	41.16±3.85	43.77±4.04	35.67±4.35	40.00±5.58
DeGLIF	5%	77.58±1.10	77.36±1.24	77.64±1.71	77.50±1.80	77.92±1.24	77.34±1.41	77.64±1.42	77.74±1.2
	10%	76.92±1.46	76.88±1.31	78.04±1.57	77.54±1.80	77.34±1.10	77.24±1.88	77.06±1.83	77.44±1.21
	15%	77.80±1.72	76.86±1.32	77.80±1.74	77.58±1.78	76.54±1.72	77.18±1.90	77.02±1.82	77.32±1.14
	20%	77.02±1.64	76.30±1.06	76.52±1.59	76.78±2.21	75.78±1.58	76.70±2.21	75.30±2.70	75.42±2.27
	25%	76.10±1.21	76.24±1.48	75.86±2.28	76.04±1.96	74.86±2.20	75.94±2.44	73.40±1.72	74.4±2.95
	30%	75.04±1.61	76.22±1.49	75.80±2.17	76.18±1.92	73.54±2.07	75.98±2.45	73.38±1.75	74.42±3.12
	35%	74.06±1.45	75.66±0.82	75.12±1.77	75.40±2.05	70.54±2.22	73.82±2.06	69.62±3.61	71.98±3.28
	40%	73.18±1.69	74.52±1.61	72.80±2.67	73.06±2.76	67.12±2.05	68.54±4.28	56.60±3.14	59.06±2.17
	45%	70.58±1.44	72.38±2.06	71.18±2.99	71.98±2.90	59.48±3.76	62.02±3.25	47±5.34	52.48±8.28
	50%	67.38±0.88	70.44±2.13	68.34±1.96	69.36±1.85	51.76±2.95	52.2±4.95	37.02±2.47	45.36±7.48

Table 11: Comparison of noise model variants across graph label noise robust algorithms for the Cora dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	84.73±0.94	85.00±0.44	85.19±0.74	85.09±0.73	84.27±0.98	85.36±0.48	85.36±0.50	84.58±0.54
	10%	83.03±1.14	83.90±0.69	83.46±0.69	83.44±0.80	82.08±1.53	83.60±1.00	82.41±1.09	83.69±0.76
	15%	81.08±1.48	83.92±0.71	83.51±0.63	83.47±0.76	79.21±1.82	83.62±1.00	82.40±1.07	83.68±0.77
	20%	79.06±1.46	80.38±1.32	78.37±1.58	78.49±1.47	75.76±1.75	78.38±2.04	74.45±1.68	79.89±1.45
	25%	76.46±1.48	77.46±1.99	74.49±2.09	74.65±2.03	71.97±1.77	74.84±2.58	68.85±2.30	76.35±1.44
	30%	73.68±1.50	77.51±1.99	74.50±2.01	74.64±2.04	67.67±1.98	74.90±2.57	68.81±2.29	76.34±1.48
	35%	70.41±1.76	74.79±2.24	71.08±1.97	71.36±1.95	62.22±2.47	70.45±2.73	63.18±2.46	71.77±2.11
	40%	66.90±2.24	67.84±2.88	62.05±2.52	62.76±2.53	56.91±2.77	60.07±3.21	50.62±2.73	58.63±3.65
	45%	62.29±2.29	63.16±2.94	57.12±2.54	58.06±2.54	50.52±2.76	52.86±3.87	44.28±2.62	50.18±3.92
	50%	57.76±2.36	57.87±2.98	51.78±2.76	52.64±2.61	44.28±2.77	46.56±3.77	38.45±2.82	39.99±5.43
DGNN	5%	78.32±4.81	82.68±2.81	79.80±1.65	78.08±4.58	74.66±9.15	82.50±0.95	78.38±7.58	79.18±1.75
	10%	78.80±5.07	81.06±2.48	68.90±11.77	70.38±9.41	76.74±2.93	82.14±0.84	70.94±8.00	77.96±2.94
	15%	72.60±12.99	81.04±2.57	67.34±13.42	70.28±9.06	72.40±4.04	82.22±0.91	74.00±7.08	75.76±2.94
	20%	77.08±4.10	80.66±2.09	70.38±9.93	67.88±8.07	67.66±8.22	78.82±2.40	63.24±10.91	64.12±11.15
	25%	74.90±5.87	79.38±2.39	65.20±11.22	65.38±13.62	61.78±9.81	77.36±3.91	53.28±12.29	66.54±7.27
	30%	60.32±21.55	79.54±2.03	64.58±11.17	64.74±14.17	61.82±11.15	77.14±3.63	48.86±11.79	63.24±7.41
	35%	59.96±16.53	74.50±8.68	55.26±18.68	61.84±8.26	53.28±10.14	77.08±4.68	49.30±17.08	63.06±3.70
	40%	65.90±15.86	70.68±7.12	54.36±9.28	52.16±14.51	45.02±10.60	58.94±9.51	38.84±8.29	48.66±8.05
	45%	62.34±12.99	60.08±15.94	40.26±8.56	40.10±8.99	46.64±11.84	45.02±11.65	30.94±6.26	52.36±8.54
	50%	64.62±8.05	56.08±15.76	38.42±9.73	40.52±9.75	33.98±7.06	33.96±5.16	21.48±5.34	39.64±6.61
PIGNN	5%	80.19±3.16	81.48±2.16	81.81±2.22	81.71±2.15	80.05±3.50	81.58±1.97	81.79±1.88	81.48±2.84
	10%	80.93±2.77	81.98±1.80	81.22±1.94	80.81±2.27	78.07±3.30	81.33±1.47	80.81±3.26	80.98±2.52
	15%	81.82±1.80	81.98±1.80	81.22±1.94	80.81±2.27	80.77±2.25	81.34±1.49	80.81±3.26	81.02±2.55
	20%	80.02±2.33	80.88±1.66	80.56±2.63	80.27±2.77	79.40±3.52	77.21±1.62	75.22±5.47	75.94±9.03
	25%	79.84±2.30	80.11±2.09	80.66±2.37	78.41±5.17	76.54±3.43	75.71±3.57	72.85±3.56	72.87±8.57
	30%	79.65±2.88	80.10±2.08	80.66±2.37	78.41±5.17	70.53±6.29	75.71±3.57	72.86±3.58	72.87±8.57
	35%	77.91±2.99	80.16±1.44	76.12±4.32	77.76±3.50	68.97±6.49	70.50±3.60	67.43±7.27	69.02±10.41
	40%	77.50±3.33	77.57±2.22	76.80±3.13	76.87±3.57	62.53±4.75	58.87±7.18	53.01±6.52	59.01±10.26
	45%	75.68±2.69	75.74±2.92	74.95±6.39	74.61±5.72	49.64±10.92	46.89±9.64	47.60±7.82	57.05±10.22
	50%	72.63±7.50	72.11±5.20	69.66±8.65	73.30±4.55	45.71±8.38	38.17±4.90	37.64±7.69	45.66±11.34
RNCGLN	5%	83.82±5.00	84.06±4.05	85.32±2.00	87.04±2.01	83.78±2.71	82.08±3.42	88.32±2.02	81.38±0.61
	10%	85.52±1.86	83.14±4.53	80.24±5.90	83.90±1.57	81.86±4.17	84.46±4.02	83.10±2.46	77.46±1.97
	15%	84.50±1.95	83.14±4.53	80.24±5.90	83.90±1.57	82.04±1.87	84.46±4.02	83.10±2.46	77.46±1.97
	20%	81.24±3.62	85.02±0.80	77.46±7.44	76.52±4.67	75.88±5.39	83.08±5.55	75.50±7.64	74.16±1.98
	25%	80.26±5.05	80.24±3.99	71.54±6.55	70.50±4.53	71.94±5.37	77.00±9.12	64.98±3.93	70.60±1.39
	30%	79.46±4.74	80.24±3.99	71.54±6.55	70.50±4.53	70.36±10.52	77.00±9.12	64.98±3.93	70.60±1.39
	35%	64.16±6.37	70.26±4.10	68.54±2.74	70.34±8.76	66.32±8.12	70.04±11.88	59.96±4.31	66.80±4.23
	40%	67.42±9.70	67.14±7.35	55.20±5.68	62.42±9.45	58.42±7.35	60.54±7.37	49.44±4.91	56.90±3.12
	45%	56.52±5.79	61.22±6.57	51.68±5.66	55.40±5.21	52.40±8.32	63.90±8.12	42.58±2.93	49.72±0.79
	50%	60.66±14.26	53.28±4.08	53.68±12.53	45.14±1.67	44.48±5.88	45.48±4.18	38.28±5.98	47.76±4.98
RTGNN	5%	73.54±2.02	74.42±2.12	74.64±1.78	75.04±1.70	75.29±3.09	73.91±2.63	74.28±1.90	73.95±1.58
	10%	75.24±2.98	72.75±2.22	74.30±2.38	75.25±1.82	77.11±1.63	71.20±2.03	73.72±2.28	73.95±1.80
	15%	75.59±1.95	72.70±2.28	74.23±2.38	75.35±1.99	75.15±0.96	71.23±2.04	73.78±2.33	73.87±1.93
	20%	75.29±2.52	73.84±2.19	73.11±5.47	73.68±4.54	75.28±3.65	62.60±7.62	67.79±3.90	72.12±2.46
	25%	75.67±3.00	72.20±3.70	74.12±3.52	73.16±5.07	70.44±3.29	62.89±6.02	55.39±9.03	68.75±4.56
	30%	73.24±5.53	72.52±3.72	74.15±3.52	73.32±5.18	68.93±5.97	63.38±6.40	55.44±8.99	63.31±8.59
	35%	68.48±6.92	72.84±3.32	72.57±4.43	72.57±4.80	64.33±6.31	62.73±5.18	52.42±8.65	56.78±7.72
	40%	72.08±2.58	70.66±4.66	69.83±4.28	69.11±8.94	58.00±10.09	51.37±7.00	45.84±9.49	49.20±6.39
	45%	66.44±7.61	64.95±8.76	68.27±6.98	71.45±5.01	57.38±6.77	51.81±3.87	40.51±8.34	42.77±7.32
	50%	66.67±3.96	64.58±4.74	68.03±8.16	63.99±8.89	52.10±12.26	46.72±5.49	33.64±7.12	42.53±10.47
NRGNN	5%	75.13±3.77	75.47±1.73	75.65±2.62	73.19±2.98	75.40±2.21	74.81±1.82	76.12±2.36	74.99±2.20
	10%	76.62±2.74	73.07±3.09	76.20±2.56	76.10±3.08	74.44±3.36	72.67±3.21	75.76±4.24	75.28±2.29
	15%	76.62±2.74	73.07±3.09	76.20±2.56	74.67±2.73	74.41±3.37	72.67±3.21	74.72±1.98	75.28±2.29
	20%	74.88±2.38	73.68±2.36	76.09±3.05	74.04±3.26	72.99±1.83	70.43±2.00	72.00±5.14	71.79±4.01
	25%	75.03±4.14	73.52±1.88	75.46±2.96	75.05±1.90	69.89±7.82	64.88±7.89	64.97±6.98	65.47±7.14
	30%	75.03±4.14	73.52±1.88	75.46±2.96	73.32±4.07	69.89±7.82	64.88±7.89	65.63±4.66	65.47±7.14
	35%	74.44±2.57	71.19±4.15	73.37±3.82	70.88±6.71	67.62±4.43	61.54±8.91	59.04±6.91	62.00±8.64
	40%	73.59±4.67	65.95±9.41	73.99±5.97	69.08±7.87	56.46±11.03	53.70±8.77	49.72±7.41	52.93±5.00
	45%	71.63±7.77	65.53±9.80	69.96±7.19	70.07±5.05	50.58±13.34	40.34±9.91	40.91±10.40	49.96±6.07
	50%	70.50±9.53	65.64±7.06	68.95±11.43	69.70±8.39	47.45±13.40	33.76±5.54	39.15±12.91	45.79±4.53

Table 11: **Continued:** Comparison of noise model variants across graph label noise robust algorithms for the Cora dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
CRGNN	5%	84.10±1.86	83.99±1.48	84.18±1.72	84.36±1.53	84.26±1.64	84.28±0.92	83.70±1.58	82.16±4.84
	10%	83.42±1.26	83.32±1.46	82.02±3.32	82.63±3.58	81.42±1.75	82.75±1.61	80.48±3.14	82.10±2.27
	15%	80.21±7.68	83.31±1.82	82.41±3.57	83.16±3.59	80.44±1.45	82.77±1.33	80.61±3.49	82.13±2.56
	20%	80.64±2.24	80.63±1.60	81.69±0.66	80.24±2.57	78.28±2.95	77.31±2.83	74.05±3.75	74.63±6.15
	25%	78.25±1.88	76.40±2.57	76.43±5.53	77.58±2.64	75.71±2.56	74.05±2.41	67.48±4.64	69.94±6.77
	30%	76.17±4.27	78.09±3.08	76.40±5.59	77.24±2.92	65.10±6.40	72.67±3.60	67.67±4.50	69.53±6.89
	35%	72.92±4.01	74.80±3.62	73.15±4.90	74.44±4.62	62.59±5.91	65.96±3.99	61.36±5.26	62.62±4.83
	40%	68.39±6.59	61.27±9.52	70.56±3.67	69.63±6.39	55.96±5.79	56.46±7.09	53.60±5.54	51.72±6.62
	45%	65.02±10.42	60.58±12.98	62.98±6.41	60.63±7.09	48.32±9.40	49.27±6.13	46.61±7.83	44.22±7.37
	50%	59.74±5.32	50.87±16.45	54.58±9.87	51.34±5.75	45.03±7.34	42.24±6.08	40.71±6.80	42.36±4.73
CGNN	5%	83.70±3.67	82.43±4.47	83.15±3.11	82.81±3.26	83.57±2.19	83.15±2.76	78.94±11.48	83.27±2.92
	10%	81.39±3.23	81.15±4.09	83.31±1.25	83.11±1.58	82.22±1.56	80.24±3.88	76.80±11.27	82.07±3.84
	15%	82.06±2.29	81.02±4.29	83.35±1.32	83.13±1.52	78.33±4.17	80.26±3.83	76.75±11.17	82.08±3.79
	20%	80.06±3.79	79.84±2.47	79.75±4.56	79.96±4.54	78.17±2.31	75.84±4.21	73.87±5.14	74.95±10.66
	25%	79.46±3.45	74.93±5.98	77.06±4.52	76.29±4.45	75.82±3.25	70.34±9.60	70.54±3.38	71.37±10.88
	30%	79.22±3.23	71.57±14.45	77.10±4.56	76.24±4.49	69.54±5.62	70.36±9.61	70.58±3.39	71.37±10.90
	35%	74.46±6.30	75.87±3.55	73.35±11.50	74.33±11.82	63.24±4.79	67.85±4.68	61.89±9.57	67.36±10.40
	40%	73.56±2.44	64.61±16.26	70.72±13.22	70.37±14.74	55.89±3.07	52.08±11.59	50.77±7.99	54.60±9.32
	45%	67.76±6.19	63.57±9.94	65.63±13.02	65.15±13.00	51.20±7.78	47.45±6.24	46.39±8.02	47.56±10.42
	50%	65.27±10.08	60.78±10.93	61.10±18.00	63.46±12.93	43.75±7.42	41.89±6.64	38.24±4.82	43.29±11.56
DeGLIF	5%	88.79±2.60	88.77±2.79	87.04±6.67	89.41±1.99	88.20±2.12	88.73±2.32	88.86±2.41	84.46±0.8
	10%	88.18±2.43	84.99±10.31	85.32±5.52	87.67±3.37	87.91±2.27	89.13±2.21	83.20±10.25	84.66±1.34
	15%	88.34±2.08	85.05±10.33	85.56±5.64	88.20±3.00	85.68±5.49	89.07±2.19	83.40±10.35	83.68±1.23
	20%	88.29±1.64	86.57±5.97	75.16±24.20	83.70±6.00	84.14±8.42	87.63±1.88	81.98±6.83	82.41±1.33
	25%	87.33±2.74	85.71±6.37	86.17±3.31	85.68±5.04	86.63±1.84	87.60±2.01	73.27±16.10	80.74±1.15
	30%	88.11±1.47	85.88±6.49	85.68±4.32	85.47±4.64	82.74±3.94	87.70±2.09	71.72±15.85	80.58±0.9
	35%	87.73±1.93	88.66±0.57	82.34±5.53	82.18±5.70	75.29±6.52	83.76±3.54	66.87±8.56	79.1±1.6
	40%	86.75±2.57	86.07±1.27	73.32±9.49	81.26±3.58	72.46±6.93	75.86±7.05	52.50±7.85	69.52±3.58
	45%	84.85±2.21	83.60±2.00	75.33±7.08	78.58±6.30	60.11±3.78	63.50±6.69	44.94±2.33	61.2±6.07
	50%	80.60±4.75	83.35±1.93	67.70±13.65	73.88±7.90	48.40±7.31	46.81±9.18	36.33±3.81	44.16±5.2

Table 12: Comparison of noise model variants across graph label noise robust algorithms for the Amazon Photo dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
GCN	5%	86.78±1.43	83.65±6.28	85.05±4.56	83.55±6.18	86.66±1.46	84.65±5.59	85.35±4.21	84.85±2.89
	10%	86.45±1.16	82.29±12.38	84.14±3.82	83.54±4.67	85.58±1.32	84.38±5.67	83.60±3.27	80.91±5.22
	15%	85.49±1.21	82.30±12.38	84.16±3.85	83.55±4.67	83.53±1.19	84.39±5.69	83.58±3.26	80.92±5.18
	20%	82.83±3.66	82.86±6.06	83.05±3.65	80.82±5.00	79.72±4.84	77.60±10.34	77.68±6.76	72.0±6.66
	25%	83.96±2.99	78.28±9.38	81.87±4.08	80.58±7.92	77.00±5.47	74.15±9.42	70.81±7.69	66.82±8.03
	30%	81.15±9.72	78.26±9.39	81.88±4.03	80.66±7.91	70.94±12.13	74.16±9.41	70.82±7.69	66.83±8.05
	35%	83.01±3.82	76.80±11.90	77.65±7.65	78.01±9.09	62.77±7.32	69.21±9.21	63.43±4.89	61.85±12.71
	40%	78.75±4.02	76.00±10.41	71.06±12.34	70.89±9.41	54.20±7.31	56.45±8.28	49.66±3.14	45.15±6.21
	45%	73.45±5.67	75.36±8.82	66.92±11.98	67.85±11.36	44.15±4.85	49.57±7.92	40.74±2.65	40.03±5.61
	50%	72.71±4.76	71.59±6.88	64.10±8.61	66.44±7.91	36.19±4.19	42.51±7.34	33.15±3.93	33.98±6.6
DGNN	5%	78.32±4.81	82.68±2.81	79.80±1.65	78.08±4.58	74.66±9.15	82.50±0.95	78.38±7.58	61.44±27.08
	10%	78.80±5.07	81.06±2.48	68.90±11.77	70.38±9.41	76.74±2.93	82.14±0.84	70.94±8.00	58.92±23.53
	15%	72.60±12.99	81.04±2.57	67.34±13.42	70.28±9.06	72.40±4.04	82.22±0.91	74.00±7.08	59.48±21.26
	20%	77.08±4.10	80.66±2.09	70.38±9.93	67.88±8.07	67.66±8.22	78.82±2.40	63.24±10.91	49.32±20.89
	25%	74.90±5.87	79.38±2.39	65.20±11.22	65.38±13.62	61.78±9.81	77.36±3.91	53.28±12.29	55.50±5.54
	30%	60.32±21.55	79.54±2.03	64.58±11.17	64.74±14.17	61.82±11.15	77.14±3.63	48.86±11.79	47.58±17.63
	35%	59.96±16.53	74.50±8.68	55.26±18.68	61.84±8.26	53.28±10.14	77.08±4.68	49.30±17.08	43.64±12.16
	40%	65.90±15.86	70.68±7.12	54.36±9.28	52.16±14.51	45.02±10.60	58.94±9.51	38.84±8.29	36.16±10.11
	45%	62.34±12.99	60.08±15.94	40.26±8.56	40.10±8.99	46.64±11.84	45.02±11.65	30.94±6.26	35.96±4.80
	50%	64.62±8.05	56.08±15.76	38.42±9.73	40.52±9.75	33.98±7.06	33.96±5.16	21.48±5.34	30.84±4.52
PIGNN	5%	88.9±0.4	89.56±0.58	90.72±0.31	92.42±0.59	89.74±1.26	88.02±0.96	89.96±0.58	90.06±0.88
	10%	90.1±1.7	89.76±0.57	90.80±0.53	90.56±0.36	90.28±0.33	88.60±1.21	88.16±2.47	89.10±1.80
	15%	91±1.3	89.66±0.57	90.70±0.55	90.70±0.60	89.94±0.76	88.72±1.25	88.24±2.08	90.00±1.31
	20%	88.1±1.8	89.28±0.77	89.88±0.47	89.92±0.77	86.96±2.16	87.62±2.28	81.84±2.14	86.22±2.34
	25%	86.8±3.4	88.96±1.72	90.30±0.65	90.52±0.50	85.22±2.21	87.52±2.15	74.56±2.17	82.10±2.06
	30%	87.6±0.7	89.28±1.50	90.00±0.87	89.80±1.33	84.74±2.88	87.92±1.78	74.46±2.84	82.08±2.14
	35%	86.3±1.8	88.50±1.94	89.44±1.07	88.26±1.61	80.28±2.50	85.74±3.42	68.84±2.21	80.32±3.22
	40%	82.5±5.2	88.24±1.05	81.78±4.91	85.44±2.54	72.60±4.82	76.26±7.91	53.78±4.28	71.98±4.49
	45%	82.2±4.2	87.22±2.37	79.86±7.22	80.64±3.36	60.44±8.51	62.38±9.04	42.86±6.44	63.52±2.81
	50%	76.9±4.3	87.22±2.11	75.68±3.31	78.70±4.57	49.82±8.58	50.70±9.25	34.38±4.72	56.26±1.92
RNCGLN	5%	83.82±5.00	84.06±4.05	85.32±2.00	87.04±2.01	83.78±2.71	82.08±3.42	88.32±2.02	84.48±3.53
	10%	85.52±1.86	83.14±4.53	80.24±5.90	83.90±1.57	81.86±4.17	84.46±4.02	83.10±2.46	83.54±4.51
	15%	84.50±1.95	83.14±4.53	80.24±5.90	83.90±1.57	82.04±1.87	84.46±4.02	83.10±2.46	83.54±4.51
	20%	81.24±3.62	85.02±0.80	77.46±7.44	76.52±4.67	75.88±5.39	83.08±5.55	75.50±7.64	75.76±7.18
	25%	80.26±5.05	80.24±3.99	71.54±6.55	70.50±4.53	71.94±5.37	77.00±9.12	64.98±3.93	69.96±6.36
	30%	79.46±4.74	80.24±3.99	71.54±6.55	70.50±4.53	70.36±10.52	77.00±9.12	64.98±3.93	69.96±6.36
	35%	64.16±6.37	70.26±4.10	68.54±2.74	70.34±8.76	66.32±8.12	70.04±11.88	59.96±4.31	67.94±9.42
	40%	67.42±9.70	67.14±7.35	55.20±5.68	62.42±9.45	58.42±7.35	60.54±7.37	49.44±4.91	57.28±8.30
	45%	56.52±5.79	61.22±6.57	51.68±5.66	55.40±5.21	52.40±8.32	63.90±8.12	42.58±2.93	48.34±1.06
	50%	60.66±14.26	53.28±4.08	53.68±12.53	45.14±1.67	44.48±5.88	45.48±4.18	38.28±5.98	45.32±2.65
RTGNN	5%	80.8±5.3	81.93±2.17	81.46±2.44	84.14±2.19	82.24±0.86	83.45±1.10	81.95±1.42	82.04±1.53
	10%	82.2±5.3	80.80±1.06	83.20±1.55	83.12±2.01	83.09±0.93	82.03±2.15	82.12±1.49	82.85±2.32
	15%	83.6±2.7	81.29±1.87	82.16±2.43	82.89±1.75	82.18±1.02	81.81±2.07	81.75±1.43	81.96±1.42
	20%	84±2.2	83.11±3.04	82.52±2.48	82.67±2.16	83.85±1.35	84.50±3.96	77.35±6.71	78.33±8.36
	25%	82.9±4.9	82.63±3.85	82.93±3.32	81.96±2.17	83.17±3.79	84.88±3.15	69.78±3.62	76.19±6.53
	30%	78.8±6.4	82.69±4.25	82.88±3.83	82.25±1.89	81.62±3.80	85.79±2.88	70.53±3.80	76.03±6.71
	35%	79.3±5.4	83.56±4.32	81.93±2.37	82.83±3.04	78.67±5.08	81.04±9.22	64.12±6.47	73.21±4.48
	40%	83.5±4.7	83.23±3.07	74.40±8.00	80.99±3.04	67.18±8.84	70.42±11.24	51.86±6.85	70.48±4.20
	45%	86±1.3	84.98±1.62	75.71±7.21	74.46±5.80	60.86±8.45	58.03±12.32	47.17±8.88	60.56±3.57
	50%	79.9±5	85.05±1.16	68.25±10.02	68.62±5.65	51.60±10.05	47.89±14.48	42.44±5.21	55.36±3.04
NRGNN	5%	69±8	87.52±0.90	87.34±1.68	88.40±2.77	89.74±1.26	87.08±1.67	86.56±1.54	85.90±2.81
	10%	68.1±6.8	86.58±1.88	88.02±1.40	87.88±1.22	90.28±0.33	87.26±1.83	86.04±2.95	85.00±2.58
	15%	72.4±5.5	86.34±2.17	87.46±1.84	87.14±0.90	89.94±0.76	87.26±1.94	85.88±2.69	84.62±3.32
	20%	66.5±5.1	86.78±2.29	87.44±0.86	86.20±1.92	86.96±2.16	87.76±1.25	78.96±4.57	82.34±5.03
	25%	55.1±5.4	86.92±2.84	85.92±0.64	86.08±0.90	85.22±2.21	85.52±2.32	72.50±4.41	81.24±5.63
	30%	60±7.1	86.90±2.73	86.00±0.76	85.94±0.40	84.74±2.88	85.22±2.14	72.32±4.41	81.00±5.43
	35%	58.3±6	85.40±4.60	85.44±1.46	84.72±2.12	80.28±2.50	84.34±3.26	67.28±3.30	78.48±7.20
	40%	60±5.1	85.44±4.15	79.38±3.36	81.32±2.96	72.60±4.82	75.40±6.37	55.44±4.89	69.90±6.54
	45%	54.5±6.2	86.70±1.72	73.78±4.98	81.42±2.51	60.44±8.51	66.20±8.31	49.90±3.87	58.78±1.89
	50%	51.5±5.9	85.92±0.87	69.54±6.52	71.34±7.86	49.82±8.58	51.24±7.32	41.64±4.98	56.56±5.51

Table 12: **Continued:** Comparison of noise model variants across graph label noise robust algorithms for the Amazon Photo dataset. Reported values are accuracy±std of 10 repetitions.

Noise Robust Methods	Noise Level	SLN	MV+ SLN	Veto+ SLN	Seq+ SLN	PWN	MV+ PWN	Veto+ PWN	Seq+ PWN
CRGNN	5%	59.04±12.73	44.60±12.81	54.28±14.68	54.52±14.41	54.80±12.30	52.82±12.77	47.36±15.24	37.54±46.21
	10%	47.82±7.18	49.66±8.69	52.98±20.93	56.80±15.44	49.50±22.16	48.52±16.00	42.60±10.71	37.70±46.43
	15%	45.18±11.56	50.88±10.12	52.66±19.01	55.70±17.17	46.32±16.69	50.60±14.56	43.18±8.97	36.84±45.31
	20%	28.26±16.21	36.92±11.71	41.66±13.60	30.96±15.38	51.22±18.45	49.02±12.78	46.08±13.86	33.22±40.32
	25%	45.02±10.86	37.82±11.13	35.76±11.64	35.22±14.65	47.68±20.70	31.22±7.03	41.32±7.76	32.74±39.74
	30%	23.20±10.72	34.80±13.36	34.20±8.65	34.04±14.97	35.78±10.66	37.42±9.29	39.16±4.63	33.24±40.32
	35%	25.78±10.25	34.08±12.27	29.32±5.16	27.10±5.88	30.62±13.45	34.92±5.10	36.94±7.39	26.36±31.04
	40%	30.56±4.71	35.72±10.82	29.00±8.54	22.84±6.12	34.36±13.35	36.58±13.16	30.90±9.06	24.52±28.75
	45%	29.48±15.05	31.20±5.21	23.12±5.72	18.82±4.97	33.14±13.04	37.74±8.31	27.42±4.28	19.78±21.92
	50%	22.32±7.22	23.46±11.85	18.96±9.50	22.50±6.74	22.00±4.49	30.28±6.45	27.88±3.31	20.48±22.98
CGNN	5%	39.08±28.12	28.70±12.19	23.32±6.22	33.60±21.41	33.82±19.18	25.10±7.71	32.08±11.53	56.84±25.81
	10%	34.84±21.85	21.94±9.72	26.16±9.72	27.18±22.91	36.48±14.53	22.44±7.35	26.90±9.63	59.74±18.83
	15%	31.26±24.51	19.46±10.57	26.30±10.02	27.52±22.67	41.60±23.20	22.44±7.34	26.66±9.52	60.02±19.02
	20%	35.18±19.95	27.46±8.12	27.58±14.10	29.90±21.35	29.64±14.72	19.42±6.97	31.82±10.28	59.46±25.09
	25%	34.08±23.35	22.70±8.20	24.30±5.93	25.88±24.09	31.26±18.21	22.48±3.59	29.08±7.08	47.86±14.05
	30%	31.98±14.61	22.32±8.40	24.38±5.96	25.72±23.70	29.58±16.67	22.38±3.70	29.10±7.20	47.50±13.35
	35%	22.42±10.69	16.68±7.75	28.20±16.37	28.30±23.33	40.74±20.02	21.70±8.10	25.56±5.51	50.58±12.89
	40%	28.72±11.36	18.12±10.43	24.04±9.91	20.62±22.20	22.00±16.94	24.02±7.07	27.00±4.35	43.52±19.07
	45%	16.62±9.35	17.40±9.27	20.84±7.90	22.96±11.08	22.74±12.74	24.44±7.80	25.78±7.39	36.52±9.30
	50%	25.10±9.55	20.32±8.24	23.74±5.31	24.00±8.78	25.22±12.10	19.60±8.02	24.78±8.12	37.12±6.93
DeGLIF	5%	88.79±2.60	88.77±2.79	87.04±6.67	89.41±1.99	88.20±2.12	88.73±2.32	88.86±2.41	89.09 ±2.13
	10%	88.18±2.43	84.99±10.31	85.32±5.52	87.67±3.37	87.91±2.27	89.13±2.21	83.20±10.25	87.11±2.74
	15%	88.34±2.08	85.05±10.33	85.56±5.64	88.20±3.00	85.68±5.49	89.07±2.19	83.40±10.35	87.40±2.41
	20%	88.29±1.64	86.57±5.97	75.16±24.20	83.70±6.00	84.14±8.42	87.63±1.88	81.98±6.83	82.98±2.91
	25%	87.33±2.74	85.71±6.37	86.17±3.31	85.68±5.04	86.63±1.84	87.60±2.01	73.27±16.10	79.08±4.45
	30%	88.11±1.47	85.88±6.49	85.68±4.32	85.47±4.64	82.74±3.94	87.70±2.09	71.72±15.85	79.25±4.25
	35%	87.73±1.93	88.66±0.57	82.34±5.53	82.18±5.70	75.29±6.52	83.76±3.54	66.87±8.56	77.09±4.9
	40%	86.75±2.57	86.07±1.27	73.32±9.49	81.26±3.58	72.46±6.93	75.86±7.05	52.50±7.85	61.99±10.1
	45%	84.85±2.21	83.60±2.00	75.33±7.08	78.58±6.30	60.11±3.78	63.50±6.69	44.94±2.33	52.92±11.73
	50%	80.60±4.75	83.35±1.93	67.70±13.65	73.88±7.90	48.40±7.31	46.81±9.18	36.33±3.81	40.52±9.96