Supplementary Materials

1 Evaluation metrics

In the model evaluation section, we evaluate the CVDs detection performance of different models using six metrics: ranking loss, coverage, mean average precision (MAP), macro AUC, macro G_{beta}, and macro F_{beta}. Here, we provide detailed descriptions of how to compute the metrics based on the model predictions $P = M(X), P \in \mathbb{R}^{N \times C}$ and the multi-label ground truths $Y \in \mathbb{R}^{N \times C}$. N is the sample size and C is the number of categories. Each row $y_n = \left[y_n^1, y_n^2, \cdots, y_n^C\right], y_n^C \in \{0, 1\}$ in Y indicates the multi-label ground-truth of sample n. Specifically, if $y_n^1 == 1, y_n^2 == 1, y_n^3 == 0$, sample n belongs to class 1 and class 2 simultaneously, but it does not belong to class 3. Each row $p_n = \left[p_n^1, p_n^2, \cdots, p_n^C\right], p_n^C \in [0, 1]$ in P indicates the multi-label CVDs predictions of sample n.

(1) The Ranking Loss calculates the average count of label pairs that are reversely ordered [1, 2]. For given predictions P and ground-truth Y, it is weighted by the size of the label set and the number of labels not in the label set. The best performance is achieved with a ranking loss of zero. The computation process of the ranking loss can be found in ref. [1].

(2) The coverage evaluates the steps needed to go through the ranked label list to cover all the ground-truth labels [1, 2]. The smaller the coverage is, the better the performance. The best value is the average number of positive labels in Y per sample. The computation process of the coverage can also be found in ref. [1].

(3) Macro AUC calculates the average Area Under Curve (AUC) across all the CVDs categories, defined as

$$\text{Macro AUC} = \frac{1}{C} \sum_{c=1}^{C} \text{AUC}_c, \tag{S1}$$

where AUC_c is AUC on CVD class c. The higher the Macro AUC is, the better the performance. The best performance is achieved with a ranking loss of one.

(4) MAP indicates the mean average precision across all CVDs. The computation process of the average precision on a given class can also be found in ref. [1]. The higher the MAP is, the better the performance. The best performance is achieved with a ranking loss of one.

(5) Macro $F_{\beta=2}$ calculates the average $F_{\beta=2}$ score across all the CVDs categories, defined as

$$\text{Macro } F_{\beta=2} = \frac{1}{C} \sum_{c=1}^{C} F_{\beta=2}^{c}, \tag{S2}$$

$$F_{\beta} = \frac{(1+\beta^2)\,\text{TP}}{(1+\beta^2)\,\text{TP} + \text{TP} + \beta^2 \text{FN}} \tag{S3}$$

where $F_{\beta=2}^{c}$ is $F_{\beta=2}$ score on CVD class c. TP represents the number of true positive predictions, while FN means the number of false negative predictions. The β value is set to 2 for all the corresponding experiments following the configurations provided in ref. [3]. The higher the macro $F_{\beta=2}$ is, the better the performance. The best performance is achieved with a macro $F_{\beta=2}$ of one.

(6) Macro $G_{\beta=2}$ calculates the average $G_{\beta=2}$ score across all the CVDs categories, defined as

$$\text{Macro } G_{\beta=2} = \frac{1}{C}\sum_{c=1}^{C} G^{c}_{\beta=2}, \tag{S4}$$

$$G_{\beta} = \frac{\text{TP}}{\text{TP} + \text{FP} + \beta\text{FN}} \tag{S5}$$

where $G^{c}_{\beta=2}$ is $G_{\beta=2}$ score on CVD class c. FP represents the number of false positive predictions. The β value is set to 2 for all the corresponding experiments following the configurations provided in ref. [3]. The higher the macro $G_{\beta=2}$ is, the better the performance. The best performance is achieved with a macro $G_{\beta=2}$ of one.

2 Detailed model performance for each CVD

Here, we provide the detailed model performance for each CVD using the base backbone. The CVDs analyzed in our study can be found in Table S1. Note that different datasets contain various CVD classes, and there is a class imbalance issue with all datasets. Then, we report the $F_{\beta=2}$ score of each compared model on each CVD class. We also present the macro $F_{\beta=2}$ score, which is an average of the $F_{\beta=2}$ score across all CVDs. In this section, state-of-the-art methods in semi-supervised learning are used for comparisons, including ReMixMatch [4], FixMatch [5], FlexMatch [6], SoftMatch [7], MixedTeacher [8], Adsh [9], SAW [10]. The experiment results on four datasets are shown in Table S2, Table S3, Table S4 and Table S5. Compared with other semi-supervised models, CE-SSL demonstrates the best detection performance in some CVDs and archives on-par performance in the remaining CVDs.

3 Detailed results on statistical analysis

In this section, we provide detailed statistical analysis results to evaluate the significance levels of the performance difference between CE-SSL and the aforementioned baselines using different backbones. Applying paired t-tests, we compare their performance on four datasets and present the two-sided p-value in Fig.S1, Fig.S2 and Fig.S3. For each dataset, the model performance under six random seeds is used for the paired t-tests. Note that the initial ranks for LoRA, DyLoRA, AdaLoRA, IncreLoRA, and CE-SSL are set to 16. Based on the calculated p-value, it can be observed that CE-SSL outperforms the baselines at a 0.05 significance level in most datasets and evaluation metrics, which indicates a significant superiority for the proposed CE-SSL framework.

4 Extended results on ablation study

In this section, we provide the ablation study of CE-SSL using medium and large backbones in Table S6 and Table S7. Note that the initial rank r is 16 for all the compared models. (1) It can be observed that removing the random-deactivation technique from CE-SSL increases the Time/iter and decreases the CVDs detection performance on the four datasets. For example, with the medium backbone, the Time/iter increases from 243ms to 259ms and the macro F_{beta} decreases from 0.561±0.024 to 0.540±0.022 on the G12EC database. With the large backbone, the Time/iter increases from 451ms to 480ms and the macro F_{beta} decreases from 0.552±0.018 to 0.529±0.021 on the Chapman database. (2) It is demonstrated that the one-shot rank allocation increases the detection performance with high computation efficiency. For instance, with the

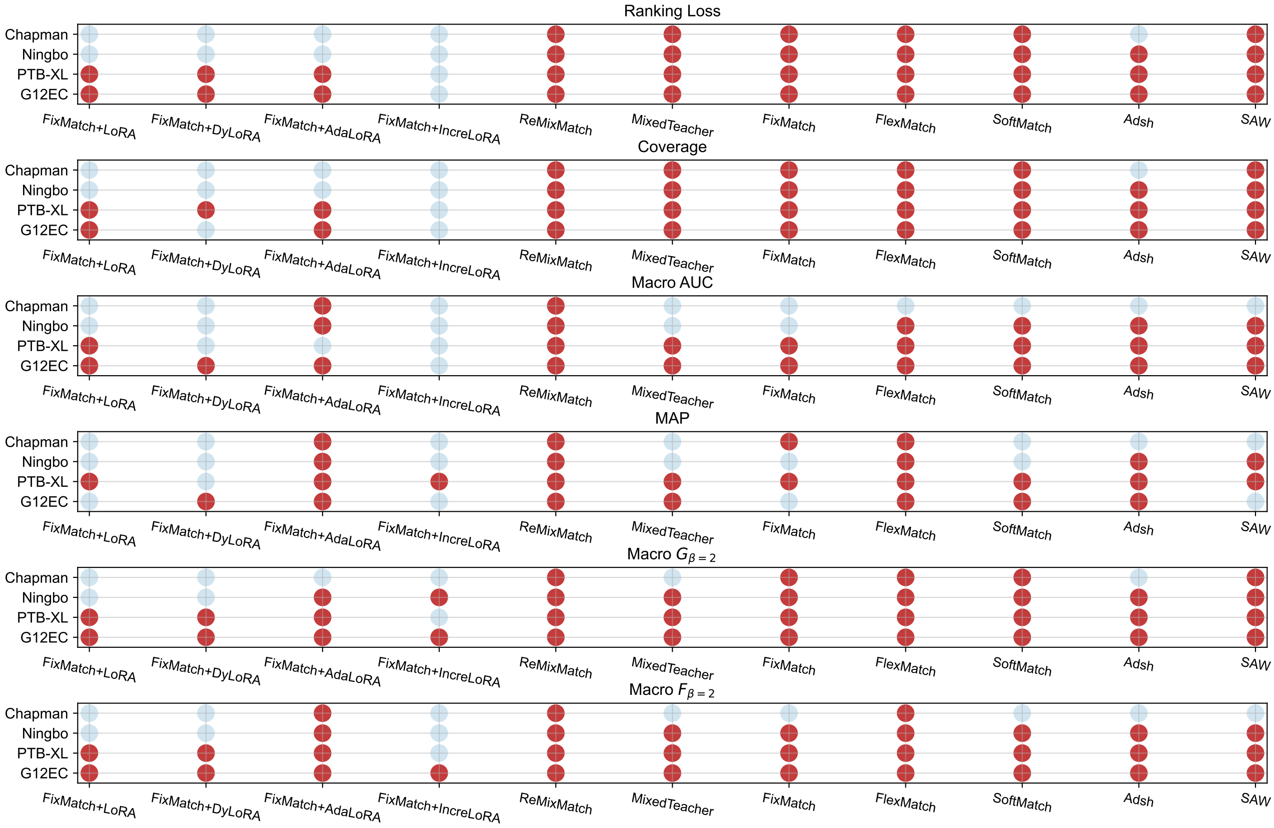

Fig S1: Paired t-test results for model performance on the base backbone. Specifically, we use the paired t-test to check if the proposed CE-SSL significantly outperforms other baseline models on four datasets and six evaluation metrics. Each circle represents a paired t-test result between CE-SSL and a baseline model. The colors of the circles denote the significance levels (two-sided p-value) of the test results after false discovery rate (FDR) correction for multiple testing. The red circle indicates that the corresponding two-sided p-value is less than 0.05.

medium backbone, the macro $F_{\beta=2}$ increases from 0.515±0.022 to 0.540±0.019, and the MAP increases from 0.537±0.010 to 0.553±0.013 on the Chapman dataset. With the large backbone, the macro $F_{\beta=2}$ increases from 0.562±0.019 to 0.587±0.008, and the macro $G_{\beta=2}$ increases from 0.340±0.016 to 0.358±0.005 on the PTB-XL database. More importantly, the proposed method completes the rank allocation process without introducing high computational costs (Time/iter only increases by 1-7ms). (3) Removing the lightweight semi-supervised learning module from CE-SSL decreases the CVDs diagnostic performance on different backbone sizes. With the medium backbone, the macro $F_{\beta=2}$ score decreases from 0.588±0.021 to 0.576±0.024 and macro $G_{\beta=2}$ decreases from 0.356±0.013 to 0.346±0.018 on the Ningbo dataset. With the large backbone, the macro $F_{\beta=2}$ score decreases from 0.565±0.010 to 0.552±0.018 and macro $G_{\beta=2}$ decreases from 0.322±0.009 to 0.314±0.014 on the G12EC dataset.

References

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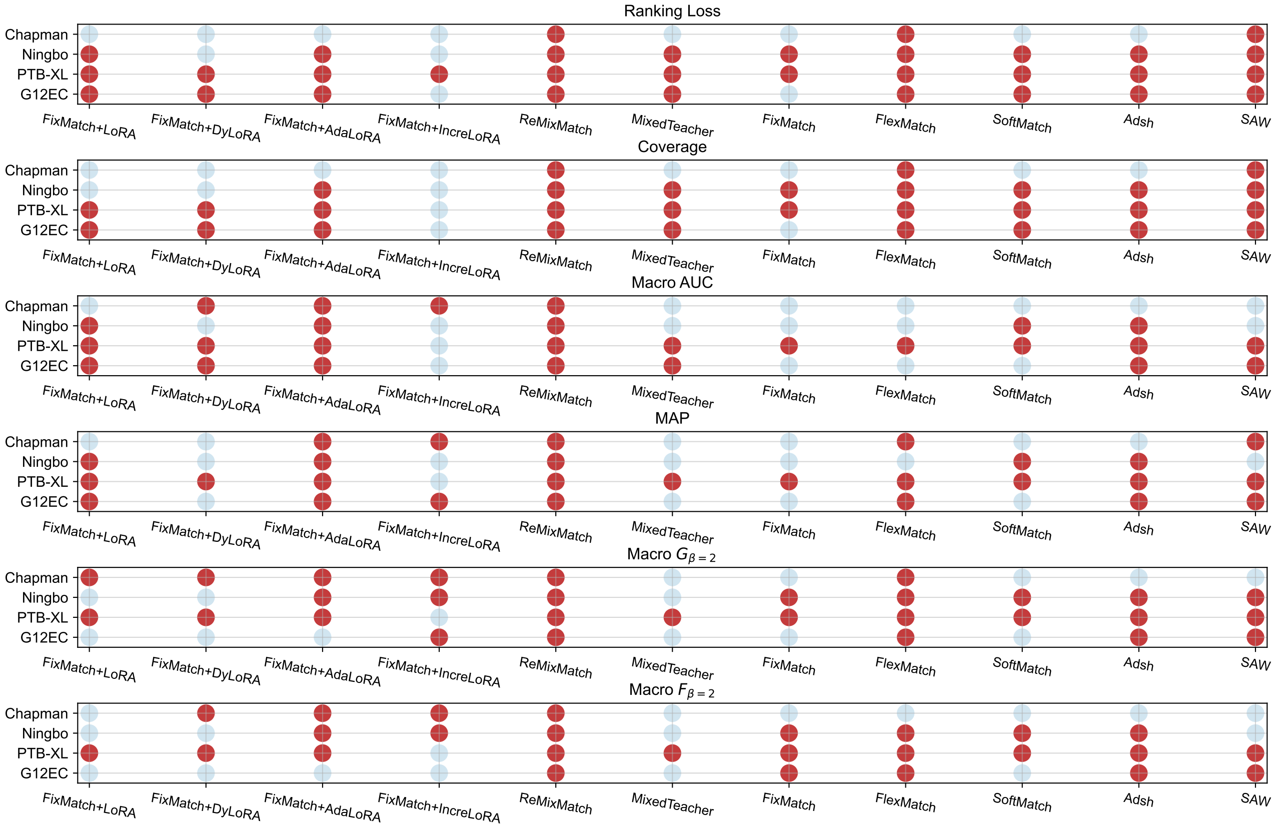

Fig S2: Paired t-test results for model performance on the medium backbone. Specifically, we use the paired t-test to check if the proposed CE-SSL significantly outperforms other baseline models on four datasets and six evaluation metrics. Each circle represents a paired t-test result between CE-SSL and a baseline model. The colors of the circles denote the significance levels (two-sided p-value) of the test results after false discovery rate (FDR) correction for multiple testing. The red circle indicates that the corresponding two-sided p-value is less than 0.05.

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Fig S3: Paired t-test results for model performance on the large backbone. Specifically, we use the paired t-test to check if the proposed CE-SSL significantly outperforms other baseline models on four datasets and six evaluation metrics. Each circle represents a paired t-test result between CE-SSL and a baseline model. The colors of the circles denote the significance levels (two-sided p-value) of the test results after false discovery rate (FDR) correction for multiple testing. The red circle indicates that the corresponding two-sided p-value is less than 0.05.

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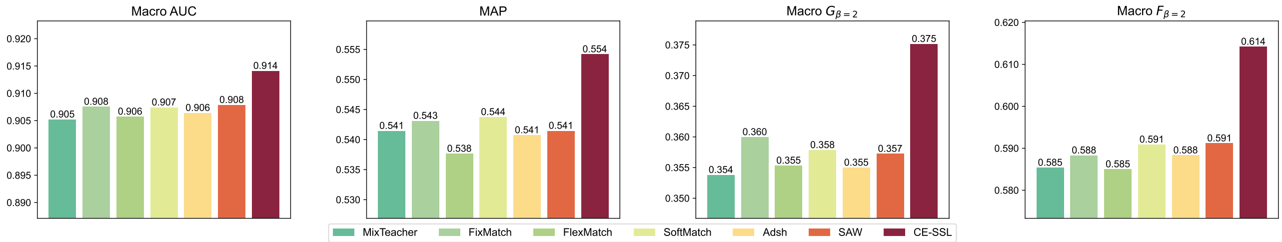
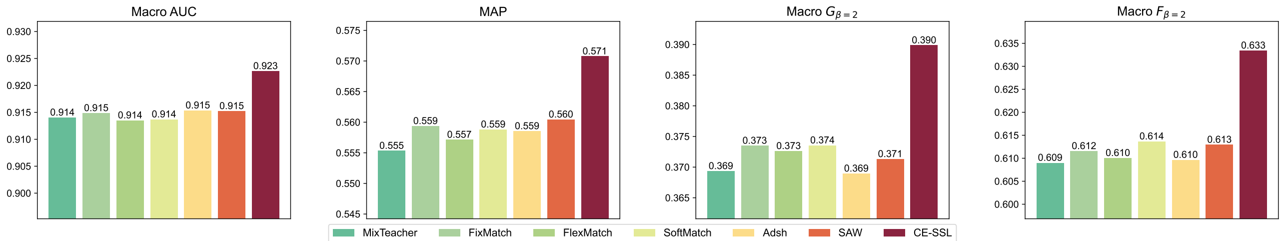
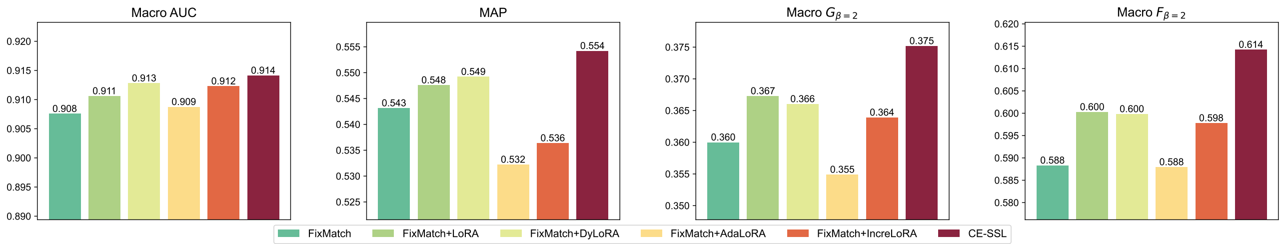


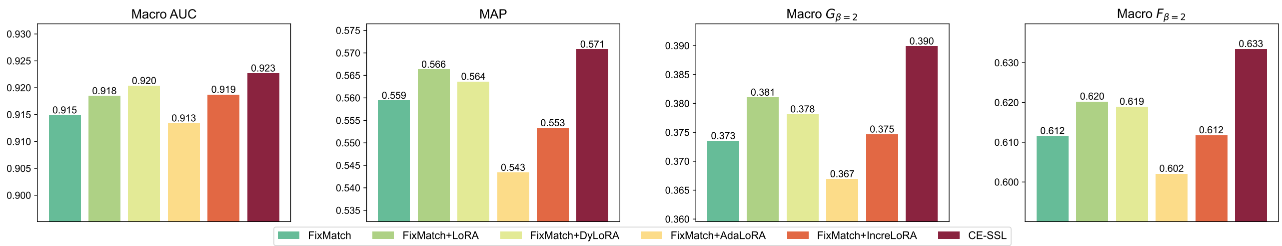
(a) Comparisons between CE-SSL and semi-supervised baselines (labeled ratio = 0.10)



(b) Comparisons between CE-SSL and semi-supervised baselines (labeled ratio = 0.15)



(c) Comparisons between CE-SSL and parameter-efficient semi-supervised baselines (labeled ratio = 0.10)



(d) Comparisons between CE-SSL and parameter-efficient semi-supervised baselines (labeled ratio = 0.15)

Fig S4: Performance comparisons between CE-SSL and the baseline models under various labeled ratios using the base backbone.

Table S1: Description of the cardiovascular diseases analyzed in our study. The abbreviations (Abb) and the total number of instances (Nums) of a certain class are denoted as 'Abb (Nums)'. During the fine-tuning process, only 5% of the training samples are labeled, while the remaining 95% samples are unlabeled.

Original annotation	**Abb (Nums)**	**Original annotation**	**Abb (Nums)**
	G12EC Dataset		
atrial fibrillation	AF (570)	1st degree av block	IAVB (769)
incomplete right bundle branch block	IRBBB (407)	left axis deviation	LAD (940)
left bundle branch block	LBBB (231)	low qrs voltages	LQRSV (374)
nonspecific intraventricular conduction disorder	NSIVCB (203)	sinus rhythm	NSR (1752)
premature atrial contraction	PAC (639)	prolonged qt interval	LQT (1391)
qwave abnormal	QAb (464)	right bundle branch block	RBBB (542)
sinus arrhythmia	SA (455)	sinus bradycardia	SB (1677)
sinus tachycardia	STach (1261)	t wave abnormal	TAb (2306)
t wave inversion	TInv (812)	ventricular premature beats	VPB (357)
	PTB-XL Dataset		
atrial fibrillation	AF (1514)	complete right bundle branch block	CRBBB (542)
1st degree av block	IAVB (797)	incomplete right bundle branch block	IRBBB (1118)
left axis deviation	LAD (5146)	left anterior fascicular block	LAnFB (1626)
left bundle branch block	LBBB (536)	nonspecific intraventricular conduction disorder	NSIVCB (789)
sinus rhythm	NSR (18092)	premature atrial contraction	PAC (398)
pacing rhythm	PR (296)	prolonged pr interval	LPR (340)
qwave abnormal	QAb (548)	right axis deviation	RAD (343)
sinus arrhythmia	SA (772)	sinus bradycardia	SB (637)
sinus tachycardia	STach (826)	t wave abnormal	TAb (2345)
t wave inversion	TInv (294)		
	Ningbo Dataset		
atrial flutter	AFL (7615)	bundle branch block	BBB (385)
complete left bundle branch block	CLBBB (213)	complete right bundle branch block	CRBBB (1096)
1st degree av block	IAVB (893)	incomplete right bundle branch block	IRBBB (246)
left axis deviation	LAD (1163)	left anterior fascicular block	LAnFB (380)
low qrs voltages	LQRSV (794)	nonspecific intraventricular conduction disorder	NSIVCB (536)
sinus rhythm	NSR (6299)	premature atrial contraction	PAC (1054)
pacing rhythm	PR (1182)	poor R wave Progression	PRWP (638)
premature ventricular contractions	PVC (1091)	prolonged qt interval	LQT (337)
qwave abnormal	QAb (828)	right axis deviation	RAD (638)
sinus arrhythmia	SA (2550)	sinus bradycardia	SB (12670)
sinus tachycardia	STach (5687)	t wave abnormal	TAb (5167)
t wave inversion	TInv (2720)		
	Chapman Dataset		
atrial fibrillation	AF (1780)	atrial flutter	AFL (445)
1st degree av block	IAVB (247)	left axis deviation	LAD (382)
left bundle branch block	LBBB (205)	low qrs voltages	LQRSV (249)
nonspecific intraventricular conduction disorder	NSIVCB (235)	sinus rhythm	NSR (1826)
premature atrial contraction	PAC (258)	qwave abnormal	QAb (235)
right axis deviation	RAD (215)	right bundle branch block	RBBB (454)
sinus bradycardia	SB (3889)	sinus tachycardia	STach (1568)
t wave abnormal	TAb (1876)	ventricular premature beats	VPB (294)

Table S2: Detailed model performance for each CVD within the G12EC dataset using the base backbone. For each CVD, the averaged $F_{\beta=2}$ and standard deviations are shown across six seeds. For simplicity, we present the abbreviations of different CVDs. The model with the best performance is denoted in **bold**.

Methods	ReMixMatch	MixedTeacher	FixMatch	FlexMatch	SoftMatch	Adsh	SAW	**CE-SSL$_{r=4}$**	**CE-SSL$_{r=16}$**
AF	0.311±0.145	0.508±0.078	0.523±0.083	0.529±0.072	0.521±0.059	0.443±0.133	0.566±0.067	0.659±0.075	**0.668±0.036**
IAVB	0.389±0.076	0.729±0.030	0.670±0.066	0.597±0.129	0.679±0.044	0.589±0.194	0.654±0.077	**0.747±0.022**	0.719±0.081
IRBBB	0.218±0.037	0.467±0.067	0.435±0.071	0.425±0.058	0.410±0.092	0.381±0.126	0.436±0.090	**0.536±0.022**	0.533±0.040
LAD	0.492±0.109	**0.659±0.065**	0.627±0.094	0.642±0.031	0.604±0.084	0.601±0.077	0.608±0.070	0.633±0.045	0.636±0.043
LBBB	0.450±0.186	0.581±0.236	0.624±0.193	0.557±0.255	0.544±0.201	0.588±0.126	0.598±0.221	0.706±0.121	**0.713±0.191**
LQRSV	0.139±0.079	0.208±0.069	**0.212±0.025**	0.167±0.068	0.202±0.051	0.160±0.065	0.205±0.030	0.184±0.062	0.197±0.064
NSIVCB	0.033±0.057	0.119±0.090	0.058±0.044	0.080±0.070	0.077±0.075	0.030±0.035	0.051±0.059	**0.260±0.030**	0.208±0.026
NSR	0.639±0.048	0.759±0.020	0.754±0.024	0.764±0.029	**0.771±0.018**	0.755±0.009	0.738±0.031	0.748±0.020	0.766±0.014
PAC	0.260±0.029	0.313±0.027	0.310±0.031	0.299±0.025	0.324±0.046	0.329±0.035	0.292±0.056	**0.388±0.043**	0.376±0.033
LQT	0.496±0.037	0.548±0.055	0.578±0.013	**0.579±0.022**	0.559±0.037	0.524±0.070	0.516±0.066	0.576±0.034	0.570±0.037
QAb	0.178±0.108	0.315±0.029	**0.322±0.031**	0.298±0.088	0.305±0.033	0.306±0.040	0.260±0.042	0.319±0.020	0.305±0.052
RBBB	0.433±0.137	0.702±0.073	0.721±0.075	0.749±0.119	**0.766±0.044**	0.753±0.028	0.732±0.083	0.737±0.031	0.755±0.022
SA	0.173±0.061	0.214±0.032	0.205±0.025	0.172±0.043	0.179±0.086	0.220±0.017	0.189±0.050	0.266±0.034	**0.268±0.024**
SB	0.769±0.101	0.874±0.033	0.879±0.036	**0.902±0.014**	0.891±0.021	0.882±0.033	0.865±0.044	0.891±0.039	0.891±0.020
STach	0.846±0.033	0.891±0.018	0.894±0.025	0.882±0.035	0.885±0.025	0.898±0.014	0.893±0.023	**0.911±0.011**	0.896±0.020
TAb	0.672±0.031	0.731±0.010	0.722±0.020	0.719±0.028	**0.737±0.012**	0.722±0.017	0.720±0.024	0.713±0.018	0.707±0.023
TInv	0.270±0.030	0.288±0.062	0.310±0.045	0.306±0.063	0.318±0.038	0.283±0.044	0.297±0.057	**0.352±0.032**	0.339±0.012
VPB	0.205±0.112	0.222±0.138	0.334±0.055	0.280±0.111	0.304±0.079	0.343±0.061	0.277±0.048	0.326±0.041	**0.369±0.024**
Average	0.387±0.031	0.507±0.025	0.510±0.016	0.497±0.035	0.504±0.021	0.489±0.013	0.494±0.024	**0.553±0.020**	0.551±0.017

Table S3: Detailed model performance for each CVD within the PTB-XL dataset using the base backbone. For each CVD, the averaged $F_{\beta=2}$ and standard deviations are shown across six seeds. For simplicity, we present the abbreviations of different CVDs. The model with the best performance is denoted in **bold**.

Methods	ReMixMatch	MixedTeacher	FixMatch	FlexMatch	SoftMatch	Adsh	SAW	**CE-SSL$_{r=4}$**	**CE-SSL$_{r=16}$**
AF	0.617±0.050	0.882±0.009	0.890±0.010	0.846±0.042	0.880±0.018	0.864±0.048	0.890±0.019	**0.908±0.007**	0.904±0.014
CRBBB	0.603±0.109	0.667±0.145	0.714±0.068	0.697±0.084	0.711±0.082	0.646±0.121	0.696±0.127	**0.814±0.042**	0.790±0.045
IAVB	0.359±0.045	0.604±0.038	0.616±0.026	0.577±0.037	0.635±0.030	0.635±0.050	0.646±0.039	**0.682±0.030**	0.679±0.019
IRBBB	0.275±0.060	0.557±0.061	0.535±0.043	0.515±0.040	0.512±0.049	0.551±0.021	0.541±0.025	**0.594±0.032**	0.561±0.062
LAD	0.687±0.022	0.769±0.016	0.764±0.020	0.758±0.017	0.772±0.017	0.777±0.009	0.754±0.005	0.774±0.007	**0.779±0.004**
LAnFB	0.580±0.048	0.788±0.019	**0.800±0.007**	0.789±0.015	0.780±0.018	0.776±0.024	0.747±0.035	0.771±0.018	0.784±0.010
LBBB	0.728±0.032	0.844±0.046	0.789±0.078	0.797±0.043	**0.848±0.043**	0.820±0.074	0.810±0.031	0.804±0.037	0.761±0.063
NSIVCB	0.180±0.040	0.176±0.044	0.221±0.028	**0.244±0.037**	0.155±0.087	0.190±0.061	0.225±0.055	0.219±0.054	0.208±0.068
NSR	0.956±0.006	0.968±0.013	0.972±0.005	0.968±0.006	0.972±0.003	**0.973±0.002**	0.968±0.004	0.970±0.009	0.965±0.013
PAC	0.129±0.046	0.156±0.037	0.107±0.078	0.120±0.050	0.183±0.028	0.148±0.054	0.219±0.071	**0.272±0.039**	0.262±0.026
PR	0.569±0.101	0.588±0.054	0.737±0.028	0.698±0.049	0.638±0.102	0.733±0.048	0.715±0.059	0.728±0.027	**0.747±0.026**
LPR	0.191±0.100	0.527±0.035	0.525±0.026	0.450±0.063	0.509±0.025	0.458±0.081	0.488±0.112	0.583±0.042	**0.600±0.026**
QAb	0.137±0.067	0.135±0.041	0.121±0.054	0.152±0.044	0.154±0.055	0.082±0.065	0.128±0.039	**0.185±0.020**	0.169±0.037
RAD	0.180±0.072	0.428±0.068	0.373±0.025	0.415±0.057	0.361±0.111	**0.482±0.052**	0.416±0.068	0.408±0.056	0.412±0.041
SA	0.151±0.044	0.172±0.052	0.144±0.041	0.150±0.076	0.164±0.027	0.165±0.046	0.175±0.047	0.245±0.029	**0.281±0.042**
SB	0.457±0.128	0.557±0.026	0.549±0.022	0.548±0.032	0.526±0.042	0.554±0.034	**0.568±0.029**	0.566±0.049	0.558±0.032
STach	0.597±0.180	0.817±0.051	0.809±0.055	0.818±0.049	0.770±0.031	0.787±0.082	0.729±0.054	0.853±0.024	**0.860±0.016**
TAb	0.514±0.034	0.518±0.050	0.497±0.019	0.515±0.028	0.549±0.026	0.519±0.020	0.516±0.011	0.549±0.035	**0.561±0.013**
TInv	0.122±0.059	0.141±0.051	0.123±0.014	0.124±0.046	0.132±0.027	0.159±0.035	**0.182±0.039**	0.100±0.052	0.093±0.044
Average	0.423±0.028	0.542±0.014	0.541±0.007	0.536±0.007	0.540±0.011	0.543±0.015	0.548±0.017	**0.580±0.006**	0.578±0.006

Table S4: Detailed model performance for each CVD within the Ningbo dataset using the base backbone. For each CVD, the averaged $F_{\beta=2}$ and standard deviations are shown across six seeds. For simplicity, we present the abbreviations of different CVDs. The model with the best performance is denoted in **bold**.

Methods	ReMixMatch	MixedTeacher	FixMatch	FlexMatch	SoftMatch	Adsh	SAW	**CE-SSL**$_{r=4}$	**CE-SSL**$_{r=16}$
AFL	0.874±0.045	0.959±0.008	0.962±0.007	0.957±0.007	**0.966±0.002**	0.959±0.006	0.963±0.005	0.963±0.005	0.965±0.005
BBB	0.289±0.061	0.266±0.160	0.291±0.145	0.295±0.111	0.280±0.120	0.287±0.105	0.317±0.093	0.391±0.040	**0.397±0.054**
CLBBB	0.478±0.148	0.713±0.143	**0.749±0.045**	0.707±0.135	0.708±0.102	0.725±0.051	0.745±0.050	0.719±0.065	0.721±0.080
CRBBB	0.620±0.074	0.760±0.027	0.766±0.017	0.722±0.118	0.706±0.067	0.761±0.020	0.712±0.085	**0.777±0.029**	0.764±0.036
IAVB	0.355±0.077	0.677±0.053	0.686±0.030	0.675±0.044	0.672±0.026	0.698±0.047	0.690±0.042	**0.710±0.040**	0.704±0.040
IRBBB	0.098±0.028	0.138±0.092	0.094±0.039	0.191±0.060	0.168±0.039	0.167±0.056	**0.203±0.129**	0.186±0.044	0.153±0.064
LAD	0.360±0.082	**0.628±0.033**	0.605±0.046	0.596±0.056	0.603±0.050	0.623±0.022	0.585±0.084	0.590±0.037	0.603±0.039
LAnFB	0.322±0.030	0.418±0.081	0.426±0.051	0.368±0.113	**0.474±0.050**	0.419±0.025	0.401±0.089	0.417±0.059	0.435±0.052
LQRSV	0.195±0.056	0.221±0.045	0.198±0.051	0.222±0.047	0.208±0.025	0.195±0.066	0.174±0.054	0.245±0.030	**0.255±0.028**
NSIVCB	0.313±0.040	0.432±0.056	0.388±0.087	0.447±0.030	0.413±0.057	0.436±0.052	0.397±0.146	0.468±0.076	**0.476±0.061**
NSR	0.736±0.023	0.857±0.009	**0.859±0.013**	0.853±0.009	0.851±0.020	0.842±0.017	0.841±0.019	0.828±0.013	0.852±0.011
PAC	0.213±0.016	0.413±0.040	0.401±0.038	0.408±0.037	0.428±0.043	0.389±0.050	0.346±0.061	**0.512±0.018**	0.501±0.030
PR	0.685±0.080	0.804±0.031	0.772±0.079	0.793±0.080	0.819±0.045	0.786±0.063	0.818±0.036	0.810±0.039	**0.839±0.022**
PRWP	0.287±0.065	0.281±0.105	**0.289±0.059**	0.214±0.096	0.253±0.119	0.227±0.094	0.232±0.064	0.251±0.086	0.260±0.072
PVC	0.514±0.040	0.613±0.055	0.637±0.037	0.640±0.040	**0.652±0.050**	0.596±0.043	0.582±0.083	0.638±0.048	0.643±0.025
LQT	0.090±0.060	0.151±0.045	**0.197±0.049**	0.136±0.083	0.188±0.063	0.134±0.068	0.175±0.045	0.123±0.071	0.161±0.030
QAb	0.315±0.028	**0.385±0.041**	0.352±0.046	0.350±0.035	0.328±0.050	0.303±0.084	0.333±0.041	0.362±0.042	0.359±0.063
RAD	0.225±0.029	0.362±0.030	0.319±0.120	0.335±0.033	**0.389±0.051**	0.365±0.019	0.360±0.064	0.366±0.063	0.351±0.059
SA	0.360±0.035	0.461±0.077	0.475±0.058	0.497±0.070	0.518±0.056	0.530±0.043	0.417±0.050	**0.548±0.048**	0.536±0.060
SB	0.943±0.027	0.971±0.004	0.975±0.003	**0.975±0.002**	0.974±0.003	0.970±0.005	0.968±0.004	0.974±0.002	0.974±0.003
STach	0.598±0.114	0.919±0.014	0.895±0.031	0.920±0.016	0.912±0.008	0.916±0.014	0.899±0.046	**0.934±0.009**	0.926±0.012
TAb	0.513±0.064	0.575±0.039	0.591±0.029	0.575±0.037	0.596±0.019	0.598±0.033	0.586±0.029	**0.607±0.025**	0.597±0.028
TInv	0.517±0.032	0.614±0.034	0.604±0.033	**0.627±0.034**	0.598±0.048	0.597±0.034	0.590±0.067	0.615±0.020	0.605±0.050
Average	0.430±0.020	0.549±0.028	0.545±0.020	0.544±0.019	0.552±0.020	0.545±0.012	0.536±0.016	0.567±0.011	**0.569±0.014**

Table S5: Detailed model performance for each CVD within the Chapman dataset using the base backbone. For each CVD, the averaged $F_{\beta=2}$ and standard deviations are shown across six seeds. For simplicity, we present the abbreviations of different CVDs. The model with the best performance is denoted in **bold**.

Methods	ReMixMatch	MixedTeacher	FixMatch	FlexMatch	SoftMatch	Adsh	SAW	**CE-SSL**$_{r=4}$	**CE-SSL**$_{r=16}$
AF	0.839±0.034	0.926±0.018	0.944±0.008	0.917±0.018	0.925±0.031	0.938±0.007	0.935±0.015	0.945±0.014	**0.948±0.010**
AFL	0.404±0.040	0.482±0.026	0.507±0.034	0.463±0.060	**0.523±0.028**	0.487±0.015	0.466±0.051	0.473±0.012	0.489±0.042
IAVB	0.173±0.037	0.356±0.111	0.357±0.175	0.308±0.170	0.418±0.173	0.412±0.131	0.390±0.156	**0.524±0.151**	0.383±0.185
LAD	0.318±0.039	0.390±0.173	0.397±0.128	0.455±0.029	0.406±0.098	0.410±0.176	**0.478±0.057**	0.438±0.059	0.445±0.054
LBBB	0.332±0.119	**0.455±0.122**	0.295±0.157	0.265±0.081	0.375±0.123	0.420±0.092	0.203±0.169	0.328±0.127	0.339±0.114
LQRSV	0.079±0.052	0.081±0.069	0.072±0.073	**0.144±0.026**	0.091±0.083	0.105±0.065	0.133±0.077	0.105±0.022	0.053±0.025
NSIVCB	0.276±0.027	0.337±0.129	0.329±0.063	0.272±0.087	0.310±0.044	0.313±0.072	**0.399±0.064**	0.207±0.071	0.370±0.047
NSR	0.850±0.048	0.869±0.046	0.944±0.004	0.930±0.042	0.893±0.046	0.920±0.030	0.937±0.009	0.930±0.026	**0.946±0.015**
PAC	0.124±0.042	0.111±0.092	0.140±0.050	0.106±0.062	0.147±0.051	0.135±0.078	0.111±0.056	**0.211±0.020**	0.209±0.075
QAb	0.113±0.047	**0.150±0.114**	0.114±0.125	0.067±0.080	0.065±0.098	0.137±0.103	0.096±0.109	0.052±0.083	0.064±0.101
RAD	0.179±0.056	0.288±0.097	**0.375±0.051**	0.276±0.090	0.240±0.100	0.287±0.092	0.285±0.114	0.342±0.060	0.305±0.051
RBBB	0.354±0.180	0.786±0.066	0.814±0.069	0.729±0.091	0.774±0.073	0.787±0.064	0.790±0.076	0.858±0.016	**0.879±0.033**
SB	0.931±0.072	0.961±0.028	0.974±0.016	0.970±0.017	0.970±0.014	0.963±0.026	**0.980±0.009**	0.969±0.012	0.978±0.007
STach	0.857±0.035	0.943±0.010	0.941±0.011	0.928±0.022	0.939±0.016	0.943±0.005	0.928±0.041	0.950±0.016	**0.954±0.007**
TAb	0.615±0.043	0.607±0.036	0.646±0.032	0.643±0.029	0.647±0.026	0.656±0.020	0.620±0.036	0.651±0.018	**0.667±0.016**
VPB	0.402±0.156	0.422±0.098	0.431±0.147	0.443±0.138	0.450±0.221	0.356±0.192	0.407±0.133	**0.494±0.053**	0.447±0.039
Average	0.428±0.020	0.510±0.024	0.518±0.025	0.495±0.019	0.511±0.021	0.517±0.020	0.510±0.020	0.530±0.012	**0.530±0.008**

Table S6: Ablation study of the proposed CE-SSL on the medium backbone. 'w/o random deactivation' represents the CE-SSL without the random deactivation technique, and the deactivation probability p is set to zero. 'w/o rank allocation' represents the CE-SSL without the one-shot rank allocation, and all pre-trained weights are updated with the initial rank r. 'w/o semi-supervised BN' denotes the CE-SSL without the semi-supervised batch normalization for lightweight semi-supervised learning.

Methods	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro F_{beta} ↑
			G12EC Dataset				
w/o random deactivation	259ms	0.091±0.004	3.887±0.138	0.855±0.005	0.497±0.010	0.304±0.015	0.540±0.022
w/o rank allocation	241ms	0.087±0.003	3.795±0.110	0.861±0.005	0.506±0.004	0.306±0.017	0.551±0.022
w/o semi-supervised BN	189ms	0.085±0.005	3.750±0.159	0.864±0.007	0.506±0.008	0.308±0.021	0.548±0.024
CE-SSL	**243ms**	**0.086±0.004**	**3.740±0.134**	**0.862±0.006**	**0.507±0.007**	**0.317±0.022**	**0.561±0.024**
			PTB-XL Dataset				
w/o random deactivation	289ms	0.030±0.002	2.630±0.064	0.905±0.003	0.534±0.006	0.351±0.006	0.577±0.013
w/o rank allocation	269ms	0.028±0.001	2.563±0.028	0.912±0.005	0.540±0.006	0.351±0.012	0.575±0.016
w/o semi-supervised BN	213ms	0.028±0.001	2.563±0.035	0.911±0.003	0.547±0.005	0.358±0.010	0.582±0.016
CE-SSL	**271ms**	**0.027±0.001**	**2.539±0.033**	**0.913±0.003**	**0.550±0.004**	**0.369±0.005**	**0.588±0.003**
			Ningbo Dataset				
w/o random deactivation	301ms	0.028±0.001	2.744±0.046	0.930±0.003	0.516±0.021	0.336±0.017	0.558±0.029
w/o rank allocation	281ms	0.028±0.001	2.736±0.055	0.932±0.003	0.518±0.022	0.343±0.017	0.574±0.023
w/o semi-supervised BN	224ms	0.027±0.000	2.671±0.028	0.934±0.002	0.525±0.020	0.346±0.018	0.576±0.024
CE-SSL	**282ms**	**0.027±0.001**	**2.701±0.051**	**0.933±0.003**	**0.531±0.018**	**0.356±0.013**	**0.588±0.021**
			Chapman Dataset				
w/o random deactivation	256ms	0.036±0.002	2.388±0.043	0.911±0.006	0.549±0.016	0.353±0.009	0.530±0.013
w/o rank allocation	240ms	0.037±0.002	2.397±0.055	0.906±0.007	0.537±0.010	0.349±0.014	0.515±0.022
w/o semi-supervised BN	188ms	0.035±0.001	2.349±0.019	0.912±0.006	0.555±0.016	0.356±0.007	0.525±0.018
CE-SSL	**241ms**	**0.035±0.002**	**2.362±0.049**	**0.909±0.007**	**0.553±0.013**	**0.367±0.008**	**0.540±0.019**

Table S7: Ablation study of the proposed CE-SSL on the large backbone. 'w/o random deactivation' represents the CE-SSL without the random deactivation technique, and the deactivation probability p is set to zero. 'w/o rank allocation' represents the CE-SSL without the one-shot rank allocation, and all pre-trained weights are updated with the initial rank r. 'w/o semi-supervised BN' denotes the CE-SSL without the semi-supervised batch normalization for lightweight semi-supervised learning.

Methods	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro F_{beta} ↑
			G12EC Dataset				
w/o random deactivation	483ms	0.092±0.005	3.948±0.164	0.850±0.005	0.498±0.006	0.309±0.008	0.547±0.013
w/o rank allocation	450ms	0.088±0.003	3.830±0.100	0.855±0.002	0.499±0.005	0.312±0.009	0.551±0.016
w/o semi-supervised BN	332ms	0.088±0.005	3.839±0.129	0.855±0.005	0.506±0.008	0.314±0.014	0.552±0.018
CE-SSL	**453ms**	**0.085±0.005**	**3.778±0.140**	**0.857±0.004**	**0.509±0.007**	**0.322±0.009**	**0.565±0.010**
			PTB-XL Dataset				
w/o random deactivation	542ms	0.030±0.001	2.612±0.026	0.907±0.004	0.531±0.004	0.349±0.008	0.572±0.012
w/o rank allocation	501ms	0.030±0.001	2.642±0.038	0.909±0.005	0.534±0.003	0.340±0.016	0.562±0.019
w/o semi-supervised BN	373ms	0.030±0.001	2.630±0.046	0.910±0.003	0.540±0.006	0.360±0.010	0.592±0.008
CE-SSL	**508ms**	**0.030±0.002**	**2.618±0.061**	**0.909±0.004**	**0.537±0.004**	**0.358±0.005**	**0.587±0.008**
			Ningbo Dataset				
w/o random deactivation	563ms	0.031±0.002	2.860±0.094	0.927±0.004	0.513±0.026	0.333±0.013	0.567±0.022
w/o rank allocation	523ms	0.029±0.001	2.757±0.043	0.930±0.001	0.514±0.026	0.335±0.013	0.568±0.022
w/o semi-supervised BN	392ms	0.028±0.001	2.759±0.039	0.931±0.002	0.519±0.024	0.343±0.013	0.576±0.021
CE-SSL	**530ms**	**0.029±0.001**	**2.779±0.027**	**0.931±0.002**	**0.523±0.027**	**0.344±0.010**	**0.578±0.013**
			Chapman Dataset				
w/o random deactivation	480ms	0.038±0.001	2.438±0.041	0.905±0.004	0.549±0.006	0.348±0.013	0.529±0.021
w/o rank allocation	447ms	0.038±0.002	2.448±0.060	0.904±0.008	0.551±0.006	0.352±0.009	0.520±0.016
w/o semi-supervised BN	329ms	0.037±0.002	2.411±0.051	0.903±0.006	0.554±0.009	0.366±0.005	0.546±0.011
CE-SSL	**451ms**	**0.037±0.001**	**2.417±0.035**	**0.904±0.004**	**0.556±0.006**	**0.371±0.010**	**0.552±0.018**

Table S8: Performance comparisons between CE-SSL and parameter-efficient semi-supervised baselines on the base backbone. The average performance on all CVDs within each dataset is shown across six seeds. The standard deviation is also reported for the evaluation metrics.

Methods	Params ↓	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro $F_{\beta=2}$ ↑
G12EC Dataset								
FixMatch	9.505 M	187 ms	0.107±0.006	4.292±0.163	0.829±0.004	0.468±0.009	0.280±0.010	0.510±0.016
+ LoRA$_{r=16}$	0.795 M	204 ms	0.098±0.003	4.003±0.114	0.841±0.009	0.460±0.017	0.279±0.022	0.518±0.031
+ DyLoRA$_{r=16}$	0.795 M	204 ms	0.098±0.004	3.981±0.084	0.841±0.009	0.456±0.010	0.282±0.017	0.515±0.022
+ AdaLoRA$_{r=16}$	0.796 M	237 ms	0.096±0.003	3.986±0.110	0.844±0.007	0.461±0.008	0.284±0.015	0.520±0.015
+ IncreLoRA$_{r=16}$	0.824 M	430 ms	0.088±0.003	3.770±0.056	0.850±0.005	0.460±0.008	0.289±0.011	0.532±0.013
+ LoRA$_{r=4}$	0.222 M	202 ms	0.092±0.004	3.859±0.124	0.850±0.007	0.467±0.004	0.289±0.014	0.529±0.024
+ DyLoRA$_{r=4}$	0.222 M	203 ms	0.095±0.002	3.915±0.106	0.843±0.005	0.460±0.009	0.278±0.017	0.518±0.016
+ AdaLoRA$_{r=4}$	0.222 M	236 ms	0.093±0.003	3.871±0.079	0.849±0.005	0.463±0.008	0.288±0.011	0.528±0.016
+ IncreLoRA$_{r=4}$	0.246 M	292 ms	0.090±0.001	3.817±0.043	0.847±0.005	0.454±0.006	0.281±0.015	0.521±0.022
CE-SSL$_{r=16}$	**0.510 M**	**98 ms**	**0.092±0.002**	**3.867±0.088**	**0.855±0.005**	**0.476±0.006**	**0.307±0.016**	**0.551±0.017**
CE-SSL$_{r=4}$	**0.183 M**	**98 ms**	**0.089±0.003**	**3.804±0.095**	**0.853±0.004**	**0.467±0.006**	**0.304±0.013**	**0.553±0.020**
PTB-XL Dataset								
FixMatch	9.505 M	208 ms	0.038±0.001	2.905±0.061	0.882±0.004	0.510±0.006	0.322±0.007	0.541±0.007
+ LoRA$_{r=16}$	0.795 M	225 ms	0.033±0.001	2.733±0.034	0.892±0.002	0.520±0.006	0.331±0.005	0.557±0.004
+ DyLoRA$_{r=16}$	0.795 M	226 ms	0.033±0.001	2.716±0.057	0.894±0.003	0.524±0.003	0.321±0.010	0.553±0.010
+ AdaLoRA$_{r=16}$	0.796 M	262 ms	0.032±0.001	2.687±0.025	0.896±0.003	0.508±0.009	0.326±0.012	0.552±0.015
+ IncreLoRA$_{r=16}$	0.825 M	469 ms	0.031±0.001	2.620±0.020	0.903±0.002	0.520±0.004	0.342±0.008	0.573±0.008
+ LoRA$_{r=4}$	0.222 M	225 ms	0.032±0.001	2.673±0.035	0.898±0.004	0.522±0.006	0.329±0.012	0.554±0.009
+ DyLoRA$_{r=4}$	0.222 M	225 ms	0.032±0.001	2.668±0.036	0.896±0.003	0.521±0.005	0.328±0.008	0.554±0.008
+ AdaLoRA$_{r=4}$	0.223 M	263 ms	0.032±0.000	2.696±0.010	0.896±0.002	0.510±0.003	0.323±0.008	0.550±0.012
+ IncreLoRA$_{r=4}$	0.246 M	322 ms	0.031±0.001	2.630±0.034	0.899±0.004	0.518±0.006	0.338±0.009	0.570±0.010
CE-SSL$_{r=16}$	**0.582 M**	**110 ms**	**0.031±0.000**	**2.641±0.020**	**0.901±0.003**	**0.530±0.005**	**0.346±0.006**	**0.578±0.006**
CE-SSL$_{r=4}$	**0.159 M**	**109 ms**	**0.030±0.001**	**2.626±0.026**	**0.899±0.004**	**0.526±0.005**	**0.346±0.005**	**0.580±0.006**
Ningbo Dataset								
FixMatch	9.506 M	217 ms	0.035±0.003	3.025±0.121	0.922±0.009	0.493±0.023	0.321±0.014	0.545±0.020
+ LoRA$_{r=16}$	0.796 M	234 ms	0.032±0.001	2.864±0.045	0.926±0.002	0.497±0.018	0.326±0.007	0.561±0.008
+ DyLoRA$_{r=16}$	0.796 M	235 ms	0.032±0.002	2.874±0.083	0.927±0.003	0.498±0.017	0.321±0.011	0.553±0.016
+ AdaLoRA$_{r=16}$	0.797 M	272 ms	0.032±0.002	2.851±0.054	0.925±0.003	0.487±0.021	0.317±0.017	0.546±0.028
+ IncreLoRA$_{r=16}$	0.827 M	491 ms	0.030±0.001	2.772±0.045	0.929±0.003	0.499±0.023	0.328±0.011	0.564±0.016
+ LoRA$_{r=4}$	0.223 M	234 ms	0.031±0.001	2.842±0.046	0.926±0.003	0.489±0.026	0.319±0.013	0.551±0.019
+ DyLoRA$_{r=4}$	0.223 M	234 ms	0.031±0.001	2.841±0.034	0.924±0.003	0.489±0.020	0.323±0.016	0.556±0.026
+ AdaLoRA$_{r=4}$	0.224 M	272 ms	0.033±0.001	2.896±0.037	0.923±0.004	0.480±0.018	0.312±0.006	0.543±0.017
+ IncreLoRA$_{r=4}$	0.247 M	332 ms	0.030±0.001	2.794±0.046	0.927±0.002	0.490±0.025	0.314±0.014	0.551±0.022
CE-SSL$_{r=16}$	**0.550 M**	**115 ms**	**0.030±0.001**	**2.805±0.063**	**0.928±0.002**	**0.505±0.019**	**0.334±0.011**	**0.569±0.014**
CE-SSL$_{r=4}$	**0.168 M**	**114 ms**	**0.030±0.001**	**2.776±0.028**	**0.929±0.001**	**0.500±0.017**	**0.327±0.010**	**0.567±0.011**
Chapman Dataset								
FixMatch	9.504 M	186 ms	0.046±0.004	2.626±0.096	0.897±0.006	0.520±0.009	0.339±0.012	0.518±0.025
+ LoRA$_{r=16}$	0.795 M	201 ms	0.041±0.002	2.493±0.058	0.899±0.005	0.521±0.014	0.338±0.011	0.515±0.015
+ DyLoRA$_{r=16}$	0.795 M	202 ms	0.042±0.004	2.512±0.091	0.899±0.003	0.524±0.011	0.336±0.009	0.511±0.015
+ AdaLoRA$_{r=16}$	0.795 M	234 ms	0.042±0.001	2.520±0.039	0.883±0.011	0.503±0.020	0.338±0.018	0.498±0.019
+ IncreLoRA$_{r=16}$	0.822 M	426 ms	0.041±0.003	2.484±0.072	0.884±0.017	0.495±0.022	0.334±0.019	0.504±0.029
+ LoRA$_{r=4}$	0.222 M	201 ms	0.038±0.001	2.427±0.039	0.902±0.006	0.522±0.010	0.338±0.011	0.523±0.012
+ DyLoRA$_{r=4}$	0.222 M	200 ms	0.039±0.002	2.445±0.057	0.898±0.010	0.518±0.013	0.331±0.008	0.506±0.016
+ AdaLoRA$_{r=4}$	0.222 M	233 ms	0.039±0.002	2.457±0.044	0.891±0.010	0.512±0.014	0.345±0.014	0.521±0.018
+ IncreLoRA$_{r=4}$	0.246 M	288 ms	0.039±0.001	2.446±0.039	0.888±0.008	0.502±0.015	0.339±0.014	0.505±0.022
CE-SSL$_{r=16}$	**0.581 M**	**97 ms**	**0.040±0.002**	**2.483±0.055**	**0.896±0.006**	**0.536±0.004**	**0.355±0.005**	**0.530±0.008**
CE-SSL$_{r=4}$	**0.180 M**	**97 ms**	**0.038±0.002**	**2.418±0.049**	**0.898±0.005**	**0.526±0.006**	**0.352±0.009**	**0.530±0.012**

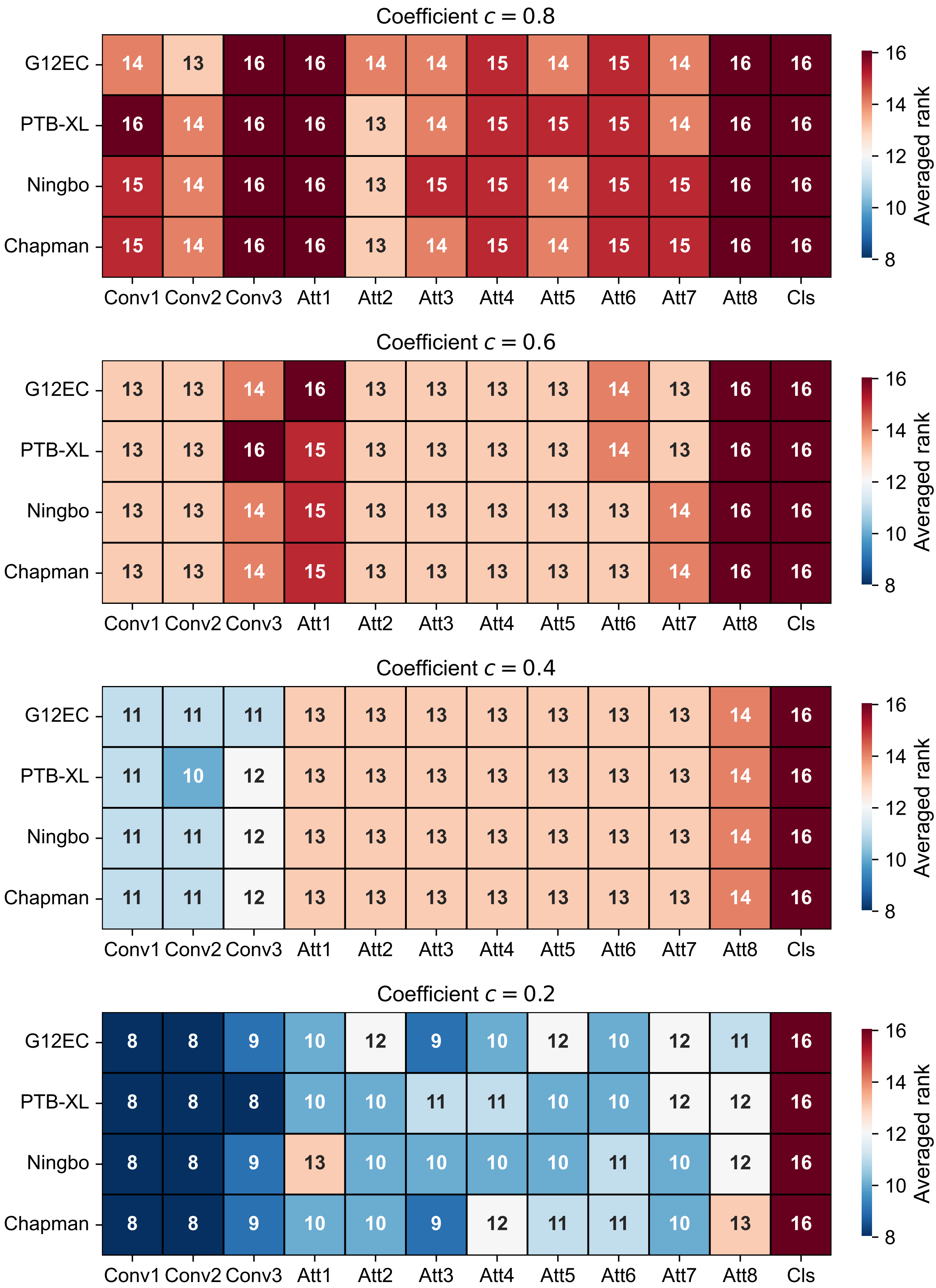


Fig S5: The rank distributions generated by the proposed one-shot rank allocation method on four datasets using the base backbone. Specifically, we visualize the allocated rank of each block in the backbone network, which is the average rank of the incremental matrices within the block. For simplicity, we present the abbreviations of different blocks.('Conv1': the 1-st convolution block; 'Att1': the 1-st self-attention block ; 'Cls': classification block.

Table S9: Performance comparisons between CE-SSL and semi-supervised baselines on the medium backbone. The average performance on all CVDs within each dataset is shown across six seeds. The standard deviation is also reported for the evaluation metrics.

Methods	Params ↓	Mem ↓	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro $F_{\beta=2}$ ↑
G12EC Dataset									
ReMixMatch	50.493 M	17.931 GB	719 ms	0.160±0.009	5.299±0.175	0.766±0.014	0.318±0.020	0.194±0.013	0.430±0.023
MixedTeacher	50.493 M	9.461 GB	396 ms	0.096±0.003	4.016±0.060	0.846±0.008	0.499±0.009	0.303±0.014	0.537±0.018
FixMatch	50.493 M	13.589 GB	499 ms	0.096±0.006	4.027±0.109	0.850±0.009	0.499±0.014	0.299±0.016	0.529±0.016
FlexMatch	50.493 M	13.589 GB	498 ms	0.104±0.003	4.216±0.070	0.848±0.008	0.499±0.009	0.294±0.019	0.521±0.020
SoftMatch	50.493 M	13.589 GB	498 ms	0.097±0.003	4.096±0.093	0.853±0.007	0.505±0.008	0.309±0.010	0.536±0.013
Adsh	50.493 M	9.251 GB	524 ms	0.098±0.003	4.107±0.090	0.845±0.008	0.493±0.011	0.298±0.014	0.531±0.020
SAW	50.493 M	13.589 GB	499 ms	0.100±0.003	4.129±0.083	0.847±0.004	0.490±0.007	0.293±0.014	0.526±0.012
CE-SSL$_{r=16}$	**1.568 M**	**6.158 GB**	**243 ms**	**0.086±0.004**	**3.740±0.134**	**0.862±0.006**	**0.507±0.007**	**0.317±0.022**	**0.561±0.024**
CE-SSL$_{r=4}$	**0.458 M**	**6.146 GB**	**241 ms**	**0.085±0.002**	**3.741±0.068**	**0.862±0.007**	**0.503±0.006**	**0.316±0.013**	**0.560±0.015**
PTB-XL Dataset									
ReMixMatch	50.494 M	17.931 GB	797 ms	0.064±0.005	3.589±0.161	0.815±0.012	0.335±0.017	0.209±0.010	0.423±0.009
MixedTeacher	50.494 M	9.459 GB	440 ms	0.032±0.001	2.706±0.049	0.898±0.004	0.539±0.005	0.340±0.013	0.559±0.012
FixMatch	50.494 M	13.589 GB	553 ms	0.034±0.002	2.767±0.053	0.898±0.003	0.536±0.006	0.340±0.006	0.556±0.010
FlexMatch	50.494 M	13.589 GB	553 ms	0.034±0.001	2.747±0.047	0.901±0.004	0.529±0.004	0.348±0.013	0.559±0.008
SoftMatch	50.494 M	13.589 GB	553 ms	0.034±0.001	2.790±0.026	0.898±0.003	0.533±0.004	0.341±0.007	0.553±0.009
Adsh	50.494 M	9.251 GB	796 ms	0.033±0.002	2.757±0.079	0.901±0.003	0.537±0.007	0.339±0.008	0.557±0.014
SAW	50.494 M	13.589 GB	554 ms	0.034±0.001	2.778±0.050	0.899±0.001	0.531±0.010	0.344±0.011	0.562±0.009
CE-SSL$_{r=16}$	**1.485 M**	**6.161 GB**	**271 ms**	**0.027±0.001**	**2.539±0.033**	**0.913±0.003**	**0.550±0.004**	**0.369±0.005**	**0.588±0.003**
CE-SSL$_{r=4}$	**0.505 M**	**6.150 GB**	**270 ms**	**0.027±0.001**	**2.529±0.019**	**0.914±0.003**	**0.547±0.003**	**0.372±0.006**	**0.599±0.010**
Ningbo Dataset									
ReMixMatch	50.496 M	17.932 GB	825 ms	0.082±0.016	4.224±0.386	0.829±0.025	0.298±0.038	0.195±0.027	0.396±0.034
MixedTeacher	50.496 M	9.459 GB	457 ms	0.031±0.002	2.856±0.078	0.926±0.009	0.525±0.023	0.342±0.016	0.571±0.023
FixMatch	50.496 M	13.589 GB	572 ms	0.031±0.002	2.869±0.081	0.931±0.003	0.531±0.021	0.349±0.014	0.575±0.015
FlexMatch	50.496 M	13.589 GB	573 ms	0.031±0.002	2.853±0.081	0.930±0.002	0.524±0.012	0.347±0.013	0.575±0.018
SoftMatch	50.496 M	13.589 GB	574 ms	0.031±0.002	2.877±0.094	0.927±0.002	0.525±0.019	0.344±0.014	0.573±0.017
Adsh	50.496 M	9.251 GB	1061 ms	0.031±0.002	2.868±0.061	0.927±0.004	0.523±0.013	0.342±0.012	0.571±0.017
SAW	50.496 M	13.589 GB	572 ms	0.032±0.002	2.911±0.105	0.930±0.003	0.525±0.017	0.342±0.013	0.578±0.016
CE-SSL$_{r=16}$	**1.705 M**	**6.172 GB**	**282 ms**	**0.027±0.001**	**2.701±0.051**	**0.933±0.003**	**0.531±0.018**	**0.356±0.013**	**0.588±0.021**
CE-SSL$_{r=4}$	**0.507 M**	**6.160 GB**	**282 ms**	**0.026±0.001**	**2.661±0.058**	**0.934±0.004**	**0.525±0.018**	**0.352±0.013**	**0.587±0.020**
Chapman Dataset									
ReMixMatch	50.492 M	17.931 GB	715 ms	0.101±0.019	3.608±0.283	0.823±0.021	0.362±0.036	0.230±0.029	0.426±0.028
MixedTeacher	50.492 M	9.461 GB	394 ms	0.037±0.002	2.420±0.071	0.909±0.010	0.539±0.007	0.348±0.016	0.513±0.026
FixMatch	50.492 M	13.589 GB	495 ms	0.038±0.004	2.439±0.092	0.905±0.010	0.538±0.011	0.357±0.009	0.522±0.020
FlexMatch	50.492 M	13.589 GB	495 ms	0.041±0.003	2.519±0.077	0.901±0.004	0.531±0.011	0.345±0.016	0.512±0.030
SoftMatch	50.492 M	13.589 GB	495 ms	0.043±0.004	2.546±0.101	0.902±0.009	0.535±0.008	0.355±0.015	0.526±0.026
Adsh	50.492 M	9.251 GB	527 ms	0.039±0.004	2.440±0.073	0.909±0.006	0.546±0.007	0.356±0.007	0.530±0.013
SAW	50.492 M	13.589 GB	493 ms	0.043±0.003	2.549±0.073	0.901±0.006	0.531±0.008	0.357±0.013	0.532±0.027
CE-SSL$_{r=16}$	**1.601 M**	**6.159 GB**	**241 ms**	**0.035±0.002**	**2.362±0.049**	**0.909±0.007**	**0.553±0.013**	**0.367±0.008**	**0.540±0.019**
CE-SSL$_{r=4}$	**0.402 M**	**6.145 GB**	**240 ms**	**0.034±0.001**	**2.334±0.033**	**0.908±0.008**	**0.538±0.014**	**0.361±0.009**	**0.531±0.019**

Table S10: Performance comparisons between CE-SSL and semi-supervised baselines on the large backbone. The average performance on all CVDs within each dataset is shown across six seeds. The standard deviation is also reported for the evaluation metrics.

Methods	Params ↓	Mem ↓	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro $F_{\beta=2}$ ↑
				G12EC Dataset					
ReMixMatch	113.489 M	26.325 GB	1418 ms	0.157±0.016	5.240±0.328	0.776±0.017	0.336±0.025	0.205±0.019	0.432±0.027
MixedTeacher	113.489 M	14.257 GB	728 ms	0.111±0.022	4.365±0.447	0.835±0.026	0.489±0.018	0.285±0.017	0.517±0.029
FixMatch	113.489 M	20.061 GB	966 ms	0.100±0.005	4.147±0.113	0.843±0.007	0.493±0.008	0.293±0.011	0.518±0.015
FlexMatch	113.489 M	20.061 GB	966 ms	0.099±0.006	4.088±0.149	0.847±0.003	0.489±0.005	0.299±0.011	0.534±0.015
SoftMatch	113.489 M	20.061 GB	943 ms	0.100±0.007	4.138±0.194	0.847±0.004	0.498±0.005	0.297±0.004	0.532±0.013
Adsh	113.489 M	13.815 GB	951 ms	0.103±0.003	4.240±0.073	0.843±0.008	0.496±0.007	0.294±0.010	0.521±0.023
SAW	113.489 M	20.061 GB	939 ms	0.102±0.002	4.189±0.070	0.842±0.003	0.490±0.005	0.300±0.007	0.534±0.019
CE-SSL$_{r=16}$	**2.658 M**	**9.217 GB**	**453 ms**	**0.085±0.005**	**3.778±0.140**	**0.857±0.004**	**0.509±0.007**	**0.322±0.009**	**0.565±0.010**
CE-SSL$_{r=4}$	**0.761 M**	**9.206 GB**	**453 ms**	**0.084±0.003**	**3.742±0.117**	**0.859±0.004**	**0.506±0.007**	**0.323±0.004**	**0.561±0.002**
				PTB-XL Dataset					
ReMixMatch	113.490 M	26.325 GB	1614 ms	0.063±0.011	3.590±0.332	0.834±0.024	0.380±0.029	0.237±0.027	0.449±0.033
MixedTeacher	113.490 M	14.257 GB	809 ms	0.035±0.001	2.831±0.032	0.895±0.006	0.522±0.004	0.334±0.006	0.556±0.008
FixMatch	113.490 M	20.061 GB	1072 ms	0.035±0.003	2.805±0.102	0.894±0.004	0.521±0.006	0.342±0.007	0.560±0.012
FlexMatch	113.490 M	20.061 GB	1071 ms	0.041±0.004	3.016±0.124	0.893±0.004	0.519±0.006	0.342±0.010	0.557±0.010
SoftMatch	113.490 M	20.061 GB	1047 ms	0.038±0.003	2.886±0.094	0.893±0.004	0.523±0.007	0.334±0.007	0.542±0.011
Adsh	113.490 M	13.815 GB	1432 ms	0.036±0.003	2.848±0.114	0.892±0.002	0.527±0.005	0.343±0.009	0.563±0.010
SAW	113.490 M	20.061 GB	1039 ms	0.035±0.002	2.825±0.068	0.899±0.006	0.532±0.006	0.347±0.007	0.560±0.010
CE-SSL$_{r=16}$	**2.235 M**	**9.220 GB**	**508 ms**	**0.030±0.002**	**2.618±0.061**	**0.909±0.004**	**0.537±0.004**	**0.358±0.005**	**0.587±0.008**
CE-SSL$_{r=4}$	**0.712 M**	**9.211 GB**	**506 ms**	**0.029±0.001**	**2.602±0.028**	**0.908±0.003**	**0.535±0.004**	**0.356±0.006**	**0.582±0.008**
				Ningbo Dataset					
ReMixMatch	113.493 M	26.325 GB	1637 ms	0.069±0.012	3.949±0.262	0.863±0.011	0.339±0.026	0.226±0.017	0.442±0.021
MixedTeacher	113.493 M	14.257 GB	840 ms	0.033±0.002	2.934±0.079	0.929±0.003	0.518±0.021	0.341±0.018	0.572±0.026
FixMatch	113.493 M	20.061 GB	1111 ms	0.033±0.002	2.962±0.070	0.926±0.004	0.513±0.024	0.337±0.018	0.563±0.027
FlexMatch	113.493 M	20.061 GB	1083 ms	0.035±0.002	3.038±0.076	0.926±0.004	0.511±0.023	0.332±0.012	0.562±0.017
SoftMatch	113.493 M	20.061 GB	1080 ms	0.034±0.002	2.999±0.081	0.924±0.005	0.513±0.023	0.333±0.014	0.561±0.022
Adsh	113.493 M	13.815 GB	1896 ms	0.035±0.003	3.003±0.111	0.927±0.003	0.511±0.023	0.342±0.011	0.570±0.014
SAW	113.493 M	20.061 GB	1077 ms	0.035±0.002	3.009±0.083	0.925±0.005	0.509±0.025	0.337±0.014	0.565±0.025
CE-SSL$_{r=16}$	**2.234 M**	**9.235 GB**	**530 ms**	**0.029±0.001**	**2.779±0.027**	**0.931±0.002**	**0.523±0.027**	**0.344±0.010**	**0.578±0.013**
CE-SSL$_{r=4}$	**0.740 M**	**9.223 GB**	**528 ms**	**0.028±0.001**	**2.741±0.039**	**0.930±0.002**	**0.513±0.018**	**0.346±0.007**	**0.584±0.009**
				Chapman Dataset					
ReMixMatch	113.487 M	26.324 GB	1406 ms	0.090±0.013	3.391±0.212	0.850±0.007	0.416±0.017	0.265±0.011	0.453±0.021
MixedTeacher	113.487 M	14.257 GB	724 ms	0.040±0.003	2.493±0.077	0.904±0.009	0.544±0.011	0.341±0.007	0.516±0.022
FixMatch	113.487 M	20.061 GB	960 ms	0.042±0.002	2.545±0.048	0.900±0.008	0.534±0.014	0.350±0.013	0.518±0.026
FlexMatch	113.487 M	20.061 GB	937 ms	0.045±0.003	2.620±0.079	0.895±0.014	0.523±0.024	0.333±0.018	0.495±0.025
SoftMatch	113.487 M	20.061 GB	931 ms	0.043±0.003	2.555±0.068	0.894±0.008	0.536±0.011	0.345±0.010	0.518±0.021
Adsh	113.487 M	13.815 GB	957 ms	0.046±0.003	2.649±0.075	0.893±0.009	0.533±0.010	0.341±0.010	0.511±0.014
SAW	113.487 M	20.061 GB	933 ms	0.044±0.004	2.599±0.093	0.900±0.007	0.533±0.011	0.344±0.015	0.518±0.029
CE-SSL$_{r=16}$	**2.205 M**	**9.223 GB**	**451 ms**	**0.037±0.001**	**2.417±0.035**	**0.904±0.004**	**0.556±0.006**	**0.371±0.010**	**0.552±0.018**
CE-SSL$_{r=4}$	**0.716 M**	**9.206 GB**	**451 ms**	**0.036±0.001**	**2.404±0.041**	**0.902±0.006**	**0.550±0.008**	**0.365±0.006**	**0.548±0.010**

Table S11: Performance comparisons between CE-SSL and parameter-efficient semi-supervised baselines on the medium backbone. The average performance on all CVDs within each dataset is shown across six seeds. The standard deviation is also reported for the evaluation metrics.

Methods	Params ↓	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro $F_{\beta=2}$ ↑
				G12EC Dataset				
FixMatch	50.493 M	499 ms	0.096±0.006	4.027±0.109	0.850±0.009	0.499±0.014	0.299±0.016	0.529±0.016
+ LoRA$_{r=16}$	2.135 M	545 ms	0.093±0.003	3.943±0.094	0.854±0.005	0.494±0.006	0.300±0.016	0.534±0.024
+ DyLoRA$_{r=16}$	2.135 M	542 ms	0.092±0.003	3.913±0.117	0.851±0.007	0.494±0.012	0.296±0.015	0.533±0.021
+ AdaLoRA$_{r=16}$	2.136 M	585 ms	0.096±0.004	4.013±0.095	0.847±0.008	0.478±0.014	0.296±0.009	0.533±0.008
+ IncreLoRA$_{r=16}$	2.164 M	977 ms	0.085±0.003	3.683±0.100	0.859±0.007	0.482±0.005	0.299±0.011	0.553±0.014
+ LoRA$_{r=4}$	0.597 M	543 ms	0.092±0.003	3.895±0.075	0.850±0.007	0.485±0.006	0.292±0.021	0.522±0.021
+ DyLoRA$_{r=4}$	0.597 M	542 ms	0.093±0.006	3.910±0.159	0.851±0.006	0.483±0.008	0.292±0.017	0.532±0.021
+ AdaLoRA$_{r=4}$	0.598 M	584 ms	0.093±0.005	3.933±0.135	0.850±0.005	0.486±0.005	0.295±0.008	0.533±0.012
+ IncreLoRA$_{r=4}$	0.621 M	749 ms	0.084±0.003	3.660±0.114	0.861±0.007	0.486±0.008	0.301±0.007	0.552±0.013
CE-SSL$_{r=16}$	**1.568 M**	**243 ms**	**0.086±0.004**	**3.740±0.134**	**0.862±0.006**	**0.507±0.007**	**0.317±0.022**	**0.561±0.024**
CE-SSL$_{r=4}$	**0.458 M**	**241 ms**	**0.085±0.002**	**3.741±0.068**	**0.862±0.007**	**0.503±0.006**	**0.316±0.013**	**0.560±0.015**
				PTB-XL Dataset				
FixMatch	50.494 M	553 ms	0.034±0.002	2.767±0.053	0.898±0.003	0.536±0.006	0.340±0.006	0.556±0.010
+ LoRA$_{r=16}$	2.135 M	603 ms	0.030±0.001	2.632±0.050	0.906±0.005	0.532±0.005	0.352±0.008	0.571±0.012
+ DyLoRA$_{r=16}$	2.135 M	603 ms	0.031±0.001	2.683±0.060	0.903±0.006	0.533±0.008	0.344±0.017	0.567±0.017
+ AdaLoRA$_{r=16}$	2.137 M	652 ms	0.031±0.001	2.636±0.022	0.905±0.004	0.529±0.006	0.350±0.006	0.571±0.005
+ IncreLoRA$_{r=16}$	2.005 M	1090 ms	0.029±0.001	2.567±0.029	0.908±0.004	0.540±0.007	0.364±0.007	0.586±0.013
+ LoRA$_{r=4}$	0.598 M	602 ms	0.030±0.001	2.609±0.056	0.908±0.005	0.530±0.006	0.345±0.008	0.571±0.013
+ DyLoRA$_{r=4}$	0.598 M	600 ms	0.030±0.001	2.607±0.038	0.907±0.003	0.530±0.005	0.342±0.022	0.564±0.016
+ AdaLoRA$_{r=4}$	0.598 M	650 ms	0.030±0.001	2.610±0.024	0.907±0.003	0.534±0.005	0.354±0.003	0.578±0.006
+ IncreLoRA$_{r=4}$	0.623 M	830 ms	0.028±0.000	2.548±0.009	0.912±0.002	0.542±0.005	0.362±0.013	0.586±0.012
CE-SSL$_{r=16}$	**1.485 M**	**271 ms**	**0.027±0.001**	**2.539±0.033**	**0.913±0.003**	**0.550±0.004**	**0.369±0.005**	**0.588±0.003**
CE-SSL$_{r=4}$	**0.505 M**	**270 ms**	**0.027±0.001**	**2.529±0.019**	**0.914±0.003**	**0.547±0.003**	**0.372±0.006**	**0.599±0.010**
				Ningbo Dataset				
FixMatch	50.496 M	572 ms	0.031±0.002	2.869±0.081	0.931±0.003	0.531±0.021	0.349±0.014	0.575±0.015
+ LoRA$_{r=16}$	2.137 M	625 ms	0.028±0.001	2.759±0.044	0.927±0.003	0.518±0.017	0.345±0.008	0.580±0.012
+ DyLoRA$_{r=16}$	2.137 M	625 ms	0.028±0.002	2.735±0.061	0.928±0.004	0.502±0.022	0.331±0.009	0.564±0.014
+ AdaLoRA$_{r=16}$	2.139 M	674 ms	0.030±0.001	2.799±0.084	0.927±0.002	0.507±0.020	0.330±0.010	0.565±0.018
+ IncreLoRA$_{r=16}$	2.145 M	1124 ms	0.027±0.001	2.679±0.044	0.932±0.002	0.521±0.014	0.337±0.008	0.569±0.015
+ LoRA$_{r=4}$	0.600 M	624 ms	0.028±0.001	2.722±0.058	0.929±0.002	0.516±0.014	0.338±0.015	0.565±0.016
+ DyLoRA$_{r=4}$	0.600 M	621 ms	0.028±0.001	2.717±0.039	0.929±0.002	0.510±0.018	0.335±0.011	0.569±0.017
+ AdaLoRA$_{r=4}$	0.600 M	672 ms	0.030±0.003	2.790±0.083	0.927±0.004	0.505±0.019	0.325±0.006	0.558±0.017
+ IncreLoRA$_{r=4}$	0.622 M	858 ms	0.027±0.001	2.667±0.018	0.931±0.001	0.519±0.013	0.338±0.010	0.569±0.018
CE-SSL$_{r=16}$	**1.705 M**	**282 ms**	**0.027±0.001**	**2.701±0.051**	**0.933±0.003**	**0.531±0.018**	**0.356±0.013**	**0.588±0.021**
CE-SSL$_{r=4}$	**0.507 M**	**282 ms**	**0.026±0.001**	**2.661±0.058**	**0.934±0.004**	**0.525±0.018**	**0.352±0.013**	**0.587±0.020**
				Chapman Dataset				
FixMatch	50.492 M	495 ms	0.038±0.004	2.439±0.092	0.905±0.010	0.538±0.011	0.357±0.009	0.522±0.020
+ LoRA$_{r=16}$	2.134 M	540 ms	0.038±0.002	2.424±0.053	0.899±0.009	0.532±0.021	0.345±0.009	0.514±0.024
+ DyLoRA$_{r=16}$	2.134 M	540 ms	0.037±0.004	2.401±0.095	0.903±0.008	0.531±0.013	0.345±0.013	0.518±0.027
+ AdaLoRA$_{r=16}$	2.135 M	583 ms	0.037±0.002	2.394±0.066	0.894±0.009	0.511±0.020	0.343±0.004	0.493±0.013
+ IncreLoRA$_{r=16}$	2.159 M	962 ms	0.035±0.001	2.337±0.034	0.889±0.010	0.515±0.013	0.342±0.011	0.496±0.017
+ LoRA$_{r=4}$	0.596 M	539 ms	0.036±0.002	2.372±0.051	0.901±0.005	0.535±0.007	0.357±0.010	0.521±0.022
+ DyLoRA$_{r=4}$	0.596 M	537 ms	0.036±0.002	2.371±0.034	0.903±0.005	0.528±0.015	0.350±0.011	0.515±0.020
+ AdaLoRA$_{r=4}$	0.597 M	580 ms	0.036±0.002	2.362±0.029	0.901±0.008	0.521±0.018	0.344±0.006	0.508±0.006
+ IncreLoRA$_{r=4}$	0.618 M	746 ms	0.035±0.002	2.348±0.046	0.888±0.010	0.510±0.016	0.344±0.008	0.502±0.020
CE-SSL$_{r=16}$	**1.601 M**	**241 ms**	**0.035±0.002**	**2.362±0.049**	**0.909±0.007**	**0.553±0.013**	**0.367±0.008**	**0.540±0.019**
CE-SSL$_{r=4}$	**0.402 M**	**240 ms**	**0.034±0.001**	**2.334±0.033**	**0.908±0.008**	**0.538±0.014**	**0.361±0.009**	**0.531±0.019**

Table S12: Performance comparisons between CE-SSL and parameter-efficient semi-supervised baselines on the large backbone. The average performance on all CVDs within each dataset is shown across six seeds. The standard deviation is also reported for the evaluation metrics.

Methods	Params ↓	Time/iter ↓	Ranking Loss ↓	Coverage ↓	Macro AUC ↑	MAP ↑	Macro $G_{\beta=2}$ ↑	Macro $F_{\beta=2}$ ↑
				G12EC Dataset				
FixMatch	113.489 M	966 ms	0.100±0.005	4.147±0.113	0.843±0.007	0.493±0.008	0.293±0.011	0.518±0.015
+ LoRA$_{r=16}$	3.201 M	1023 ms	0.094±0.003	3.983±0.134	0.849±0.004	0.492±0.006	0.294±0.010	0.530±0.020
+ DyLoRA$_{r=16}$	3.201 M	1024 ms	0.091±0.003	3.911±0.070	0.849±0.005	0.492±0.008	0.297±0.017	0.534±0.022
+ AdaLoRA$_{r=16}$	3.203 M	1025 ms	0.093±0.003	3.972±0.119	0.842±0.003	0.482±0.008	0.296±0.008	0.532±0.010
+ IncreLoRA$_{r=16}$	3.245 M	1575 ms	0.084±0.002	3.708±0.075	0.851±0.003	0.493±0.008	0.309±0.013	0.543±0.021
+ LoRA$_{r=4}$	0.896 M	1021 ms	0.092±0.005	3.895±0.130	0.851±0.005	0.493±0.007	0.296±0.010	0.530±0.012
+ DyLoRA$_{r=4}$	0.896 M	1021 ms	0.090±0.004	3.864±0.133	0.849±0.006	0.495±0.008	0.301±0.010	0.535±0.008
+ AdaLoRA$_{r=4}$	0.896 M	1021 ms	0.089±0.002	3.852±0.069	0.847±0.004	0.487±0.003	0.297±0.018	0.527±0.024
+ IncreLoRA$_{r=4}$	0.921 M	1348 ms	0.082±0.003	3.666±0.086	0.856±0.006	0.497±0.007	0.308±0.010	0.542±0.016
CE-SSL$_{r=16}$	**2.658 M**	**453 ms**	**0.085±0.005**	**3.778±0.140**	**0.857±0.004**	**0.509±0.007**	**0.322±0.009**	**0.565±0.010**
CE-SSL$_{r=4}$	**0.761 M**	**453 ms**	**0.084±0.003**	**3.742±0.117**	**0.859±0.004**	**0.506±0.007**	**0.323±0.004**	**0.561±0.002**
				PTB-XL Dataset				
FixMatch	113.490 M	1072 ms	0.035±0.003	2.805±0.102	0.894±0.004	0.521±0.006	0.342±0.007	0.560±0.012
+ LoRA$_{r=16}$	3.202 M	1135 ms	0.030±0.001	2.635±0.023	0.903±0.002	0.522±0.006	0.332±0.010	0.550±0.014
+ DyLoRA$_{r=16}$	3.202 M	1135 ms	0.031±0.001	2.674±0.030	0.906±0.002	0.528±0.002	0.346±0.010	0.566±0.008
+ AdaLoRA$_{r=16}$	3.203 M	1138 ms	0.033±0.000	2.716±0.019	0.894±0.003	0.517±0.006	0.345±0.008	0.558±0.006
+ IncreLoRA$_{r=16}$	3.167 M	1758 ms	0.031±0.001	2.660±0.030	0.898±0.004	0.519±0.004	0.348±0.012	0.566±0.012
+ LoRA$_{r=4}$	0.897 M	1133 ms	0.030±0.001	2.621±0.026	0.904±0.003	0.523±0.006	0.342±0.012	0.564±0.014
+ DyLoRA$_{r=4}$	0.897 M	1133 ms	0.030±0.001	2.632±0.030	0.903±0.004	0.525±0.004	0.339±0.011	0.570±0.010
+ AdaLoRA$_{r=4}$	0.897 M	1134 ms	0.032±0.001	2.699±0.052	0.897±0.004	0.516±0.004	0.339±0.007	0.567±0.007
+ IncreLoRA$_{r=4}$	0.920 M	1493 ms	0.030±0.000	2.631±0.016	0.901±0.002	0.524±0.005	0.351±0.005	0.573±0.010
CE-SSL$_{r=16}$	**2.235 M**	**508 ms**	**0.030±0.002**	**2.618±0.061**	**0.909±0.004**	**0.537±0.004**	**0.358±0.005**	**0.587±0.008**
CE-SSL$_{r=4}$	**0.712 M**	**506 ms**	**0.029±0.001**	**2.602±0.028**	**0.908±0.003**	**0.535±0.004**	**0.356±0.006**	**0.582±0.008**
				Ningbo Dataset				
FixMatch	113.493 M	1111 ms	0.033±0.002	2.962±0.070	0.926±0.004	0.513±0.024	0.337±0.018	0.563±0.027
+ LoRA$_{r=16}$	3.205 M	1177 ms	0.030±0.002	2.845±0.073	0.925±0.003	0.508±0.023	0.336±0.009	0.566±0.017
+ DyLoRA$_{r=16}$	3.205 M	1176 ms	0.030±0.002	2.834±0.093	0.927±0.003	0.504±0.024	0.326±0.013	0.553±0.019
+ AdaLoRA$_{r=16}$	3.206 M	1180 ms	0.031±0.001	2.855±0.074	0.920±0.002	0.491±0.017	0.315±0.011	0.545±0.018
+ IncreLoRA$_{r=16}$	3.247 M	1766 ms	0.028±0.001	2.750±0.030	0.926±0.004	0.502±0.024	0.330±0.009	0.562±0.017
+ LoRA$_{r=4}$	0.900 M	1173 ms	0.029±0.001	2.802±0.053	0.925±0.002	0.510±0.023	0.332±0.010	0.563±0.018
+ DyLoRA$_{r=4}$	0.900 M	1174 ms	0.030±0.001	2.803±0.035	0.926±0.003	0.505±0.028	0.330±0.010	0.564±0.020
+ AdaLoRA$_{r=4}$	0.900 M	1175 ms	0.031±0.003	2.846±0.128	0.922±0.002	0.495±0.023	0.326±0.012	0.555±0.023
+ IncreLoRA$_{r=4}$	0.923 M	1545 ms	0.028±0.001	2.736±0.028	0.927±0.003	0.499±0.016	0.329±0.011	0.561±0.017
CE-SSL$_{r=16}$	**2.234 M**	**530 ms**	**0.029±0.001**	**2.779±0.027**	**0.931±0.002**	**0.523±0.027**	**0.344±0.010**	**0.578±0.013**
CE-SSL$_{r=4}$	**0.740 M**	**528 ms**	**0.028±0.001**	**2.741±0.039**	**0.930±0.002**	**0.513±0.018**	**0.346±0.007**	**0.584±0.009**
				Chapman Dataset				
FixMatch	113.487 M	960 ms	0.042±0.002	2.545±0.048	0.900±0.008	0.534±0.014	0.350±0.013	0.518±0.026
+ LoRA$_{r=16}$	3.200 M	1016 ms	0.040±0.003	2.501±0.079	0.896±0.004	0.541±0.005	0.343±0.015	0.509±0.024
+ DyLoRA$_{r=16}$	3.200 M	1016 ms	0.040±0.004	2.484±0.080	0.897±0.006	0.537±0.009	0.352±0.006	0.524±0.021
+ AdaLoRA$_{r=16}$	3.201 M	1018 ms	0.037±0.002	2.416±0.039	0.894±0.003	0.531±0.011	0.343±0.011	0.509±0.021
+ IncreLoRA$_{r=16}$	3.231 M	1541 ms	0.033±0.002	2.309±0.037	0.895±0.008	0.539±0.014	0.355±0.010	0.517±0.017
+ LoRA$_{r=4}$	0.894 M	1016 ms	0.038±0.001	2.452±0.039	0.901±0.006	0.542±0.008	0.338±0.015	0.512±0.028
+ DyLoRA$_{r=4}$	0.894 M	1015 ms	0.037±0.003	2.415±0.068	0.899±0.005	0.533±0.015	0.341±0.013	0.505±0.021
+ AdaLoRA$_{r=4}$	0.895 M	1015 ms	0.036±0.001	2.412±0.039	0.898±0.005	0.543±0.007	0.341±0.007	0.517±0.019
+ IncreLoRA$_{r=4}$	0.920 M	1340 ms	0.033±0.001	2.316±0.028	0.897±0.007	0.539±0.025	0.360±0.017	0.528±0.019
CE-SSL$_{r=16}$	**2.205 M**	**451 ms**	**0.037±0.001**	**2.417±0.035**	**0.904±0.004**	**0.556±0.006**	**0.371±0.010**	**0.552±0.018**
CE-SSL$_{r=4}$	**0.716 M**	**451 ms**	**0.036±0.001**	**2.404±0.041**	**0.902±0.006**	**0.550±0.008**	**0.365±0.006**	**0.548±0.010**