Supplementary Material
EGAD: Evolving Graph Representation Learning with Self-Attention and Knowledge Distillation for Live Video Streaming Events

STEFANOS ANTARIS, KTH Royal Institute of Technology HiveStreaming AB, Sweden
DIMITRIOS RAFAILIDIS, Maastricht University, Netherlands
SARUNAS GIRDZIJAUSKAS, KTH Royal Institute of Technology, Sweden

Table 1. Effect on RMSE when varying the representation size d of the examined models for LiveStream-4K. We report average RMSE over the graph snapshots during the live video streaming event. Bold values denote the best configuration for each examined model.

Representation size d	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
16	0.23 ± 0.14	0.27 ± 0.09	0.18 ± 0.07	0.28 ± 0.14	0.27 ± 0.15	0.17 ± 0.09	**0.13 ± 0.09**
32	0.21 ± 0.12	**0.25 ± 0.12**	0.16 ± 0.10	0.26 ± 0.13	**0.23 ± 0.17**	0.16 ± 0.05	0.15 ± 0.10
64	**0.19 ± 0.13**	0.26 ± 0.18	**0.15 ± 0.09**	**0.25 ± 0.16**	0.24 ± 0.12	**0.14 ± 0.08**	0.16 ± 0.06
128	0.20 ± 0.17	0.26 ± 0.12	0.17 ± 0.08	0.26 ± 0.17	0.25 ± 0.16	0.15 ± 0.06	0.16 ± 0.08
256	0.21 ± 0.15	0.27 ± 0.15	0.18 ± 0.05	0.27 ± 0.19	0.26 ± 0.14	0.16 ± 0.07	0.17 ± 0.06

Table 2. Effect on RMSE when varying the representation size d of the examined models for LiveStream-6K

Representation size d	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
16	0.48 ± 0.16	0.47 ± 0.12	0.41 ± 0.15	0.48 ± 0.18	0.48 ± 0.14	0.41 ± 0.12	**0.36 ± 0.06**
32	0.46 ± 0.16	**0.44 ± 0.11**	0.40 ± 0.17	0.47 ± 0.18	**0.41 ± 0.12**	0.39 ± 0.09	0.37 ± 0.09
64	**0.45 ± 0.18**	0.45 ± 0.13	**0.39 ± 0.18**	**0.43 ± 0.16**	0.43 ± 0.15	**0.37 ± 0.10**	0.39 ± 0.10
128	0.46 ± 0.17	0.45 ± 0.14	0.41 ± 0.16	0.45 ± 0.14	0.44 ± 0.16	0.38 ± 0.11	0.40 ± 0.08
256	0.46 ± 0.18	0.46 ± 0.18	0.42 ± 0.14	0.46 ± 0.12	0.46 ± 0.18	0.38 ± 0.11	0.42 ± 0.07

Table 3. Effect on RMSE when varying the representation size d of the examined models for LiveStream-16K

Representation size d	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
16	0.36 ± 0.13	0.35 ± 0.18	0.29 ± 0.16	0.39 ± 0.15	0.39 ± 0.12	0.27 ± 0.10	**0.23 ± 0.07**
32	0.35 ± 0.14	**0.33 ± 0.19**	0.29 ± 0.14	0.37 ± 0.14	0.36 ± 0.11	0.26 ± 0.09	0.25 ± 0.09
64	**0.33 ± 0.12**	0.34 ± 0.11	**0.27 ± 0.14**	0.36 ± 0.15	**0.33 ± 0.11**	**0.24 ± 0.09**	0.26 ± 0.06
128	0.34 ± 0.11	0.35 ± 0.13	0.28 ± 0.13	**0.35 ± 0.12**	0.35 ± 0.15	0.25 ± 0.10	0.26 ± 0.08
256	0.34 ± 0.17	0.36 ± 0.11	0.29 ± 0.12	0.38 ± 0.13	0.36 ± 0.18	0.26 ± 0.10	0.27 ± 0.10

Authors' addresses: Stefanos Antaris, KTH Royal Institute of Technology, HiveStreaming AB, Sweden, antaris@kth.se; Dimitrios Rafailidis, Maastricht University, Netherlands, dimitrios.rafailidis@maastrichtuniversity.nl; Sarunas Girdzijauskas, KTH Royal Institute of Technology, Sweden, sarunasg@kth.se.

Table 4. Impact of the window size l on the performance of each examined model in terms of RMSE for LiveStream-4K

Window Size l	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	0.32 ± 0.16	0.35 ± 0.19	0.21 ± 0.12	N/A	N/A	0.18 ± 0.06	0.16 ± 0.05
2	**0.19 ± 0.13**	**0.25 ± 0.12**	**0.15 ± 0.09**	N/A	N/A	0.16 ± 0.09	0.14 ± 0.06
3	0.24 ± 0.18	0.28 ± 0.14	0.19 ± 0.14	N/A	N/A	**0.14 ± 0.08**	**0.13 ± 0.09**
4	0.29 ± 0.12	0.32 ± 0.16	0.20 ± 0.12	N/A	N/A	0.17 ± 0.10	0.16 ± 0.04
5	0.36 ± 0.17	0.42 ± 0.19	0.24 ± 0.14	N/A	N/A	0.20 ± 0.09	0.19 ± 0.06

Table 5. Impact of the window size l on the performance of each examined model in terms of RMSE for LiveStream-6K

Window Size l	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	0.48 ± 0.16	0.56 ± 0.11	0.42 ± 0.14	N/A	N/A	0.41 ± 0.11	0.39 ± 0.07
2	**0.45 ± 0.18**	**0.44 ± 0.11**	**0.39 ± 0.18**	N/A	N/A	0.38 ± 0.08	0.37 ± 0.09
3	0.46 ± 0.14	0.49 ± 0.13	0.41 ± 0.16	N/A	N/A	**0.37 ± 0.10**	**0.36 ± 0.06**
4	0.52 ± 0.19	0.51 ± 0.12	0.43 ± 0.12	N/A	N/A	0.40 ± 0.09	0.39 ± 0.04
5	0.54 ± 0.12	0.54 ± 0.18	0.49 ± 0.15	N/A	N/A	0.43 ± 0.12	0.40 ± 0.05

Table 6. Impact of the window size l on the performance of each examined model in terms of RMSE for LiveStream-16K

Window Size l	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	0.42 ± 0.12	0.38 ± 0.16	0.33 ± 0.16	N/A	N/A	0.31 ± 0.10	0.29 ± 0.06
2	**0.33 ± 0.12**	**0.33 ± 0.19**	**0.27 ± 0.14**	N/A	N/A	0.29 ± 0.11	0.27 ± 0.08
3	0.37 ± 0.11	0.36 ± 0.17	0.29 ± 0.12	N/A	N/A	**0.24 ± 0.09**	**0.23 ± 0.07**
4	0.39 ± 0.18	0.39 ± 0.19	0.31 ± 0.16	N/A	N/A	0.30 ± 0.07	0.29 ± 0.09
5	0.46 ± 0.14	0.41 ± 0.15	0.39 ± 0.14	N/A	N/A	0.38 ± 0.10	0.24 ± 0.10

Table 7. Effect on RMSE when varying the number of heads h of the self-attention mechanisms of DySAT, EGAD-$\mathcal{T}$ and EGAD-$\mathcal{S}$ for LiveStream-4K

Number of Heads h	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	N/A	N/A	0.19 ± 0.06	N/A	N/A	0.16 ± 0.05	**0.13 ± 0.09**
2	N/A	N/A	0.17 ± 0.07	N/A	N/A	0.15 ± 0.04	0.14 ± 0.10
3	N/A	N/A	**0.15 ± 0.09**	N/A	N/A	**0.14 ± 0.08**	0.16 ± 0.08
4	N/A	N/A	0.16 ± 0.08	N/A	N/A	0.16 ± 0.07	0.17 ± 0.09
5	N/A	N/A	0.18 ± 0.08	N/A	N/A	0.17 ± 0.09	0.20 ± 0.03

Table 8. Effect on RMSE when varying the number of heads h of the self-attention mechanisms of DySAT, EGAD-$\mathcal{T}$ and EGAD-$\mathcal{S}$ for LiveStream-6K.

Number of Heads h	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	N/A	N/A	0.47 ± 0.12	N/A	N/A	0.42 ± 0.07	**0.36 ± 0.06**
2	N/A	N/A	0.45 ± 0.15	N/A	N/A	0.40 ± 0.12	0.38 ± 0.06
3	N/A	N/A	**0.39 ± 0.18**	N/A	N/A	**0.37 ± 0.10**	0.41 ± 0.04
4	N/A	N/A	0.41 ± 0.14	N/A	N/A	0.38 ± 0.10	0.43 ± 0.09
5	N/A	N/A	0.46 ± 0.17	N/A	N/A	0.39 ± 0.11	0.43 ± 0.08

Table 9. Effect on RMSE when varying the number of heads h of the self-attention mechanisms of DySAT, EGAD-$\mathcal{T}$ and EGAD-$\mathcal{S}$ for LiveStream-16K

Number of Heads h	**DynVGAE**	**EvolveGCN**	**DySAT**	**DMTKG-$\mathcal{T}$**	**DMTKG-$\mathcal{S}$**	**EGAD-$\mathcal{T}$**	**EGAD-$\mathcal{S}$**
1	N/A	N/A	0.32 ± 0.17	N/A	N/A	0.28 ± 0.08	**0.23 ± 0.07**
2	N/A	N/A	0.29 ± 0.18	N/A	N/A	0.26 ± 0.10	0.25 ± 0.05
3	N/A	N/A	0.28 ± 0.15	N/A	N/A	**0.24 ± 0.09**	0.26 ± 0.09
4	N/A	N/A	**0.27 ± 0.14**	N/A	N/A	0.25 ± 0.06	0.26 ± 0.10
5	N/A	N/A	0.29 ± 0.12	N/A	N/A	0.27 ± 0.07	0.27 ± 0.08