A Temporal Graph Datasets

As shown in Table **??**, we select fifteen benchmark databases from diverse domains. All datasets are publicly available under MIT licence.

- Reddit: is bipartite interaction graph and consists of one month of posts made by users on subreddits [**?**]. Users and subreddits are nodes, and egdes are interactions of users writing posts to subreddits. The text of each post is converted into LIWC-feature vector [**?**] as an edge feature of length 172. This public dataset gives 366 true labels among 672,447 interactions, those true label are groundtruth labels of banned users from Reddit [**?**].
- Wikipedia: is a bipartite interaction graph and is one month of edits made by editors. This public dataset selecets the 1,000 most edited pages as items and editors who made at least 5 edits as users over a month [**?**]. Editors and pages are nodes, and edges are interactions of editors editing on pages. Edge features of lenth 172 are interaction edits coverted into LIWC-feature vectors [**?**]. Wikipedia dataset treats 217 public ground-truth labels of banned users from 157,474 interactions as positive labels.
- MOOC: is a bipartite MOOC online network of students and online course content units [**?**]. Students and courses are nodes, and edges with features of lenth 4 are interactions of viewing a video, submitting an answer, etc. This public dataset treats 4,066 dropout events out of 411,749 interactions as positive labels [**?**].
- LastFM: is a user-song bipartite network [**?**]. Users and songs are nodes, and edges are interactions of who-listens-to-which song information. This public dataset includes 1,293,103 interactions between all 1000 users and the 1000 most listened songs [**?**].
- Enron: is an email communication network of ENRON that collected about half a million emails over several years. [**?**]. Nodes of the network are email addresses, and edges are email communication between email addresses [**?**].
- SocialEvo: Social Evolution is a network in that experiments are conducted to closely track the everyday life of a whole undergraduate dormitory with mobile phones. This public dataset collected by a cell phone application every six minutes contains physical proximity and location between students living in halls of residence. [**?**].
- UCI: is a facebook-like social network that contains user posts to forums. Nodes are students (1,899) at University of California, Irvine, and edges are interactions of online messages (59,835) among these users [**?**]. Each edge has 100 features.
- CollegeMsg: is provided by SNAP team of stanford [**?**]. This dataset is derived from the facebook-like social network introducted in dataset UCI and SNAP team has parsed it as a temporal network. Each edge has 172 features.
- CanParl: is a the canadian parliament bill voting network extracted from open information website [**?**]. Nodes are members of parliament (), and edges are the interactions between MPs from 2006 to 2019.
- Contact: is presented as a temporal and weighted network of physical proximity among the participants [**?**]. Nodes are participant and edges are proximity events between the study participants. Edge features indicate the physical proximity between participants [**?**].
- Flights: is an weighted flight network. Nodes are airports, and edges are tracked flights of aircrafts [**?**]. weights of edges indicate the number of flights between two given airports in a day [**?**].
- UNTrade: is a food and agriculture trading weighted network among 181 nations over 30 years [**?**]. Nodes are countries and edges are trading between two countries. Weights of edges are the total sum of normalized agriculture import or export values between two given countries [**?**].

- USLegis: is a senate co-sponsorship network that examines the social relations of legislators in their co-sponsorship relationships on bills [**?**]. Nodes are congress members and edge weights are the number of times that two members of congress co-sponsor a bill in a given congress [**?**].
- UNVote: is a weighted network of roll-call votes in the UN General Assembly 1946-2021 [**?**]. Nodes are nations, and edge weights are the number of times both nations have voted "yes" to an item.
- Taobao: is a subset of the Taobao user behavior dataset intercepted based on the period 8:00 to 18:00 on 26 November 2017 [**?**]. This public dataset is a user-item bipartite network. Nodes are users and items, and edges are behaviors between users and items, including favor, click, purchase, and add a item to shopping cart. Each edge has 4 features corresponding to 4 different types of behaviors [**?**].

We collect dataset Reddit, Wikipedia, MOOC, LastFM from Here.

B Experiment Details

Table 1: Statistics of nodes and edges for link prediction task. "New-Old Validation" indicates validation dataset under Inductive New-Old setting, and so on.

	Training		**Validation**		**Transductive Test**		**Inductive Validation**		**Inductive Test**	
	# nodes	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*
Reddit	9,574	389,989	9,839	100,867	9,615	100,867	3,491	19,446	3,515	21,470
Wikipedia	6,141	81,029	3,256	23,621	3,564	23,621	2,120	12,016	2,437	11,715
MOOC	6,015	227,485	2,599	61,762	2,412	61,763	2,333	25,592	2,181	29,179
LastFM	1,612	722,758	1,714	193,965	1,753	193,966	1,643	57,651	1,674	98,442
Enron	157	79,064	155	18,786	141	18,785	112	5,637	110	4,859
SocialEvo	67	1,222,980	64	314,930	62	314,924	62	62,811	60	70,038
UCI	1,338	34,386	1,036	8,975	847	8,976	816	4,761	678	5,707
CollegeMsg	1,337	34,544	1,036	8,975	847	8,975	818	4,914	680	5,885
CanParl	618	47,435	344	11,809	342	10,113	344	5,481	341	5,591
Contact	617	1,372,030	632	364,005	629	363,780	582	68,261	590	69,617
Flights	11,230	1,107,798	10,844	279,399	10,906	287,824	6,784	54,861	6,820	58,102
UNTrade	230	291,287	230	78,721	228	61,595	227	17,528	226	14,001
USLegis	176	38,579	113	10,005	100	4,950	113	5,010	100	3,297
UNVote	178	600,511	194	135,298	194	155,119	194	28,136	194	33,083
Taobao	54,462	45,630	17,964	11,621	18,143	11,550	16,476	10,338	16,896	10,516

	New-Old Validation		**New-Old Test**		**New-New Validation**		**New-New Test**		**Unseen Nodes**
	# nodes	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*	
Reddit	3,301	16,760	3,325	18,703	488	2,686	486	2,767	1,098
Wikipedia	1,809	8,884	1,996	8,148	468	3,132	629	3,567	922
MOOC	2,316	23,109	2,164	25,730	553	2,483	592	3,449	714
LastFM	1,642	52,379	1,674	63,505	272	5,272	331	34,937	198
Enron	111	4,965	109	4,262	19	672	20	597	18
SocialEvo	62	58,959	60	65,466	7	3,852	7	4,572	7
UCI	757	3,686	606	4,193	247	1,075	213	1,514	189
CollegeMsg	759	3,839	608	4,328	247	1,075	214	1,557	189
CanParl	344	4,543	341	4,469	106	938	111	1,122	73
Contact	582	64,887	590	65,883	62	3,374	59	3,734	69
Flights	6,711	49,796	6,739	52,504	874	5,065	937	5,598	1,316
UNTrade	227	16,420	226	13,112	25	1,108	25	889	25
USLegis	112	4,154	100	2,436	37	856	42	861	22
UNVote	194	26,545	194	31,166	23	1,591	23	1,917	20
Taobao	9,247	5,678	8,136	4,860	7,706	4,660	9,298	5,656	8,256

Table 2: Statistics of nodes and edges for node classification task.

	Training		**Validation**		**Test**	
	# nodes	*# edges*	*# nodes*	*# edges*	*# nodes*	*# edges*
Reddit	10,844	470,713	9,839	100,867	9,615	100,867
Wikipedia	7,475	110,232	3,256	23,621	3,564	23,621
MOOC	6,625	288,224	2,599	61,762	2,412	61,763

Table 3: Experimental parameters of TGAT.

	d_n	d_e	d_{time}	d_{pos}	n_{head}
Reddit	172	172	172	172	2
Wikipedia	172	172	172	172	2
MOOC	172	4	172	172	2
LastFM	172	2	172	172	2
Enron	172	32	172	172	2
SocialEvo	172	2	172	172	2
UCI	172	100	172	172	2
CollegeMsg	172	172	172	172	2
CanParl	172	1	172	172	1
Contact	172	1	172	172	1
Flights	172	1	172	172	1
UNTrade	172	1	172	172	1
USLegis	172	1	172	172	1
UNVote	172	1	172	172	1
Taobao	172	4	172	172	2

Table 4: Experimental parameter d_{pos} of CAWN.

	d_n	d_e	d_{time}	d_{pos}
Reddit	172	172	172	108
Wikipedia	172	172	172	108
MOOC	172	4	172	100
LastFM	172	2	172	102
Enron	172	32	172	104
SocialEvo	172	2	172	102
UCI	172	100	172	100
CollegeMsg	172	172	172	108
CanParl	172	1	172	103
Contact	172	1	172	103
Flights	172	1	172	103
UNTrade	172	1	172	103
USLegis	172	1	172	103
UNVote	172	1	172	103
Taobao	172	4	172	100

C Model Implementation Details

We implement JODIE, DyRep, and TGN based on the TGN project.

TGAT concatenates *node features*, *edge features*, *time features*, and *position features* to perform the multi-head self-attention mechanism. There is a positional encoding in the self-attention mechanism for capturing sequential information. Let d_n, d_e, d_{time}, and d_{pos} denote the dimensions of node features, edge features, time features, and positional encoding, respectively. The number of attention heads of mechanism are n_{head}. These parameters must satisfy:

$$(d_n + d_e + d_{time} + d_{pos})\%n_{head} = 0. \tag{1}$$

Usually, $d_n = d_{time} = d_{pos}$. Experimental parameters of TGAT are shown in Table 3.

Similar to the setup of TGAT, CAWN adopts a multi-head self-attention mechanism to capture the subtle relevance of *node features*, *edge features*, *time features*, and *positional features*. Those parameters satisfy Formula (1) too, and $d_n = d_{time}$. However, CAWN initializes the number of attention heads to 2, so we change the dimension of d_{pos} to conduct experiments. The experimental parameters of CAWN are shown in Table 4.

NeurTW concatenates *node features*, *edge features*, and *positional features* (without *time features*) during the temporal random walk encoding. Regarding the temporal walk sampling strategy, given a

node u at time t, the sampling probability weights of its neighbor v, $(\{v, u\}, t') \in \mathcal{G}_{u,t}$, is proportion to $exp(\alpha(t' - t))$, where α is a temporal bias. However, the time intervals in some benchmark datasets (Enron, CanParl, UNTrade, USLegis, and UNVote) are relatively large, and the exponential sampling probability weights can encounter overflow. Therefore, we implement another strategy to calculate the sampling probability weights for these datasets:

$$W(v, t') = \begin{cases} t' - t, & t' - t > 0, \\ 1, & t' - t = 0, \\ -1/(t' - t), & t' - t < 0. \end{cases} \tag{2}$$

This strategy guarantees $W(v, t') > 0$. Finally, the sampling probability of each neighbor is obtained after normalization.

D Experiment Results

D.1 AP Results for Link Prediction

Table 5: Average precision (AP) results for the link prediction task in transductive and inductive setting. "*" denotes that TGAT layer cannot find suitable neighbors within given time interval and encounters error; "—" denotes timeout after 48 hours.

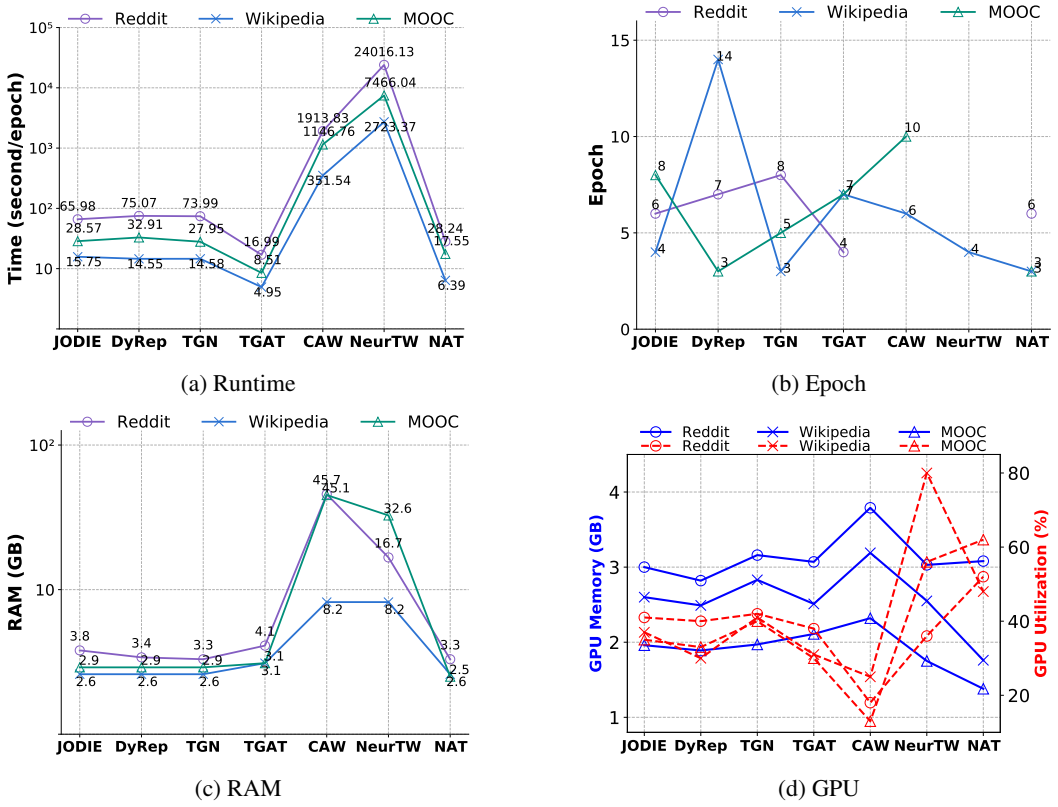
	Transductive						
Dataset \ Model	JODIE	DyRep	TGN	TGAT	CAWN	NeurTW	NAT
Reddit	0.9718 ± 0.0022	0.9808 ± 0.0006	0.9874 ± 0.0002	0.9822 ± 0.0003	0.9904 ± 0.0001	0.9855 ± 0.0013	0.9868 ± 0.0017
Wikipedia	0.9471 ± 0.0056	0.9464 ± 0.0010	0.9852 ± 0.0003	0.9536 ± 0.0022	0.9906 ± 0.0001	0.9918 ± 0.0001	0.9819 ± 0.0026
MOOC	0.7364 ± 0.0370	0.7933 ± 0.0348	0.883 ± 0.0242	0.7185 ± 0.0051	0.9369 ± 0.0009	0.7943 ± 0.0248	0.7537 ± 0.0191
LastFM	0.6762 ± 0.0678	0.6736 ± 0.0768	0.7694 ± 0.0276	0.5375 ± 0.0044	0.8946 ± 0.0006	0.8405 ± 0.0	0.8729 ± 0.0022
Enron	0.7841 ± 0.0254	0.7648 ± 0.0418	0.8472 ± 0.0173	0.6063 ± 0.0194	0.9142 ± 0.0052	0.8847 ± 0.0079	0.9044 ± 0.0036
SocialEvo	0.7982 ± 0.0476	0.8816 ± 0.0042	0.9325 ± 0.0006	0.7724 ± 0.0052	0.9188 ± 0.0011	—	0.8989 ± 0.0096
UCI	0.8436 ± 0.0110	0.4913 ± 0.0367	0.8914 ± 0.0138	0.779 ± 0.0052	0.9425 ± 0.001	0.9702 ± 0.0021	0.9253 ± 0.0083
CollegeMsg	0.5276 ± 0.0493	0.5070 ± 0.0049	0.8418 ± 0.0847	0.7902 ± 0.0033	0.9401 ± 0.0025	0.9727 ± 0.0001	0.9241 ± 0.0086
CanParl	0.7030 ± 0.0077	0.6860 ± 0.0256	0.6765 ± 0.0615	0.6811 ± 0.0157	0.6916 ± 0.0546	0.8528 ± 0.0213	0.6593 ± 0.0764
Contact	0.9087 ± 0.0114	0.9016 ± 0.0319	0.9699 ± 0.0045	0.5888 ± 0.0065	0.9677 ± 0.0024	0.9756 ± 0.0	0.945 ± 0.0168
Flights	0.9389 ± 0.0075	0.8836 ± 0.0078	0.9764 ± 0.0025	0.899 ± 0.0025	0.9860 ± 0.0002	0.9321 ± 0.0	0.9749 ± 0.0048
UNTrade	0.6329 ± 0.0102	0.6099 ± 0.0057	0.6059 ± 0.0086	*	0.7488 ± 0.0005	0.5648 ± 0.0167	0.7514 ± 0.0615
USLegis	0.7585 ± 0.0032	0.6808 ± 0.0368	0.7398 ± 0.0027	0.7206 ± 0.0071	0.9682 ± 0.0048	0.9713 ± 0.0013	0.7425 ± 0.016
UNVote	0.6090 ± 0.0076	0.5855 ± 0.0225	0.6694 ± 0.0095	0.5388 ± 0.002	0.6175 ± 0.0013	0.6008 ± 0.0	0.6449 ± 0.033
Taobao	0.808 ± 0.0015	0.8074 ± 0.0014	0.8618 ± 0.0004	0.5508 ± 0.0093	0.7464 ± 0.0027	0.8808 ± 0.0012	0.8933 ± 0.0007
	Inductive						
Dataset \ Model	JODIE	DyRep	TGN	TGAT	CAWN	NeurTW	NAT
Reddit	0.9427 ± 0.0118	0.9582 ± 0.0003	0.9767 ± 0.0003	0.9667 ± 0.0003	0.9889 ± 0.0001	0.9821 ± 0.0006	0.9912 ± 0.0027
Wikipedia	0.9316 ± 0.0049	0.9181 ± 0.0037	0.9791 ± 0.0004	0.9389 ± 0.0035	0.9903 ± 0.0002	0.9912 ± 0.0004	0.9962 ± 0.0021
MOOC	0.7282 ± 0.0686	0.7985 ± 0..0153	0.8726 ± 0.0267	0.7204 ± 0.0055	0.9394 ± 0.0005	0.7903 ± 0.0307	0.7474 ± 0.0214
LastFM	0.8057 ± 0.0424	0.7956 ± 0.0631	0.8261 ± 0.0145	0.5454 ± 0.0094	0.9225 ± 0.0009	0.8842 ± 0.0	0.9235 ± 0.0028
Enron	0.7640 ± 0.0310	0.6883 ± 0.0635	0.7982 ± 0.0237	0.5661 ± 0.0134	0.916 ± 0.001	0.8940 ± 0.0025	0.9308 ± 0.0085
SocialEvo	0.8527 ± 0.0303	0.8954 ± 0.0034	0.8944 ± 0.0102	0.6497 ± 0.004	0.9118 ± 0.0003	—	0.8682 ± 0.0324
UCI	0.7298 ± 0.0152	0.4606 ± 0.0209	0.8306 ± 0.0177	0.704 ± 0.0046	0.9421 ± 0.0012	0.9720 ± 0.0024	0.9658 ± 0.0125
CollegeMsg	0.4960 ± 0.0193	0.4858 ± 0.0051	0.7983 ± 0.049	0.7184 ± 0.0014	0.941 ± 0.0026	0.9762 ± 0.0	0.9642 ± 0.0124
CanParl	0.5148 ± 0.0119	0.5365 ± 0.0064	0.5596 ± 0.0141	0.5814 ± 0.0041	0.6915 ± 0.0578	0.8469 ± 0.0161	0.6058 ± 0.0812
Contact	0.9162 ± 0.0051	0.8334 ± 0.0620	0.9411 ± 0.0071	0.5922 ± 0.0056	0.9688 ± 0.0023	0.9762 ± 0.0	0.9489 ± 0.0091
Flights	0.9190 ± 0.0081	0.8707 ± 0.0121	0.9439 ± 0.0043	0.8361 ± 0.0039	0.9834 ± 0.0002	0.9201 ± 0.0	0.9817 ± 0.0026
UNTrade	0.6392 ± 0.0132	0.6232 ± 0.0188	0.5603 ± 0.0106	*	0.7361 ± 0.0009	0.5640 ± 0.0137	0.6586 ± 0.0543
USLegis	0.5557 ± 0.0107	0.5687 ± 0.0008	0.6048 ± 0.0047	0.5637 ± 0.0048	0.9694 ± 0.0028	0.971 ± 0.0009	0.6946 ± 0.0198
UNVote	0.5242 ± 0.0050	0.5118 ± 0.0037	0.5702 ± 0.0099	0.5204 ± 0.004	0.6014 ± 0.0013	0.6025 ± 0.0	0.7637 ± 0.0023
Taobao	0.6696 ± 0.0025	0.6717 ± 0.0006	0.6761 ± 0.0015	0.5293 ± 0.0096	0.7389 ± 0.0026	0.8815 ± 0.0045	0.9992 ± 0.0001
	Inductive New-Old						
Dataset \ Model	JODIE	DyRep	TGN	TGAT	CAWN	NeurTW	NAT
Reddit	0.9399 ± 0.0112	0.9552 ± 0.0027	0.9749 ± 0.0006	0.9659 ± 0.0004	0.9871 ± 0.0003	0.9810 ± 0.0015	0.9947 ± 0.0014
Wikipedia	0.9127 ± 0.0078	0.8947 ± 0.0040	0.9724 ± 0.0008	0.9223 ± 0.0021	0.9901 ± 0.0002	0.9884 ± 0.0007	0.9959 ± 0.0018
MOOC	0.7366 ± 0.5977	0.8011 ± 0.0092	0.8669 ± 0.0328	0.7263 ± 0.0059	0.9408 ± 0.0022	0.7907 ± 0.0336	0.7677 ± 0.0175
LastFM	0.7448 ± 0.0034	0.7024 ± 0.0532	0.7661 ± 0.0232	0.5447 ± 0.0023	0.8906 ± 0.0021	0.835 ± 0.0	0.9235 ± 0.001
Enron	0.7526 ± 0.0158	0.6742 ± 0.0632	0.7918 ± 0.0209	0.5729 ± 0.0189	0.9168 ± 0.0061	0.8925 ± 0.0090	0.9319 ± 0.0092
SocialEvo	0.8521 ± 0.0403	0.8999 ± 0.0046	0.8972 ± 0.0107	0.6578 ± 0.0041	0.8830 ± 0.0008	—	0.8437 ± 0.0569
UCI	0.6891 ± 0.0166	0.4574 ± 0.0207	0.8243 ± 0.0205	0.6826 ± 0.0084	0.9414 ± 0.002	0.9732 ± 0.0040	0.9768 ± 0.0127
CollegeMsg	0.5000 ± 0.0227	0.4834 ± 0.0177	0.7954 ± 0.0349	0.701 ± 0.0058	0.9407 ± 0.0017	0.9719 ± 0.0014	0.9763 ± 0.0133
CanParl	0.5143 ± 0.0043	0.5168 ± 0.0170	0.552 ± 0.0135	0.574 ± 0.0054	0.6952 ± 0.0518	0.8417 ± 0.0132	0.6027 ± 0.0787
Contact	0.9150 ± 0.0058	0.8253 ± 0.0637	0.9421 ± 0.0055	0.5915 ± 0.0049	0.9689 ± 0.0029	0.9757 ± 0.0	0.9384 ± 0.0175
Flights	0.9128 ± 0.0095	0.8657 ± 0.0117	0.9412 ± 0.0039	0.833 ± 0.0031	0.9827 ± 0.0002	0.9161 ± 0.0	0.9845 ± 0.0033
UNTrade	0.6333 ± 0.0102	0.6101 ± 0.0196	0.5622 ± 0.014	*	0.7375 ± 0.001	0.5692 ± 0.0185	0.5844 ± 0.053
USLegis	0.5567 ± 0.0106	0.5490 ± 0.0143	0.5651 ± 0.0131	0.5695 ± 0.0099	0.9703 ± 0.0027	0.9671 ± 0.0027	0.5024 ± 0.0511
UNVote	0.5348 ± 0.0072	0.5126 ± 0.0103	0.5724 ± 0.0107	0.5196 ± 0.0022	0.6050 ± 0.0019	0.6036 ± 0.0	0.7598 ± 0.0167
Taobao	0.6838 ± 0.0045	0.6884 ± 0.0013	0.6944 ± 0.0038	0.5309 ± 0.0189	0.7374 ± 0.0032	0.8687 ± 0.0010	0.9997 ± 0.0001
	Inductive New-New						
Dataset \ Model	JODIE	DyRep	TGN	TGAT	CAWN	NeurTW	NAT
Reddit	0.9199 ± 0.0167	0.9384 ± 0.0064	0.9727 ± 0.0004	0.9523 ± 0.0056	0.9958 ± 0.0017	0.9890 ± 0.0003	0.9951 ± 0.0005
Wikipedia	0.9307 ± 0.0060	0.9329 ± 0.0028	0.9822 ± 0.0009	0.9592 ± 0.0039	0.9941 ± 0.0004	0.9963 ± 0.0003	0.9979 ± 0.0009
MOOC	0.6623 ± 0.0189	0.7135 ± 0.0148	0.8651 ± 0.0059	0.7239 ± 0.0052	0.935 ± 0.0009	0.7871 ± 0.0221	0.6654 ± 0.0155
LastFM	0.8558 ± 0.0110	0.8388 ± 0.0209	0.8121 ± 0.0046	0.536 ± 0.0217	0.9716 ± 0.0008	0.9585 ± 0.0	0.9722 ± 0.0013
Enron	0.6525 ± 0.0146	0.6312 ± 0.0449	0.7391 ± 0.0196	0.538 ± 0.0093	0.9556 ± 0.0055	0.9358 ± 0.0008	0.9503 ± 0.0079
SocialEvo	0.5958 ± 0.0391	0.7312 ± 0.0103	0.8268 ± 0.003	0.5096 ± 0.0097	0.9150 ± 0.0013	—	0.9112 ± 0.0563
UCI	0.6249 ± 0.0198	0.5062 ± 0.0032	0.8393 ± 0.0155	0.7758 ± 0.0033	0.9488 ± 0.0012	0.9736 ± 0.0008	0.9518 ± 0.0211
CollegeMsg	0.5212 ± 0.0244	0.5328 ± 0.0117	0.8244 ± 0.0098	0.7929 ± 0.0029	0.9484 ± 0.0039	0.9797 ± 0.0008	0.95 ± 0.0257
CanParl	0.4697 ± 0.0043	0.4794 ± 0.0057	0.5553 ± 0.0258	0.6004 ± 0.0087	0.6671 ± 0.0795	0.8511 ± 0.0079	0.5989 ± 0.0571
Contact	0.7381 ± 0.0145	0.6601 ± 0.0432	0.8916 ± 0.0075	0.5779 ± 0.0044	0.9670 ± 0.0031	0.9704 ± 0.0	0.9535 ± 0.0044
Flights	0.9250 ± 0.0065	0.6312 ± 0.0449	0.9644 ± 0.0015	0.8608 ± 0.0049	0.9882 ± 0.0009	0.9496 ± 0.0	0.9906 ± 0.0009
UNTrade	0.5801 ± 0.0112	0.5344 ± 0.0130	0.5164 ± 0.0056	*	0.7404 ± 0.0023	0.5685 ± 0.0298	0.6785 ± 0.0289
USLegis	0.5250 ± 0.0045	0.5523 ± 0.0127	0.5582 ± 0.02	0.5434 ± 0.0203	0.9767 ± 0.0055	0.9803 ± 0.0005	0.8627 ± 0.0196
UNVote	0.4973 ± 0.0145	0.4856 ± 0.0078	0.5502 ± 0.0096	0.5337 ± 0.0046	0.5830 ± 0.0076	0.5964 ± 0.0	0.7549 ± 0.035
Taobao	0.6764 ± 0.0013	0.676 ± 0.0011	0.6739 ± 0.0016	0.5222 ± 0.0033	0.7390 ± 0.0147	0.9025 ± 0.0035	0.9997 ± 0.0001

D.2 GPU Utilization Comparison for Link Prediction

Table 6: GPU utilization of models on the link prediction task. "*" denotes that TGAT layer cannot find suitable neighbors within given time interval and encounters error.

	GPU Utilization (%)						
Dataset \ Model	JODIE	DyRep	TGN	TGAT	CAWN	NeurTW	NAT
Reddit	21	22	41	39	26	31	40
Wikipedia	34	46	36	35	28	17	38
MOOC	14	29	35	35	18	14	45
LastFM	22	28	38	22	23	22	48
Enron	18	24	41	24	25	22	51
SocialEvo	24	25	42	25	17	22	46
UCI	30	25	35	33	27	58	44
CollegeMsg	21	32	46	47	25	34	48
CanParl	26	27	54	47	24	22	51
Contact	25	22	40	29	19	22	50
Flights	20	20	26	35	18	24	43
UNTrade	19	23	50	*	15	23	53
USLegis	22	28	54	38	26	55	53
UNVote	12	22	37	35	16	46	54
Taobao	29	56	31	55	22	53	38

D.3 Efficiency Comparison of Node Classification Task



(a) Runtime

(b) Epoch

(c) RAM

(d) GPU

Figure 1: Efficiency performance of models on the node classification task. Null values in Subfigure (b) indicate that the model model cannot converge within 48 hours.

E TeMP

F BenchTemp Modules

Table 7: BENCHTEMP modules.

Task	Modules	

Link Prediction	`benchtemp.lp.DataLoader`
	`benchtemp.lp.EdgeSampler`
	`benchtemp.lp.Evaluator`
		`benchtemp.DataPreprocessor`
		`benchtemp.EarlyStopMonitor`
		`benchtemp.LeaderBoard`

Node Classfication	`benchtemp.nc.DataLoader` `benchtemp.nc.Evaluator`	`benchtemp.BCELoss` `benchtemp.Optimizer`