

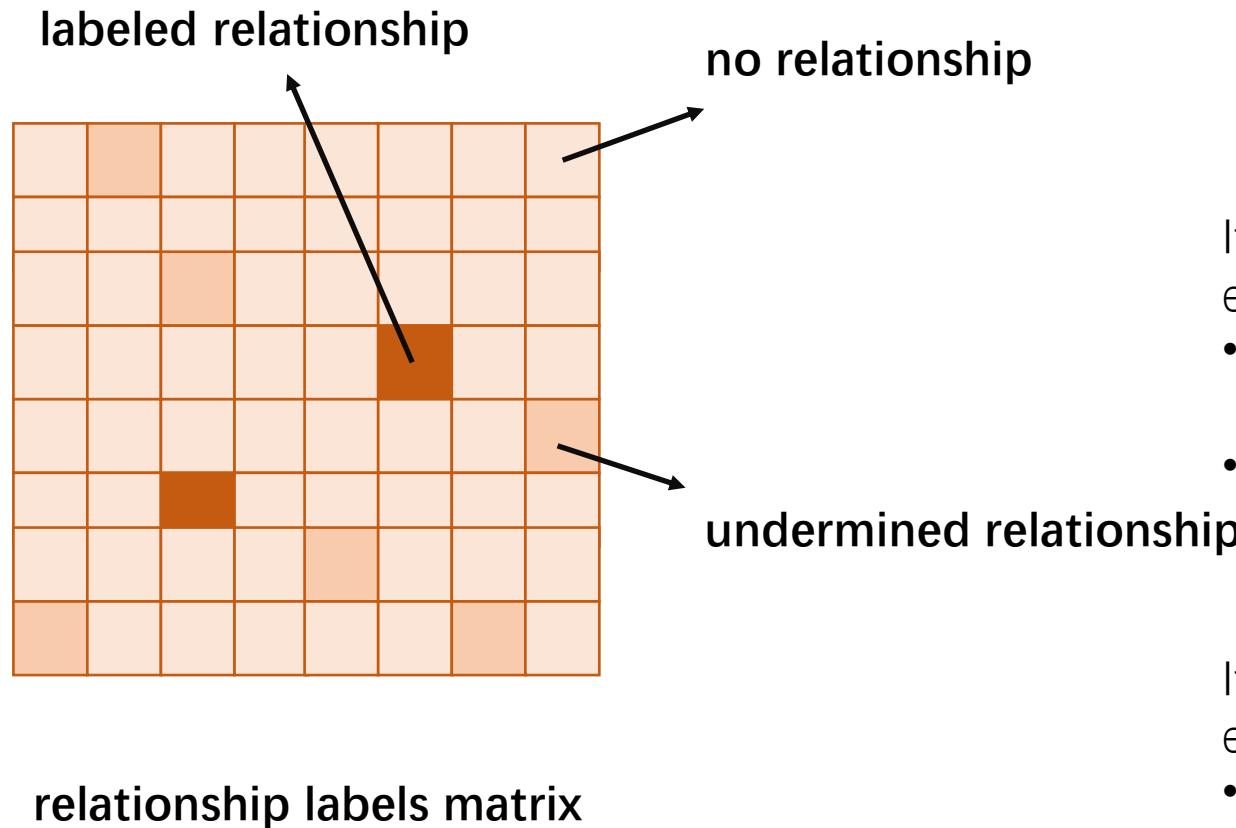
Experiments

霍超凡

Loss for relationship

- Assume we have n objects, then there will be n^2 relationships. Assume we have 10000 relationships, but less than 100 relationships are positive samples.
- Note that our dataset is not completely annotated, there have many relationships not be labeled.
- When we design loss, we must take these factors into considerations.

Loss for relationship



NO_REL_CLS_WEIGHT: weight
for no relationship class

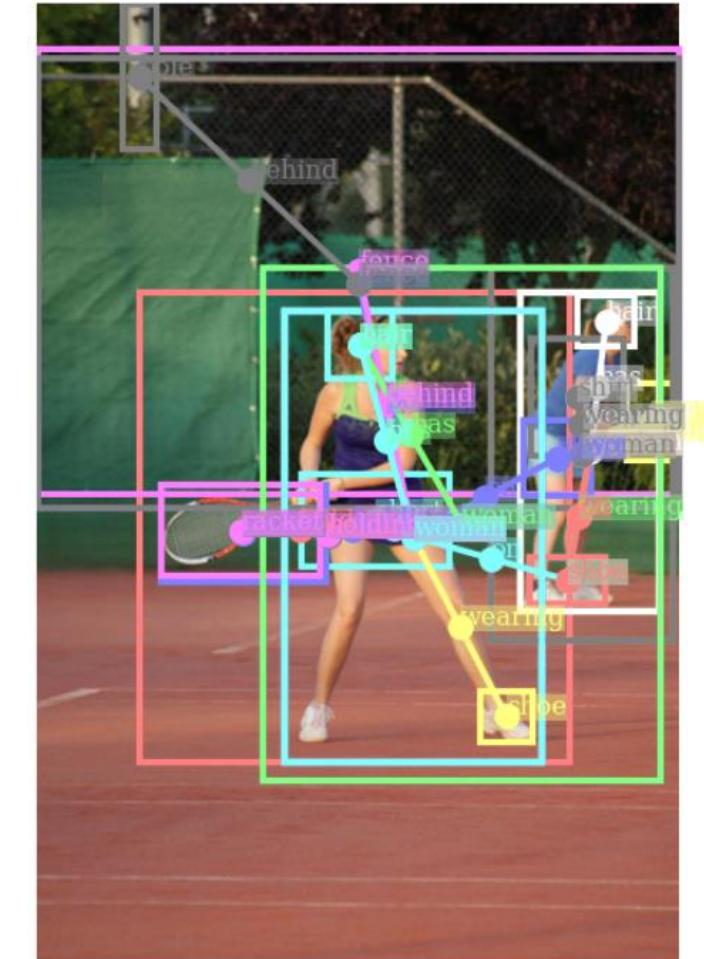
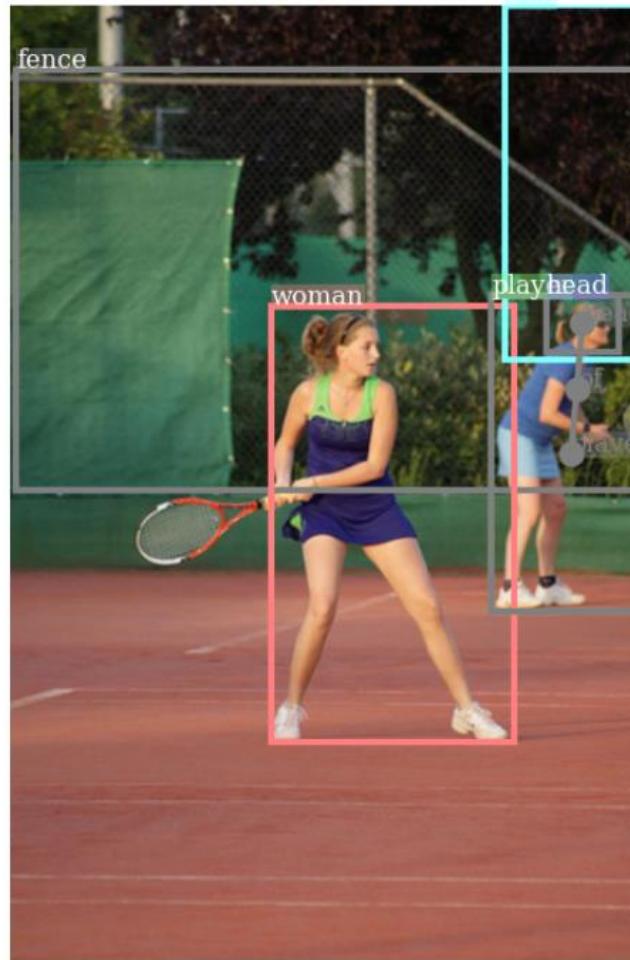
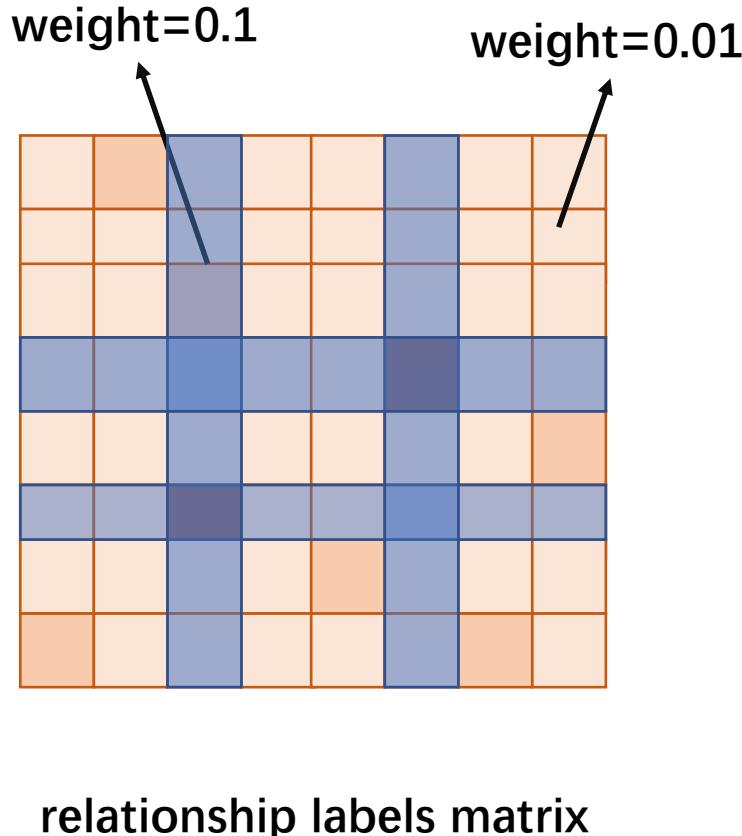
If we set NO_REL_CLS_WEIGHT too high, for example 0.1, then

- undermined relationships are punished too heavy.
- And model is biased to no relationship.

If we set NO_REL_CLS_WEIGHT too small, for example 0.01, then

- false positive will show up.

Loss for relationship



Performance

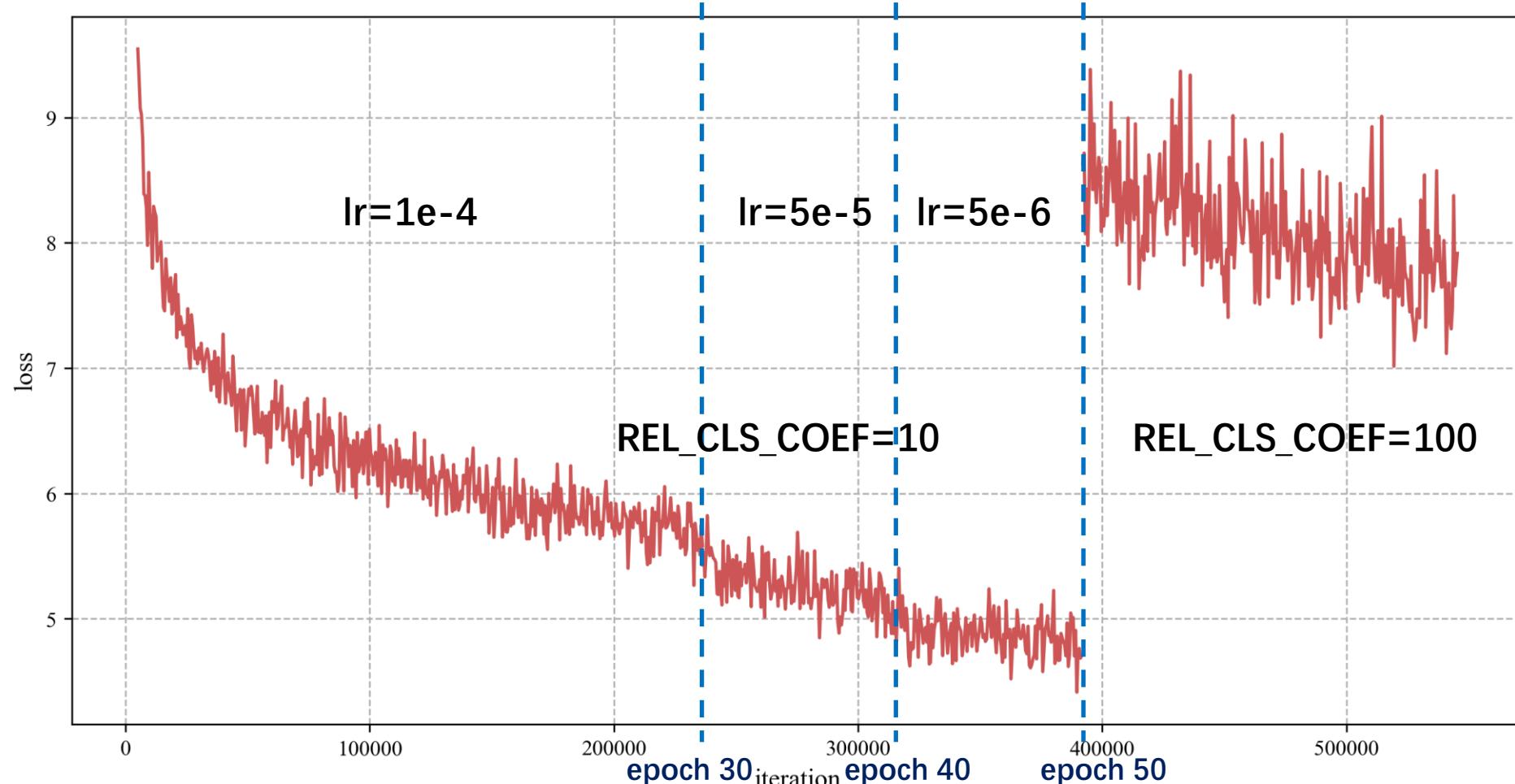
Model	object query number	relationship query number	Graph Transformer layer number	mAp		
				full	rare	non-rare
DETR	20	20	5	22.31	18.36	23.49
SGGTR	20	20	5	21.93	18.45	22.97
	50	50	6	20.51	15.68	21.96
	50	50	5	21.94	17.14	23.37

Performance

Model	w/o knowledge loss	w/o auxiliary relationship loss	mAp on eval set	Recall with graph constraint on eval set			mAp on train set	Recall with graph constraint on train set		
				20	50	100		20	50	100
DETR-based	✗	✗	23.61	13.47	20.93	25.90	53.71	31.99	43.69	51.87
SGGTR	✗	✗	24.50	18.45	24.30	28.56	34.46	24.56	29.96	31.24
	✗	✓	24.11	11.05	16.94	22.01	36.39	39.07	48.63	54.98
	✓	✓	22.32	10.01	15.20	20.23	32.78	35.88	44.20	49.64
SGGTR with exknowledge	✗	✗	22.36	14.66	21.82	26.28				
	✓	✓	21.99	9.96	15.35	20.19	43.53	41.75	52.06	58.60

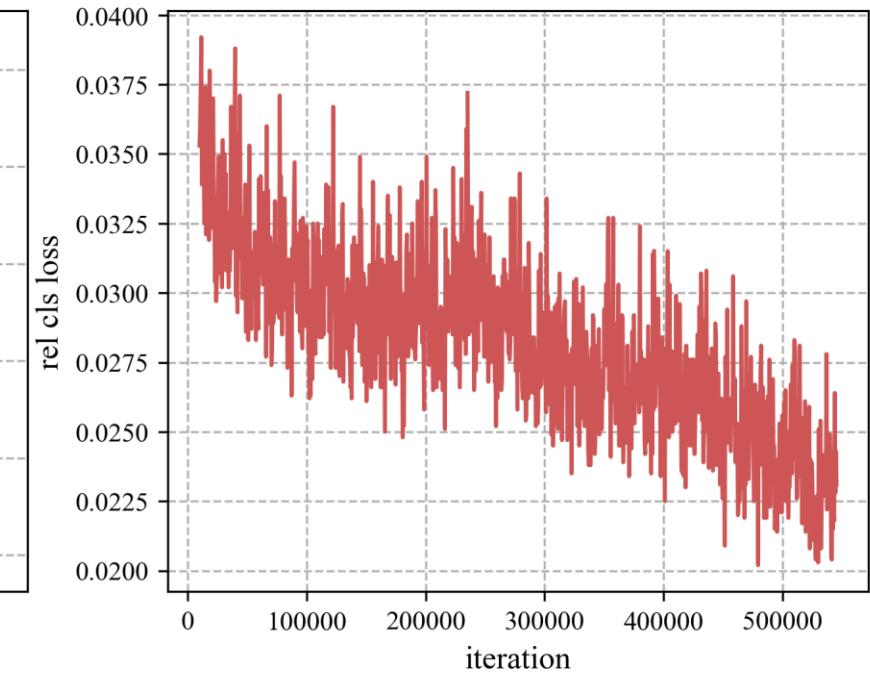
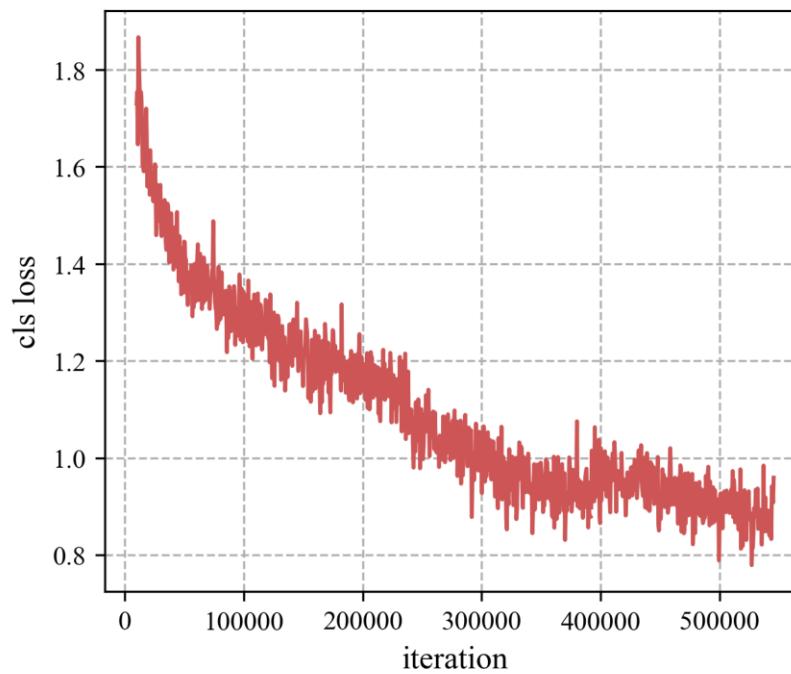
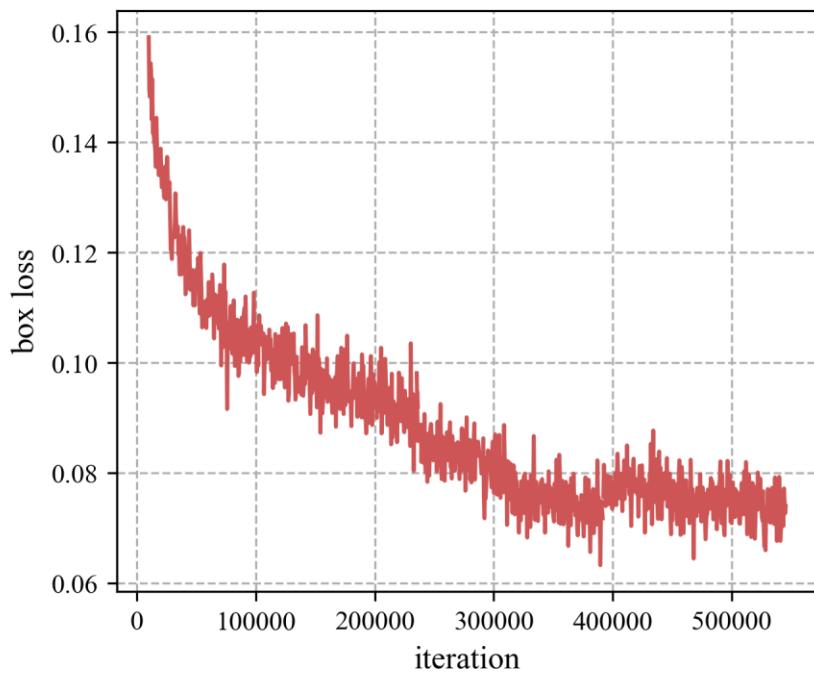
On VG dataset

Model #1: SGGTR with OD and SGG branch



On VG dataset

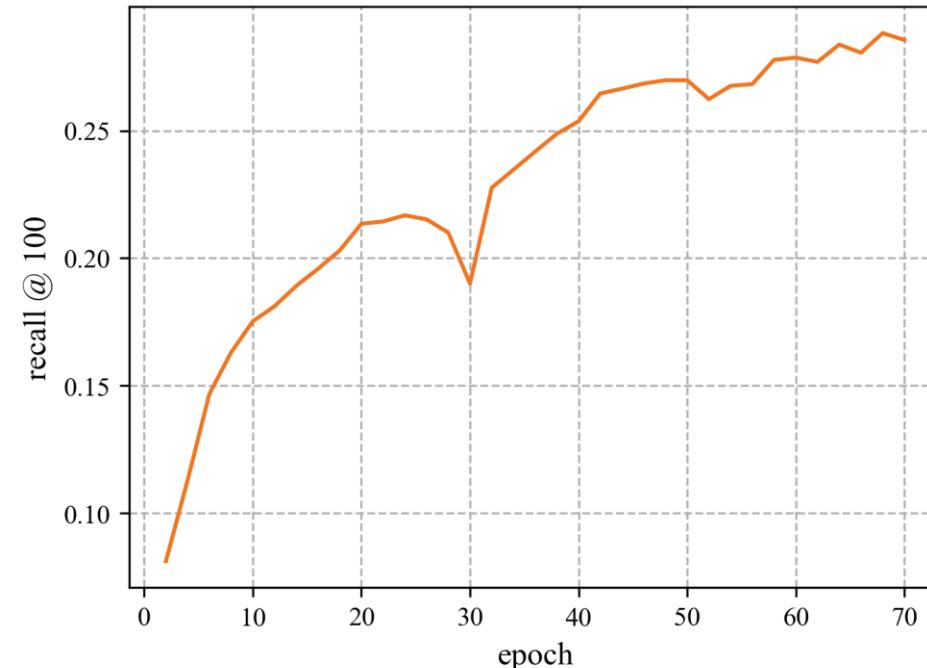
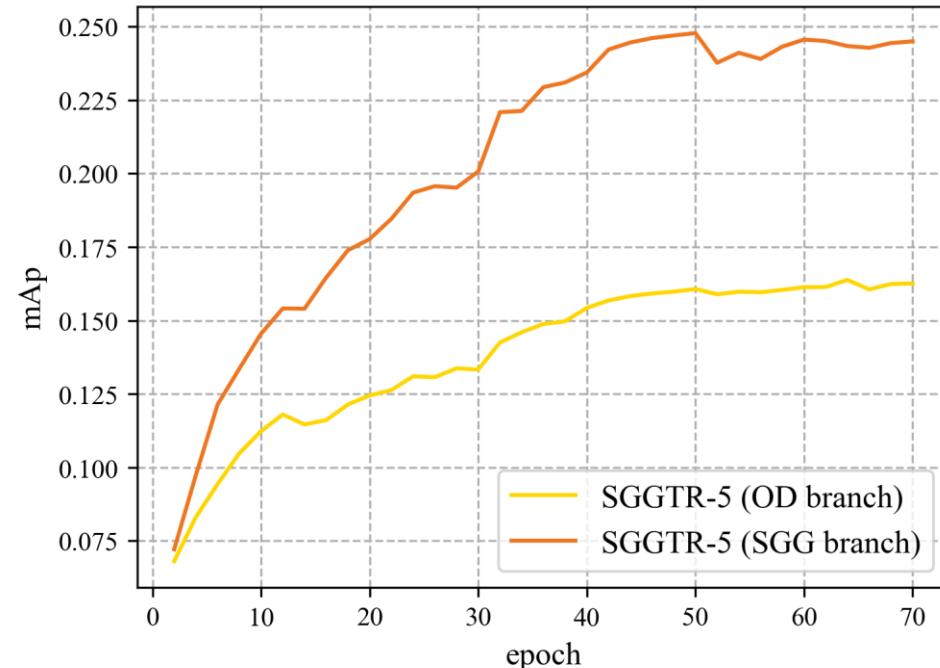
Model #1: SGGTR with OD and SGG branch



On VG dataset

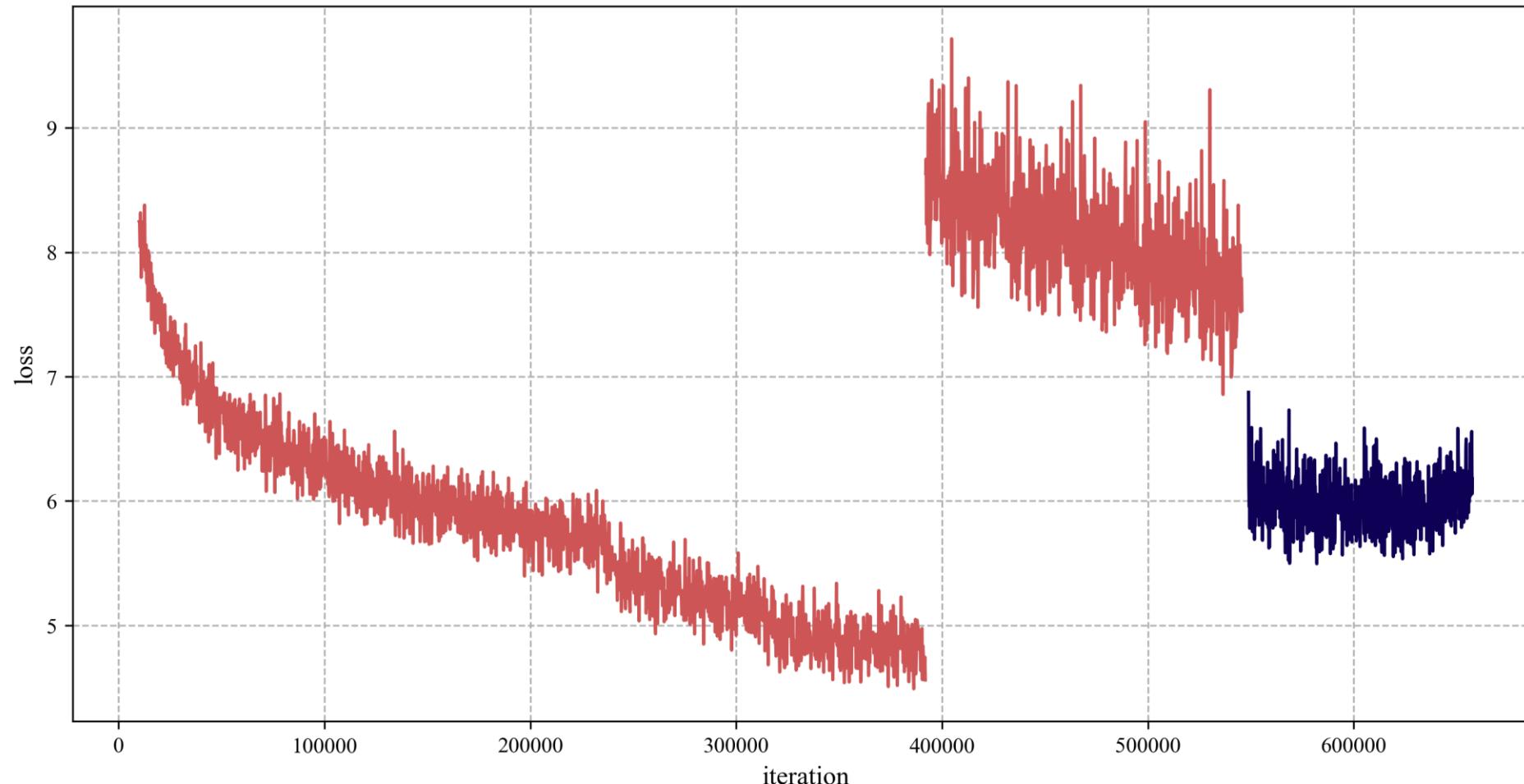
Model #1: SGGTR with OD and SGG branch

mAp	Recall@K				No-gc Recall@K			Mean Recall@K			No-gc Mean Recall@K		
	IoU=0.5	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50	R@100
24.08	18.75	24.78	28.93	20.57	28.12	33.52	4.07	5.93	7.46	5.80	9.73	13.72	



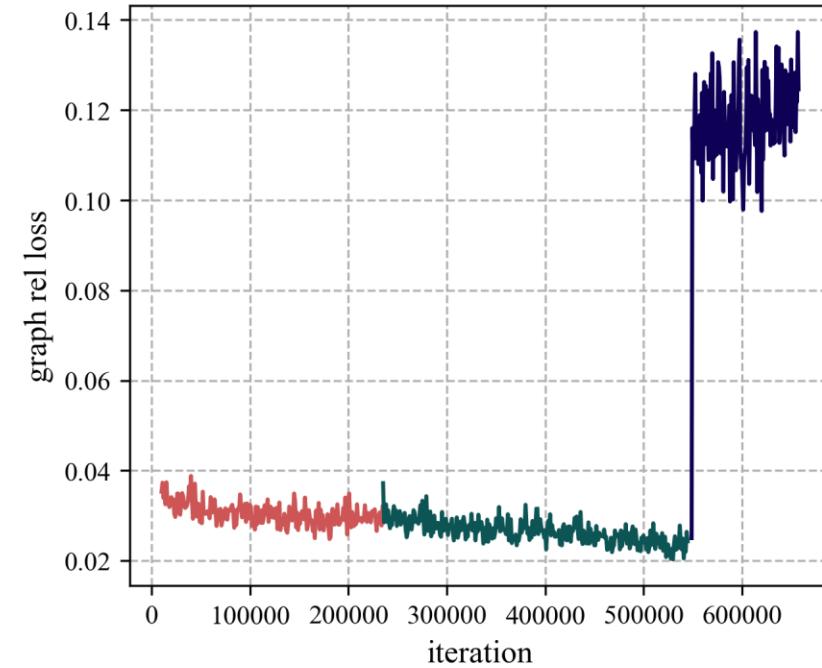
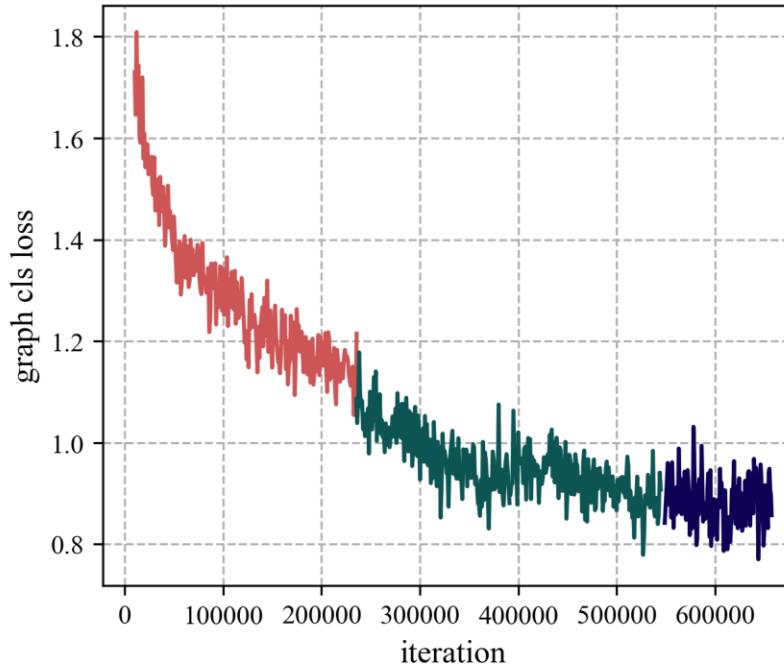
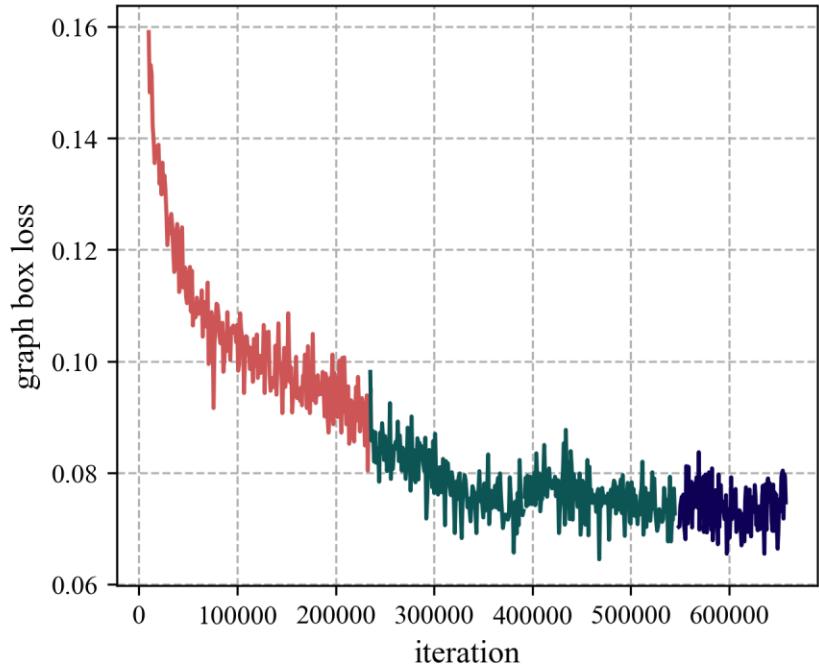
On VG dataset

Model #: SGGTR with OD and SGG branch and additional loss for relationship



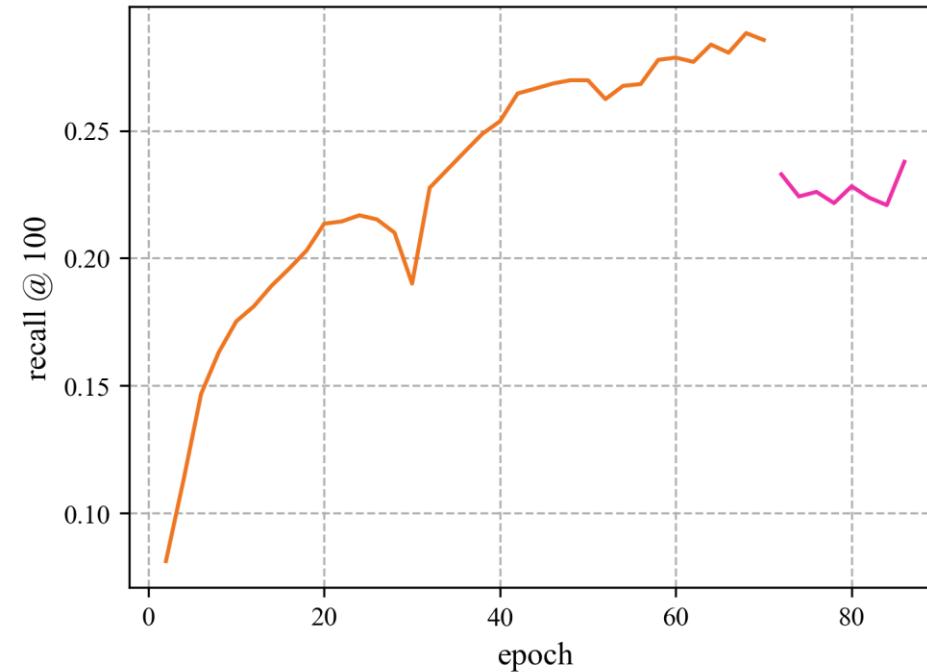
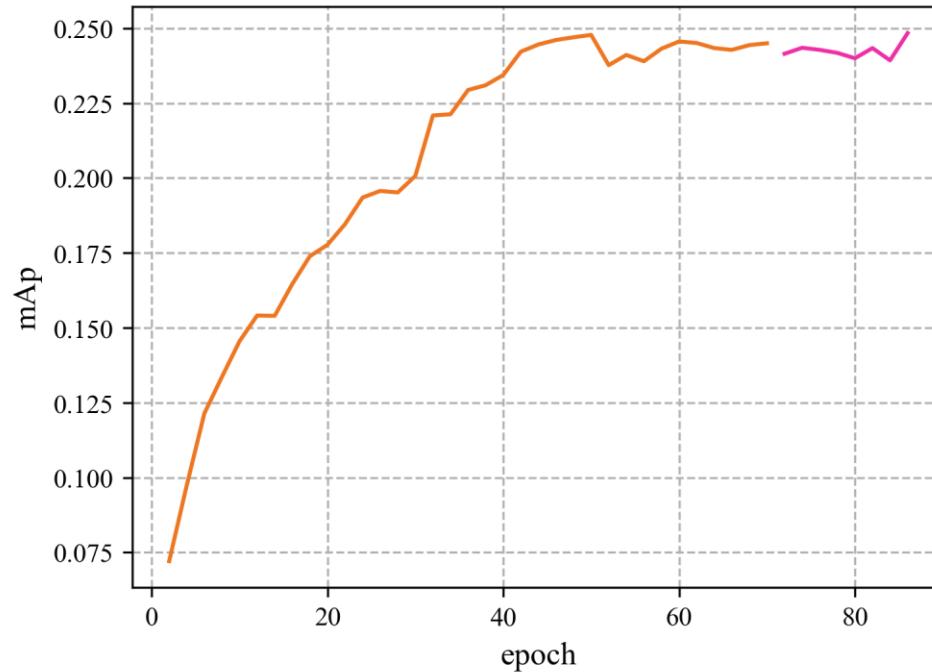
On VG dataset

Model #: SGGTR with OD and SGG branch and additional loss for relationship



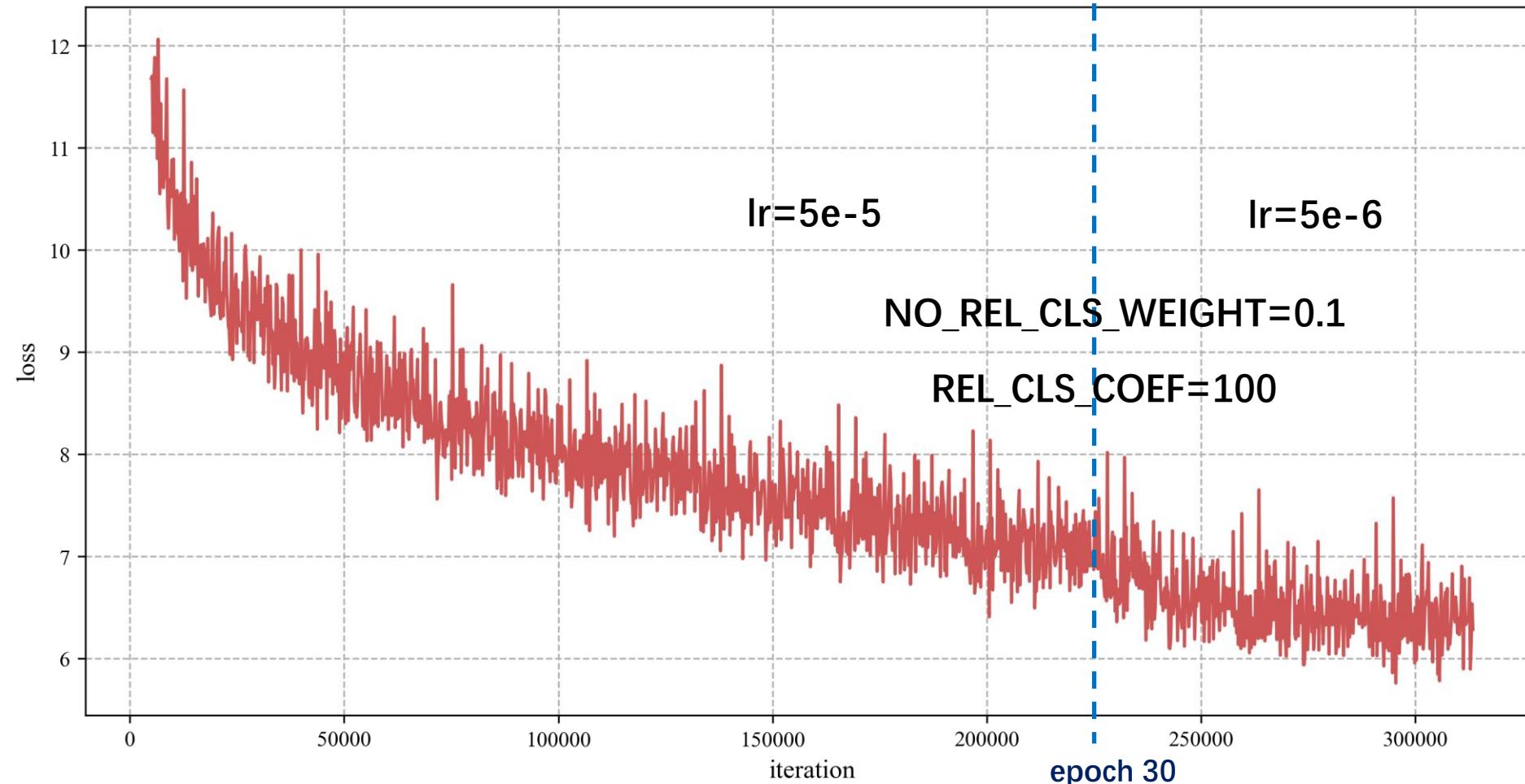
On VG dataset

Model #: SGGTR with OD and SGG branch and additional loss for relationship



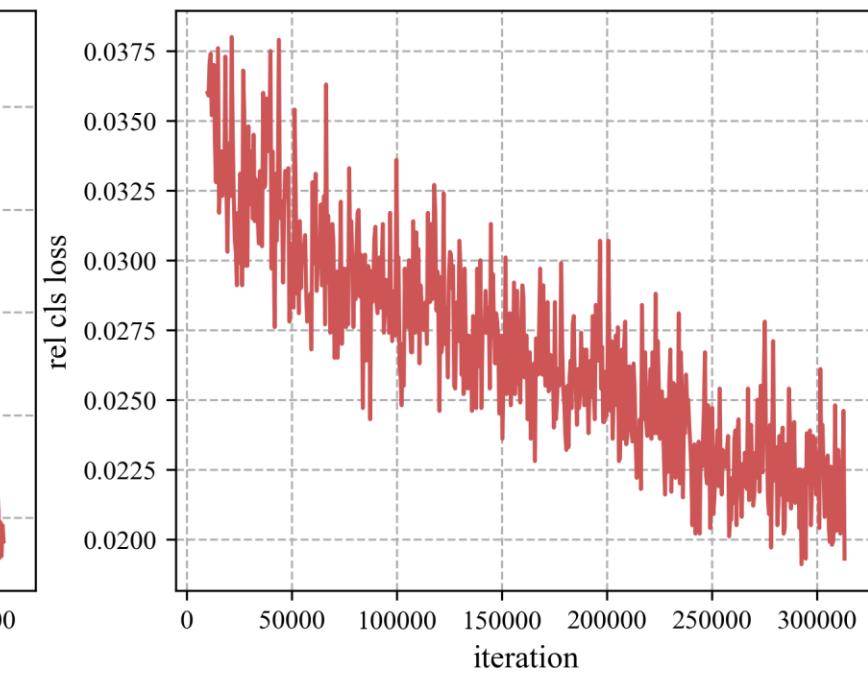
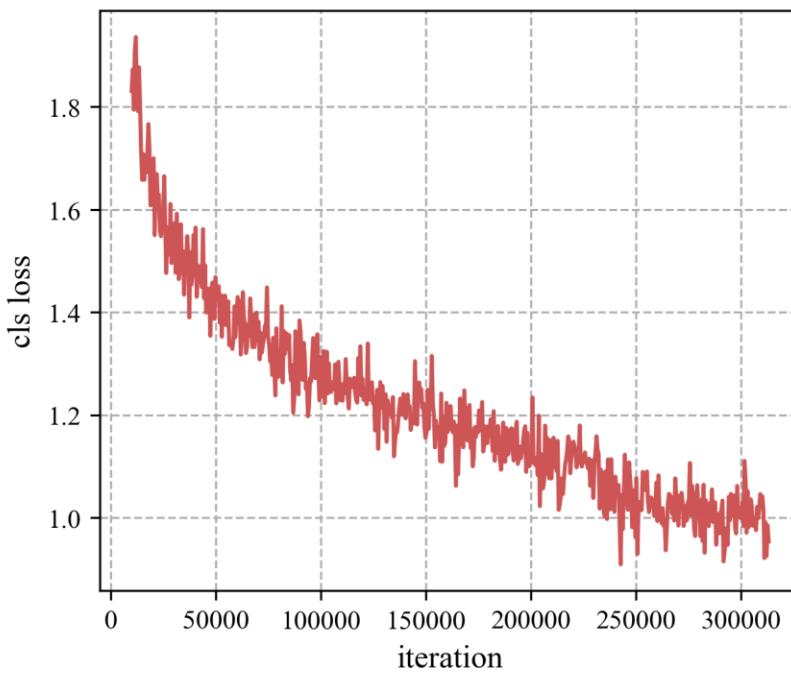
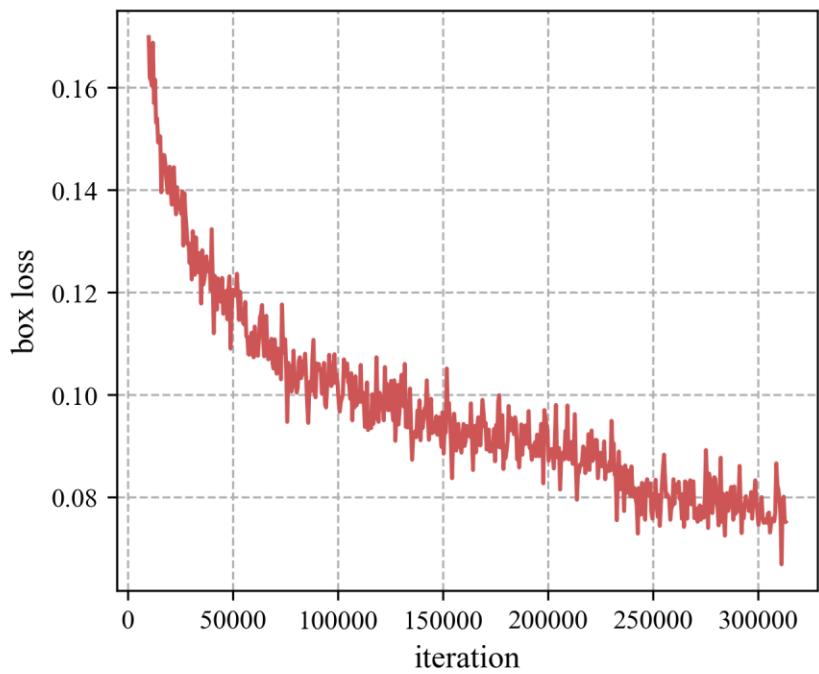
On VG dataset

Model #2: SGGTR (SGG only)



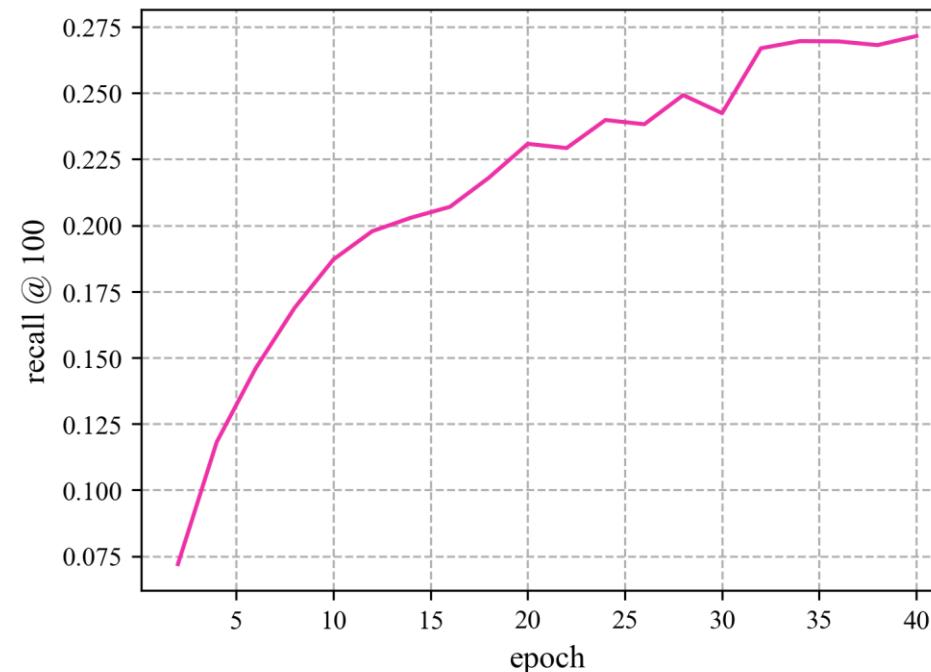
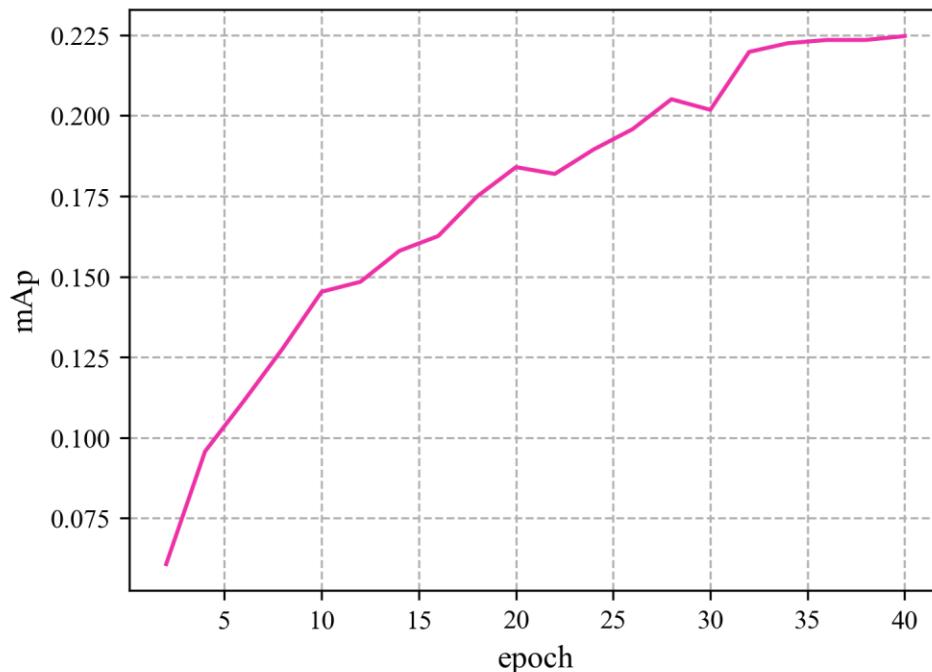
On VG dataset

Model #2: SGGTR (SGG only)



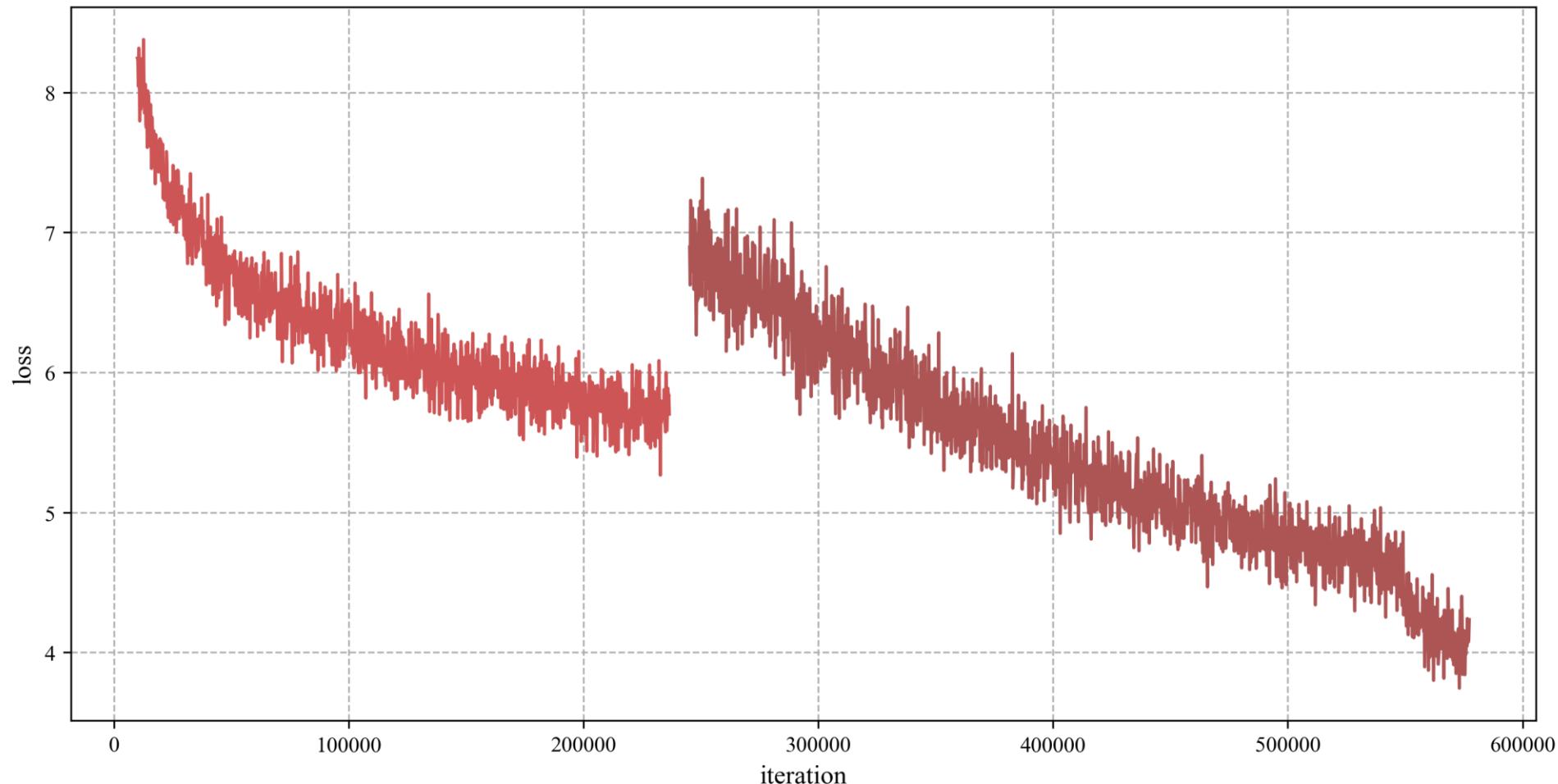
On VG dataset

Model #2: SGGTR (SGG only)



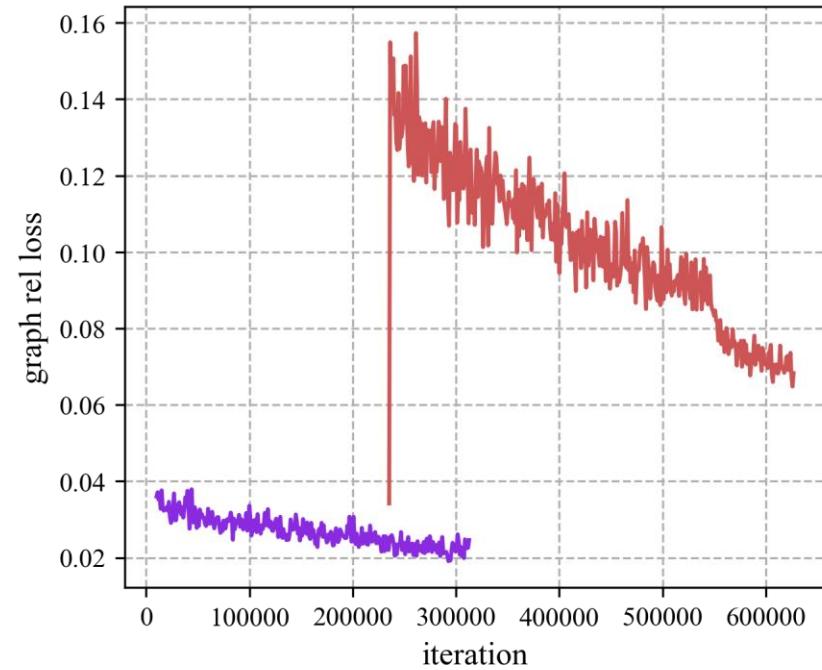
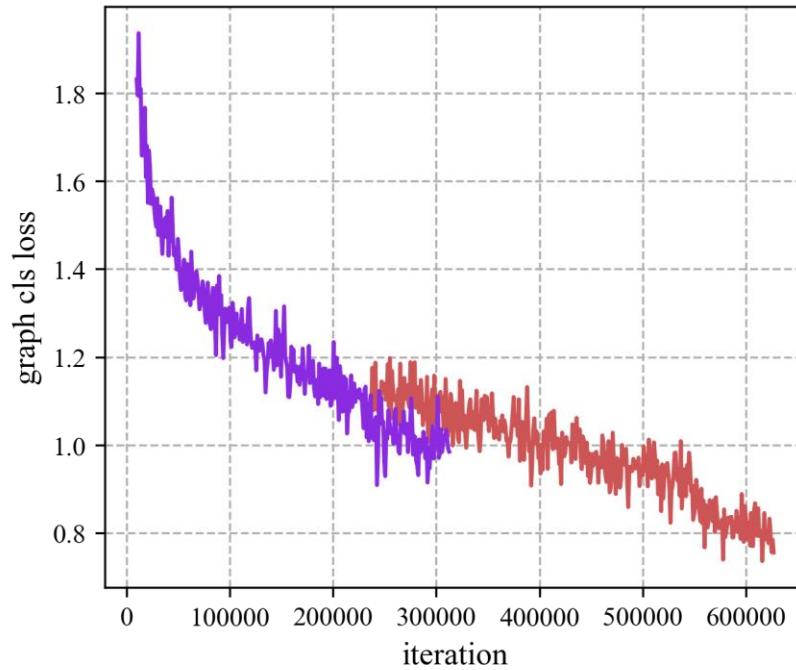
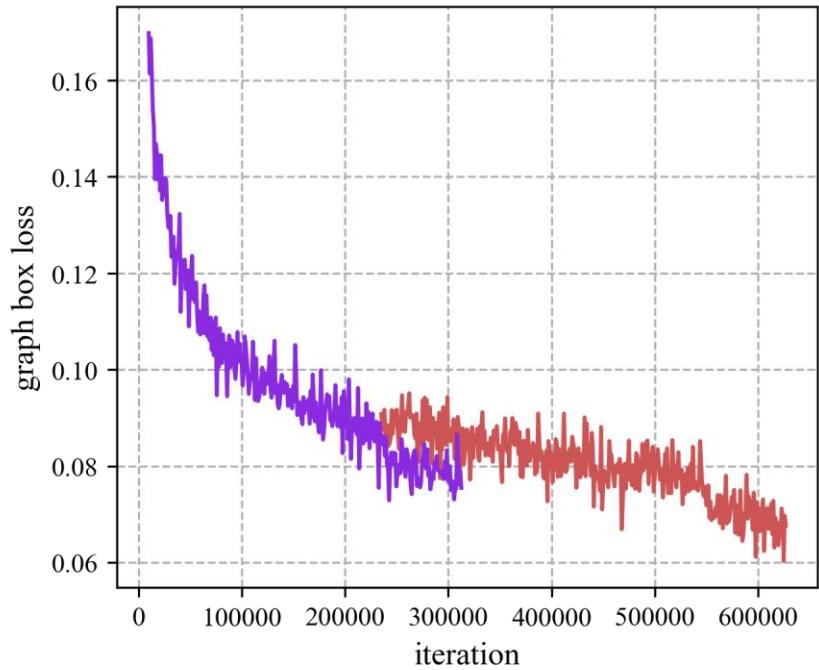
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss



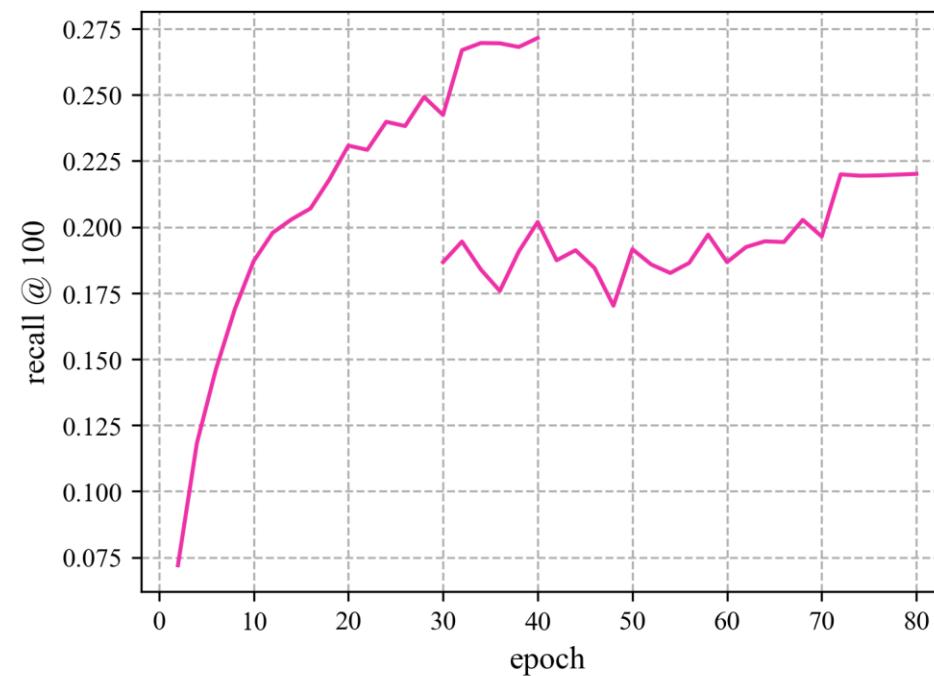
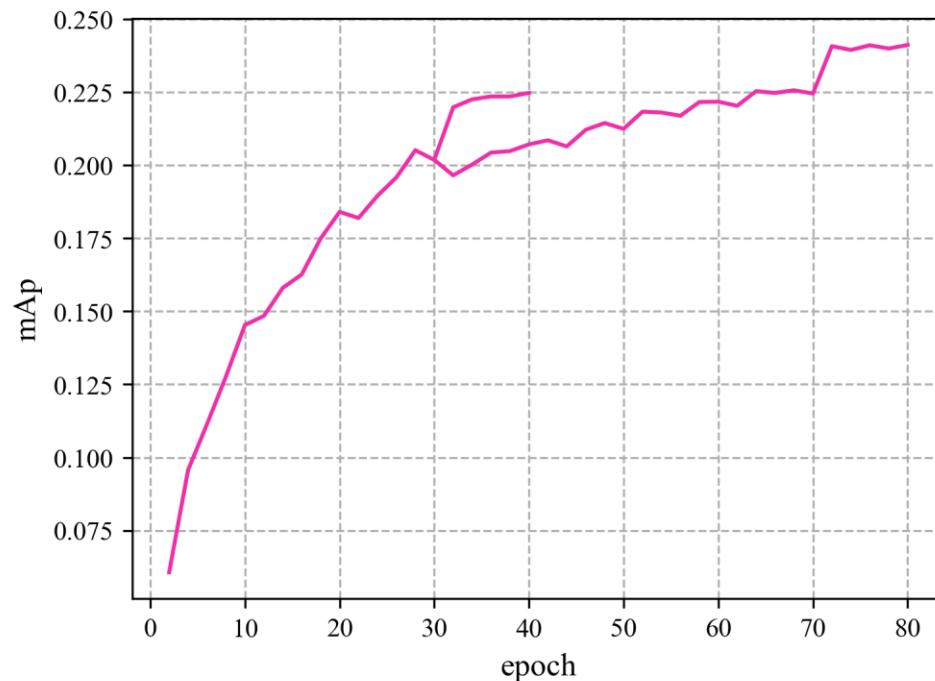
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss



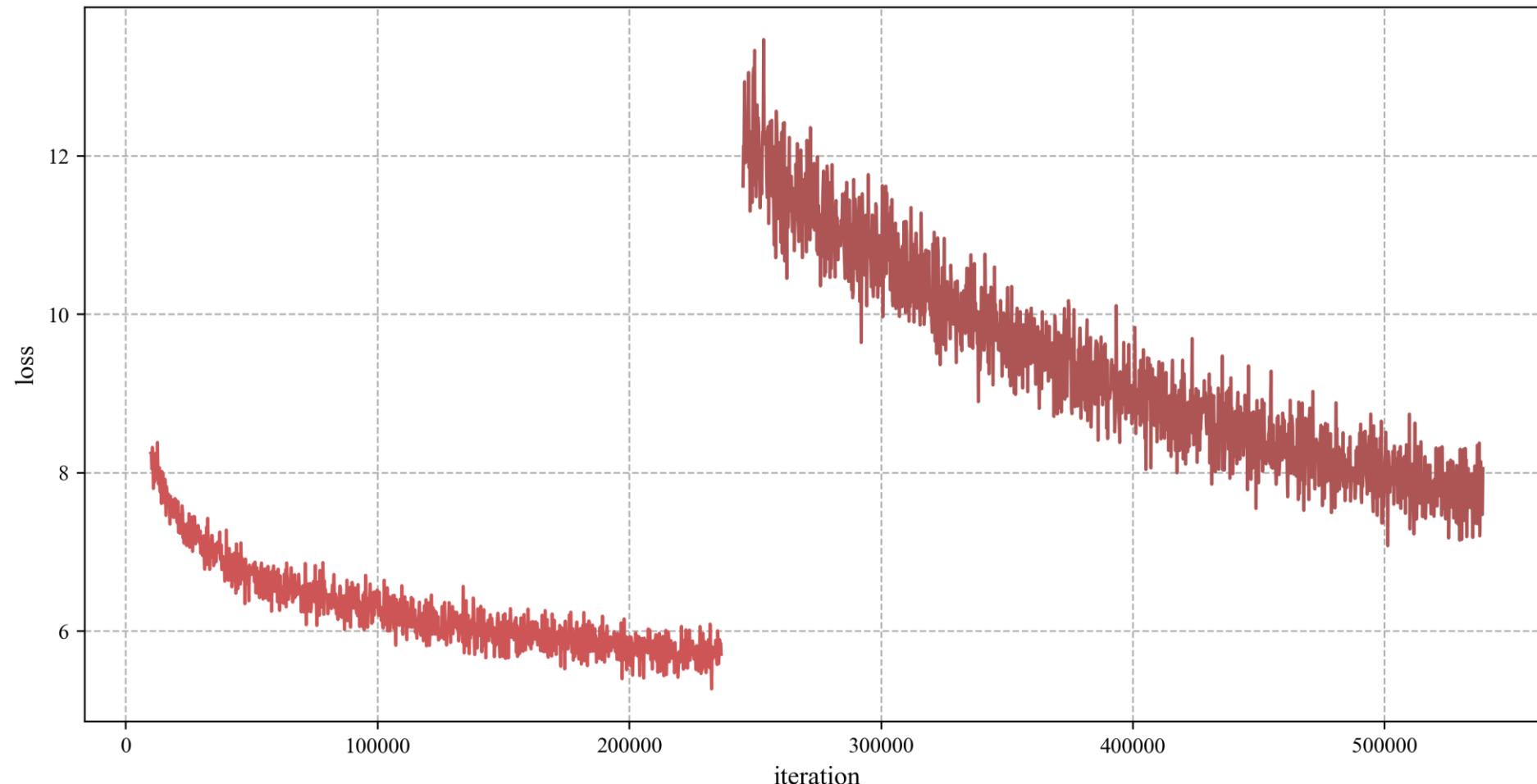
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss



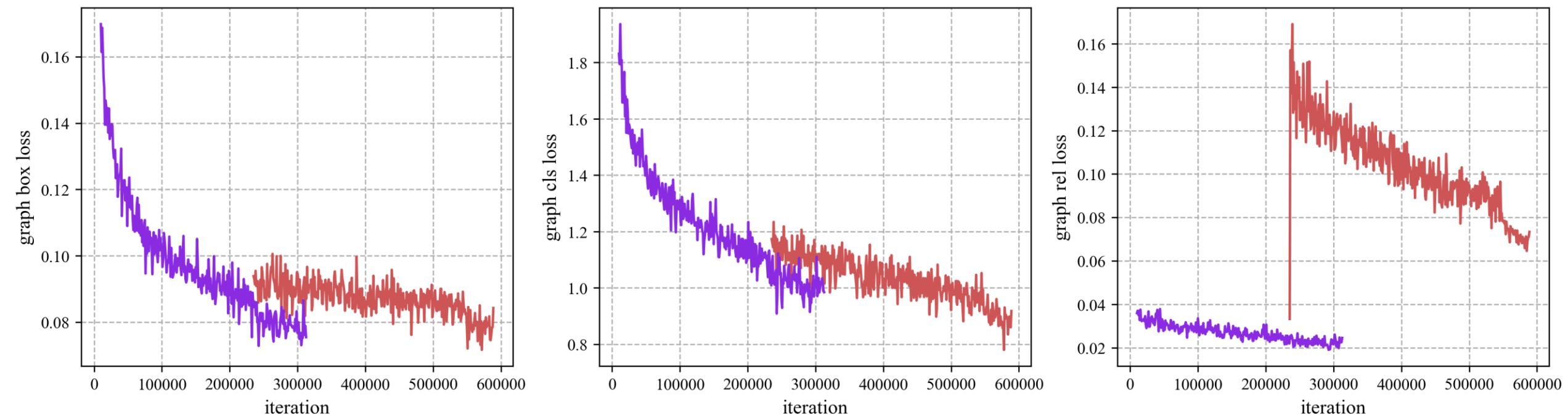
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss and knowledge loss



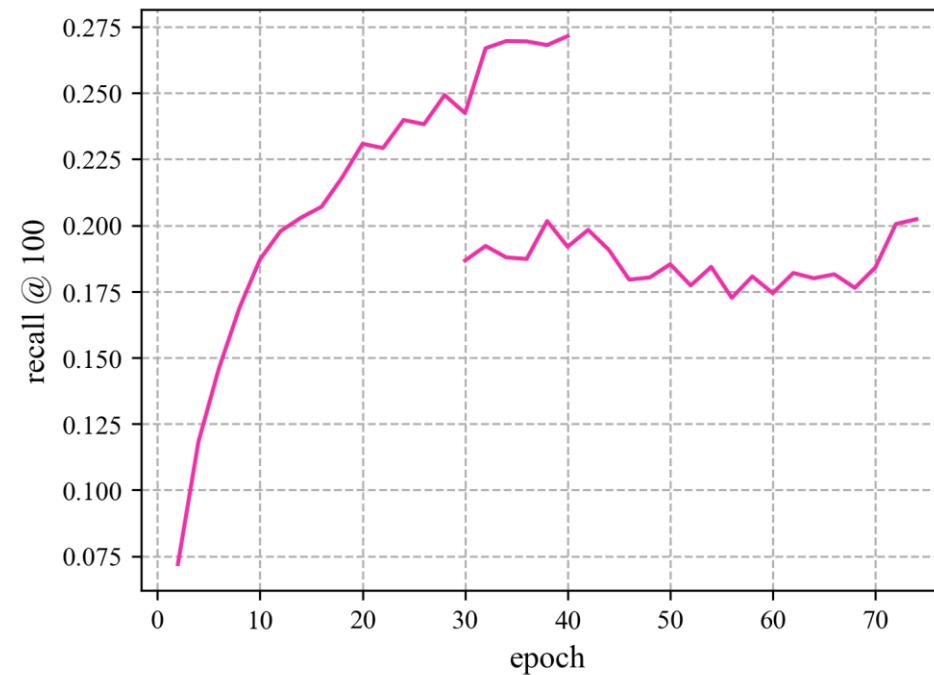
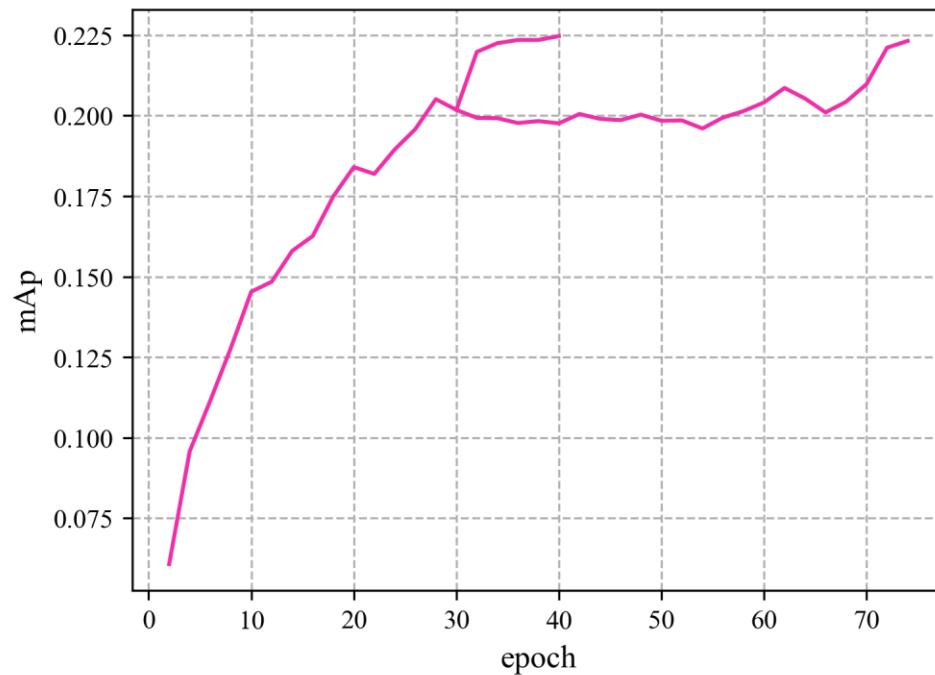
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss and knowledge loss



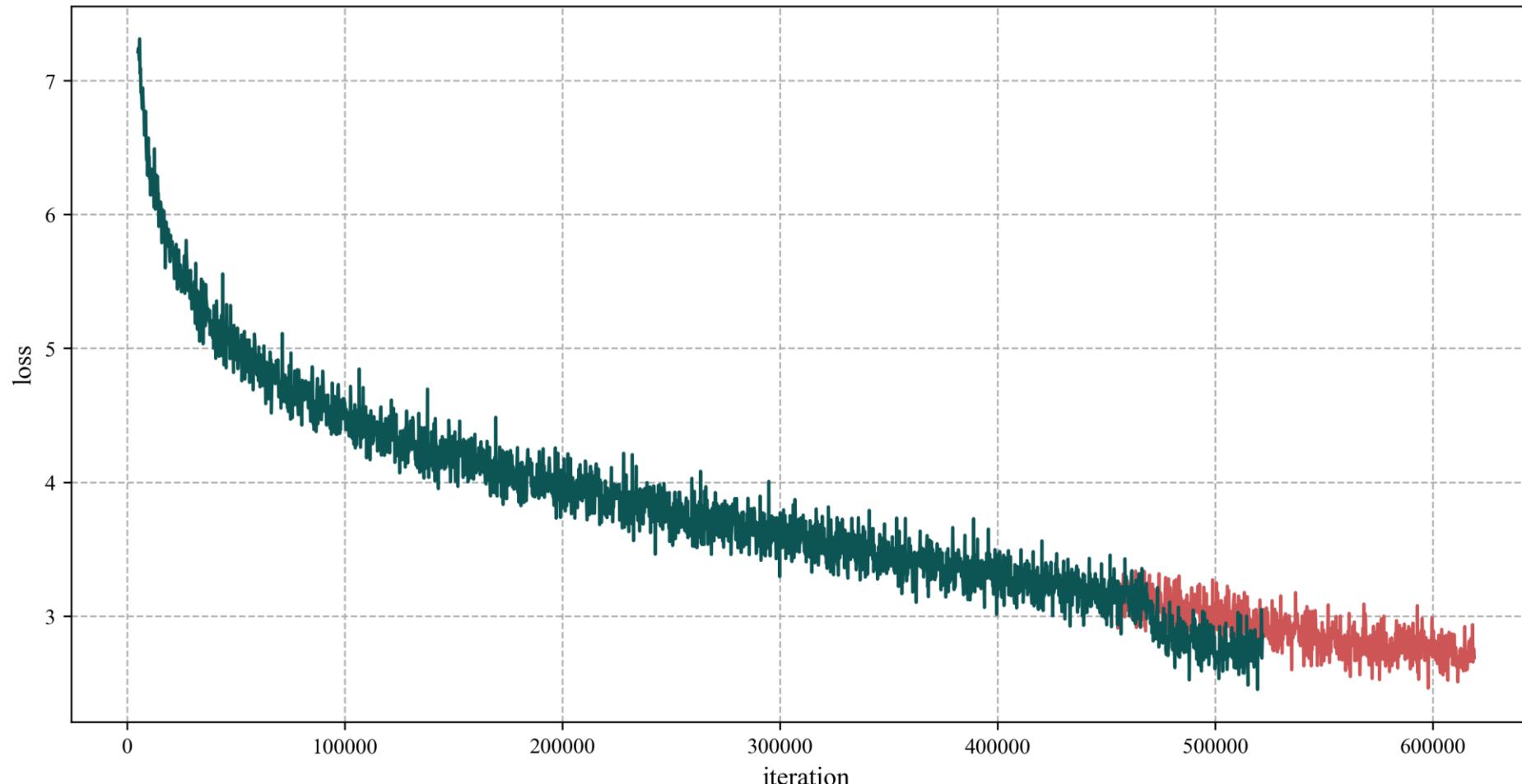
On VG dataset

Model #2: SGGTR (SGG only) with additional relationship loss and knowledge loss



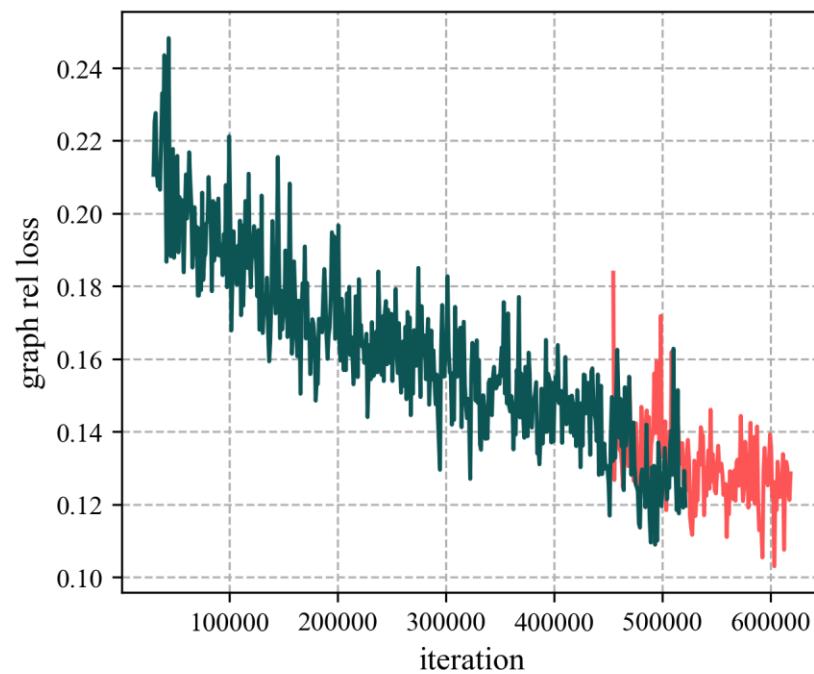
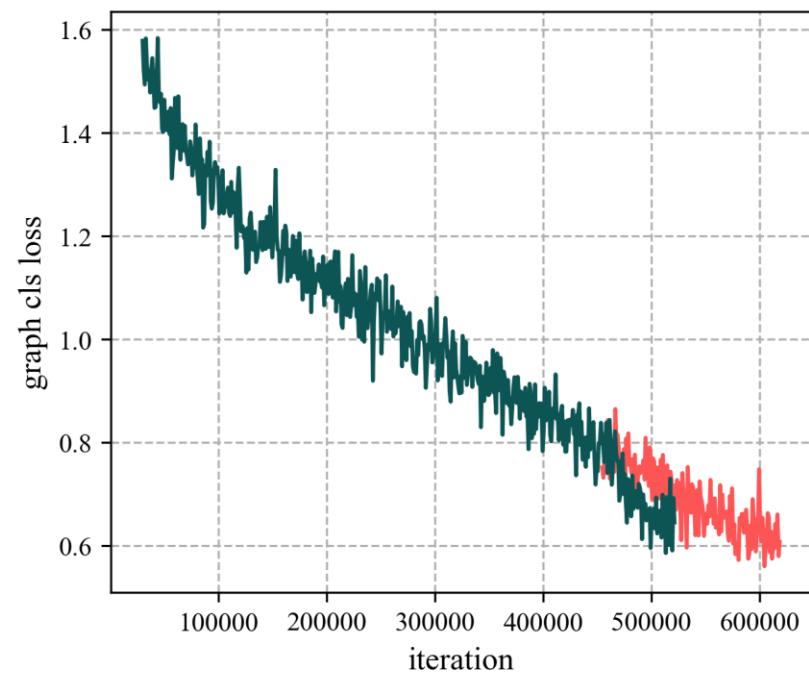
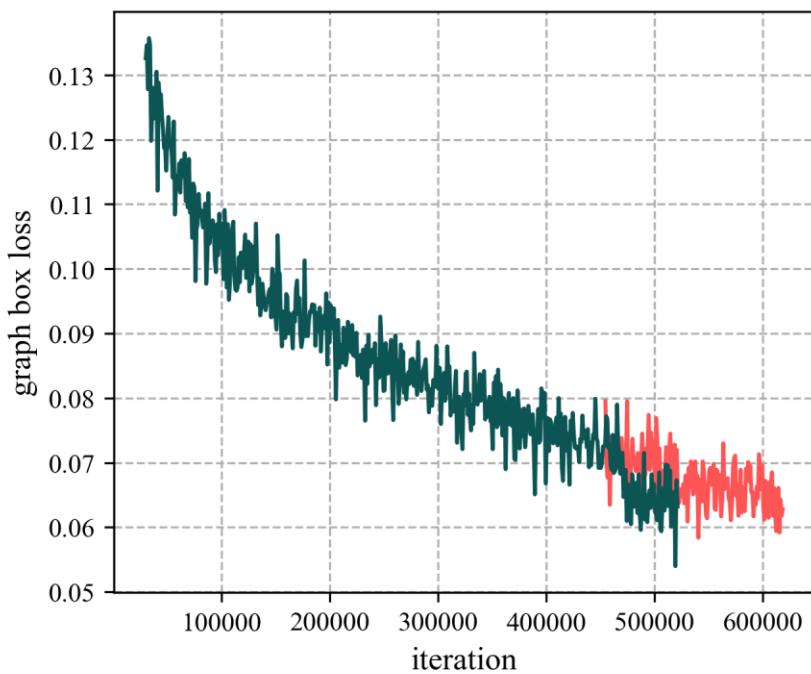
On VG dataset

Model #3: SGGTR with Exknowledge



On VG dataset

Model #3: SGGTR with Exknowledge

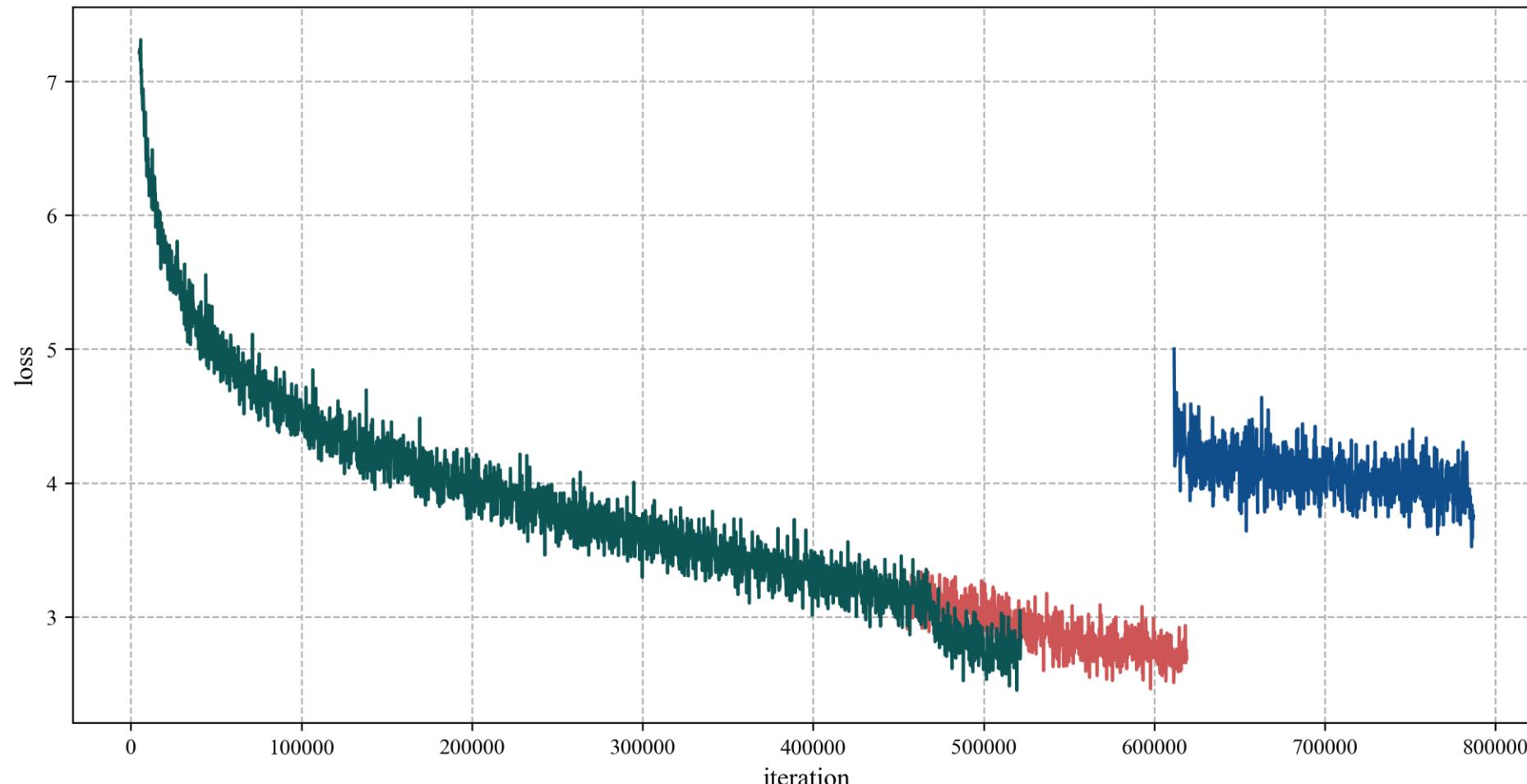


On VG dataset

Model #3: SGGTR with Exknowledge

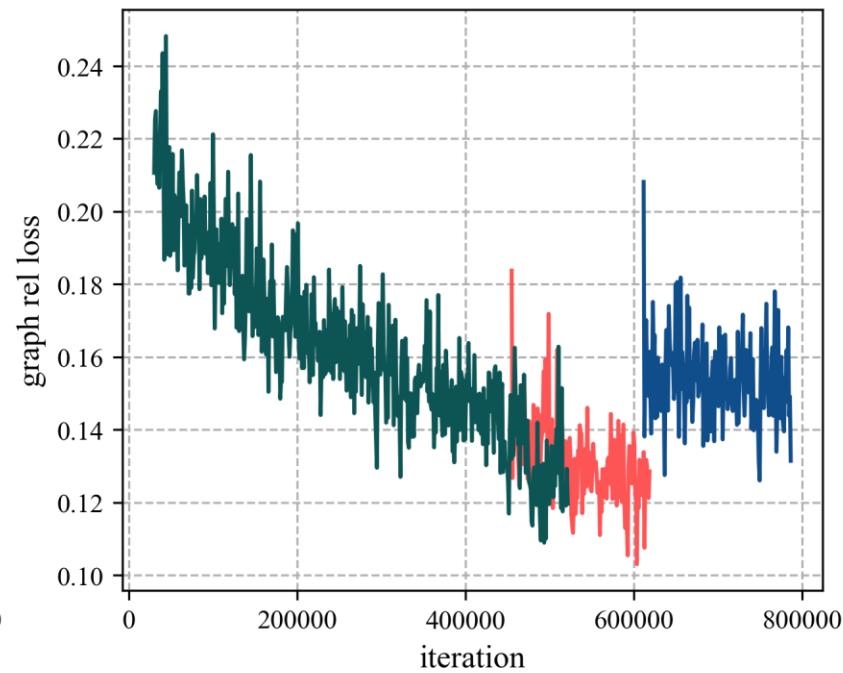
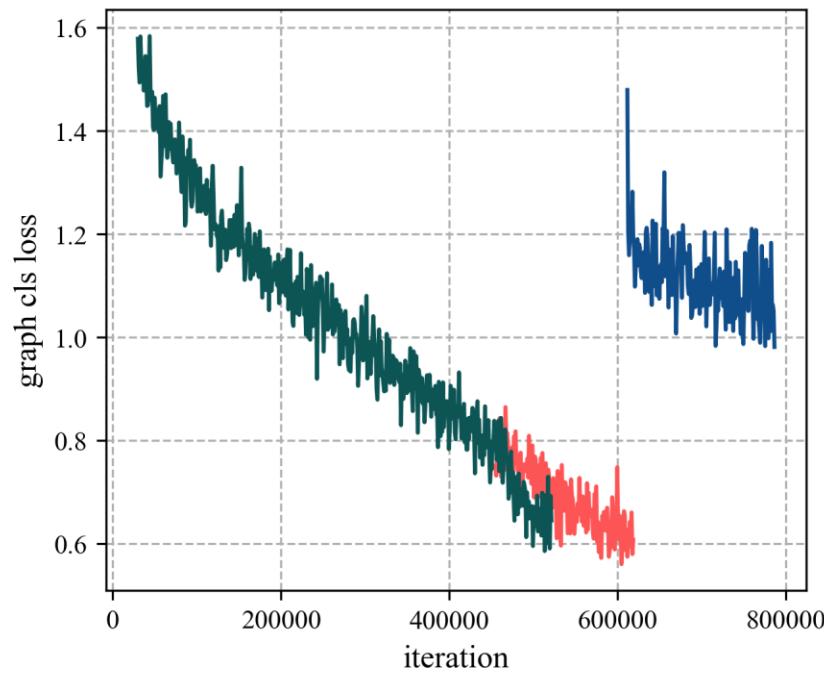
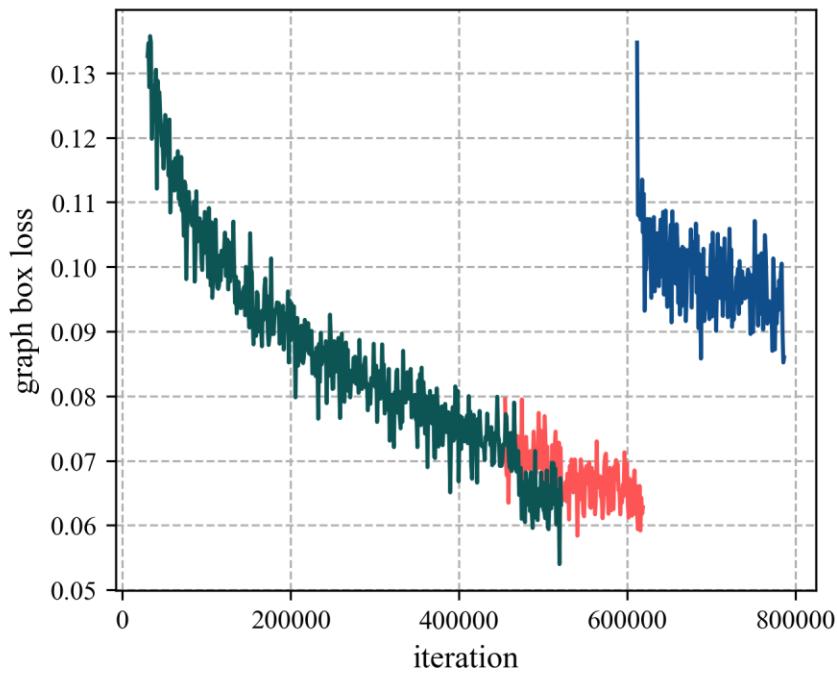
On VG dataset

Model #3: SGGTR with Exknowledge and data augmentation



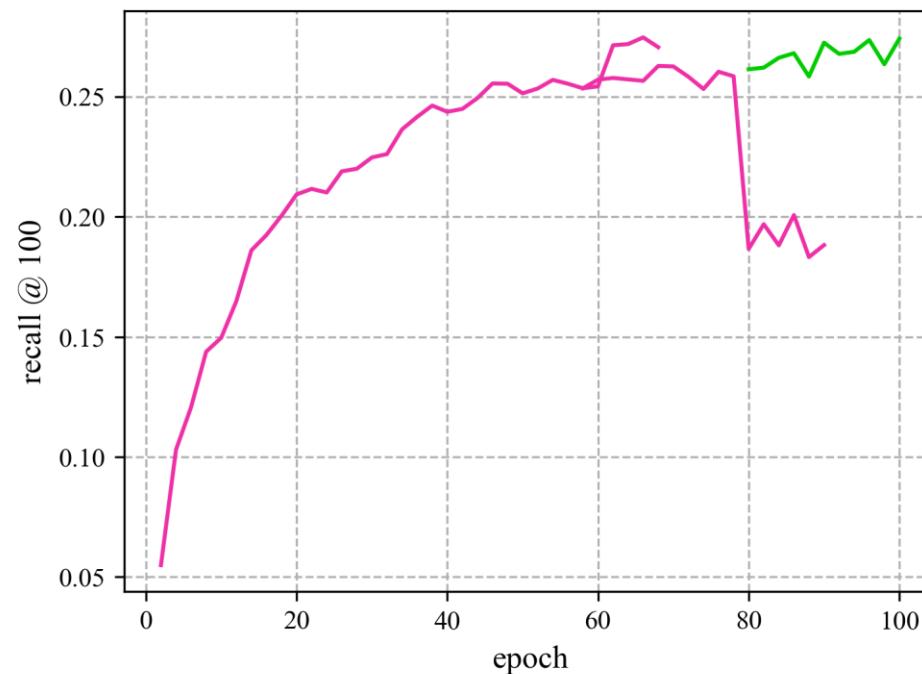
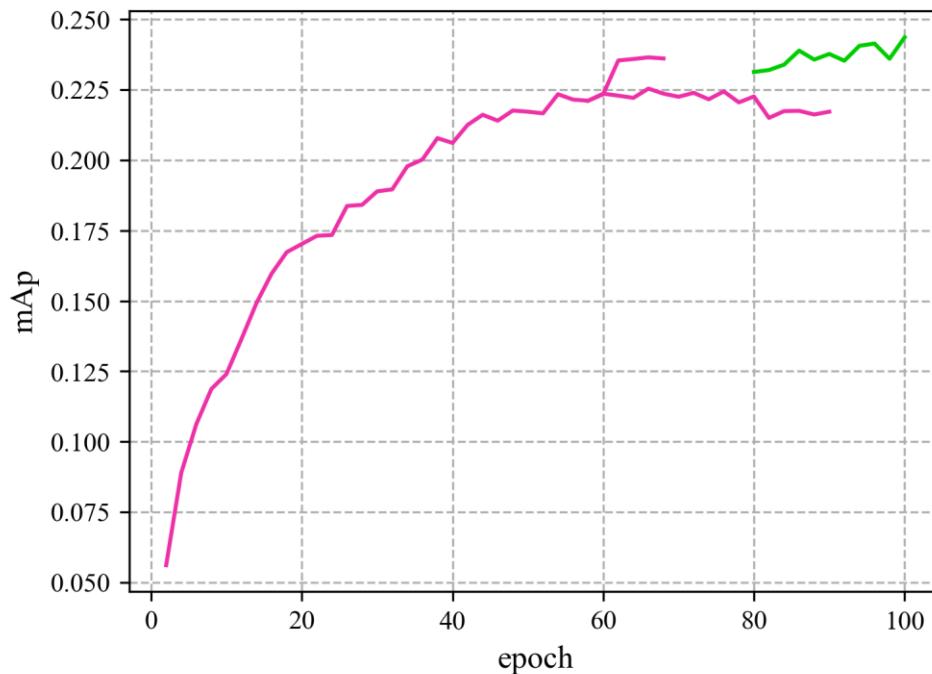
On VG dataset

Model #3: SGGTR with Exknowledge and data augmentation



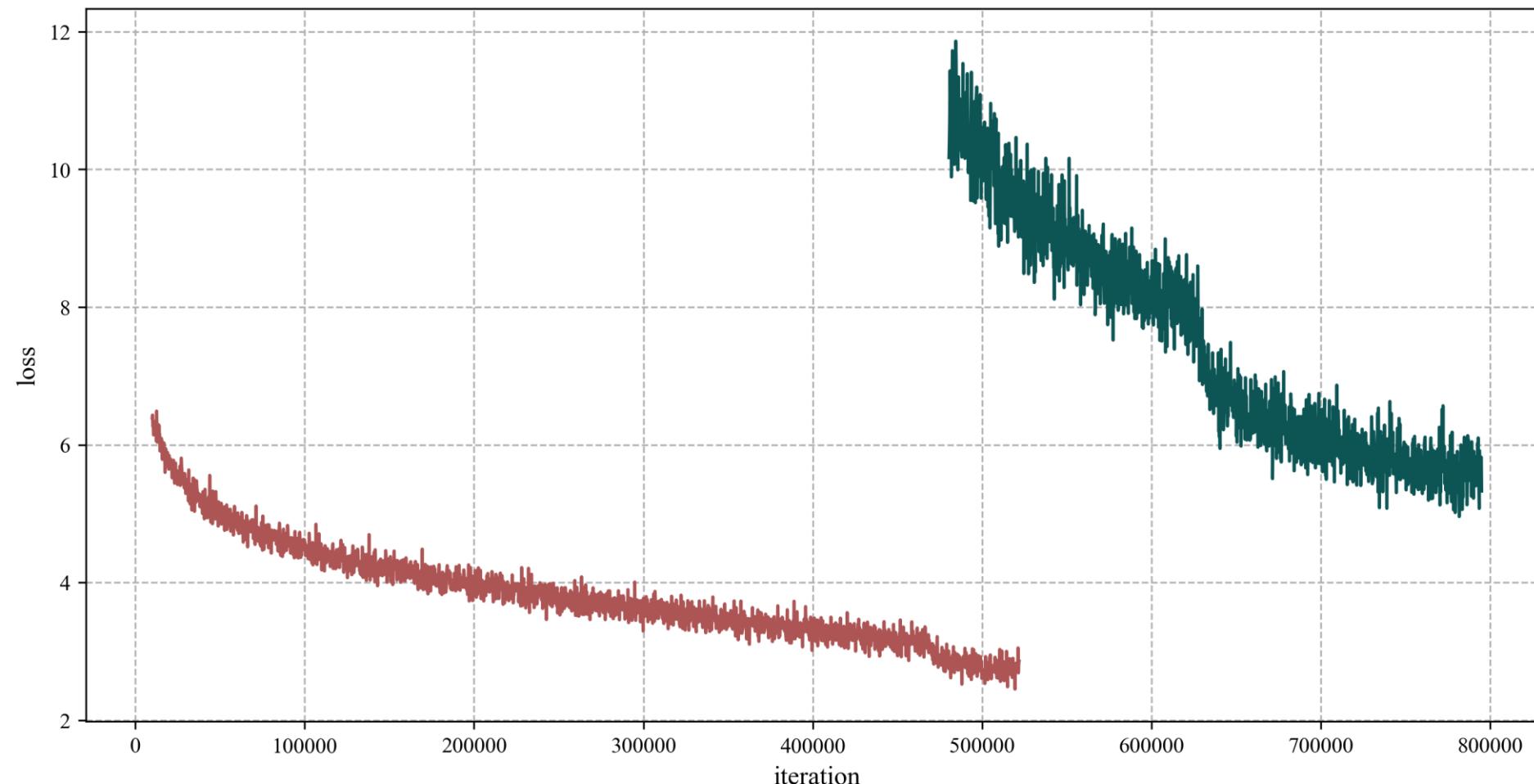
On VG dataset

Model #3: SGGTR with Exknowledge and data augmentation



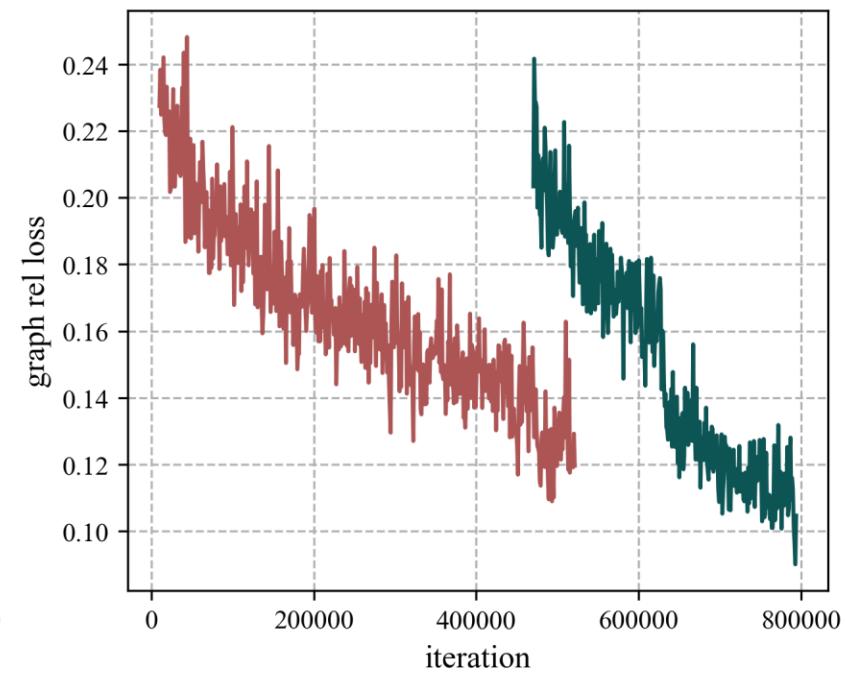
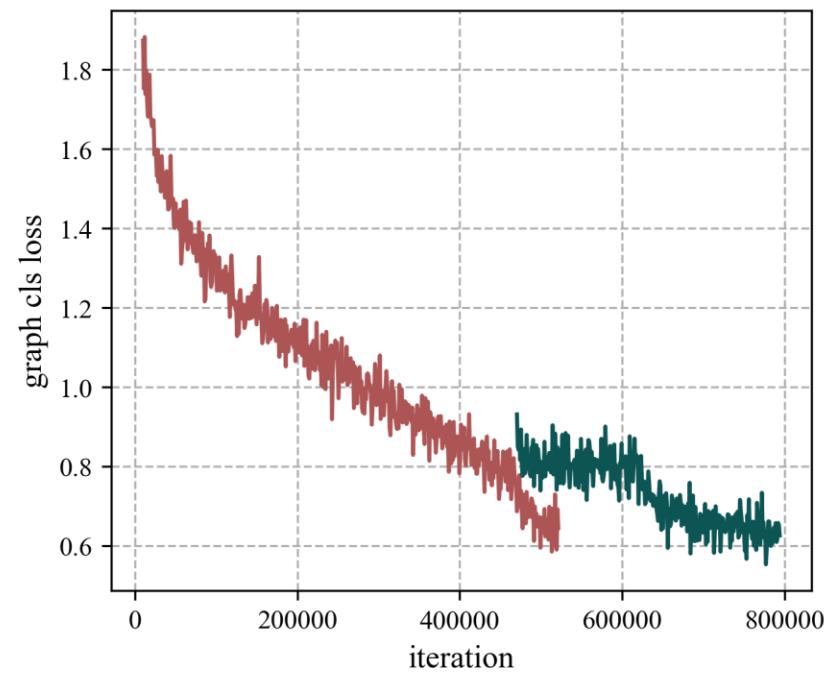
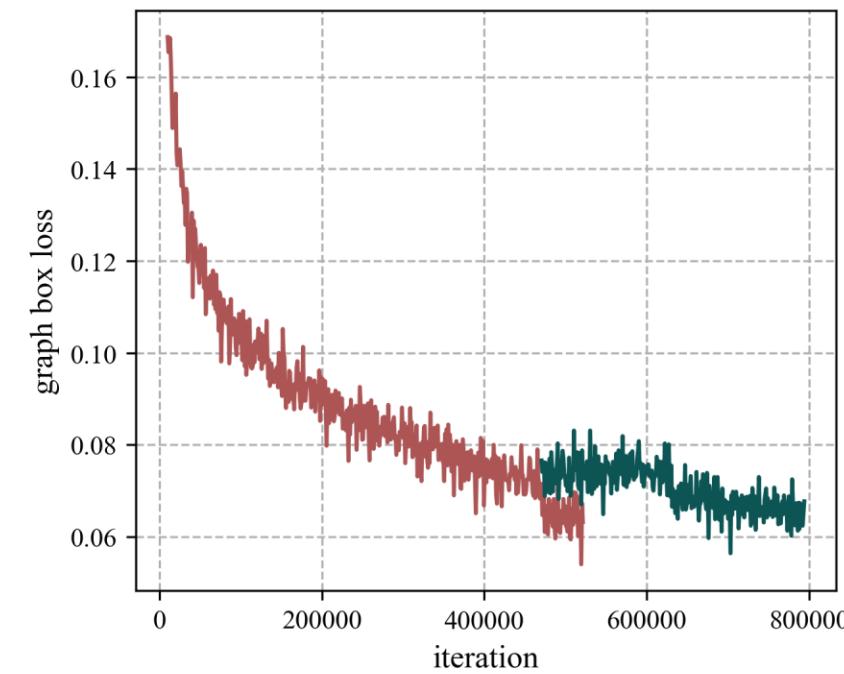
On VG dataset

Model #4: SGGTR with (1) Exknowledge (2) knowledge loss (3) addition loss for relationship



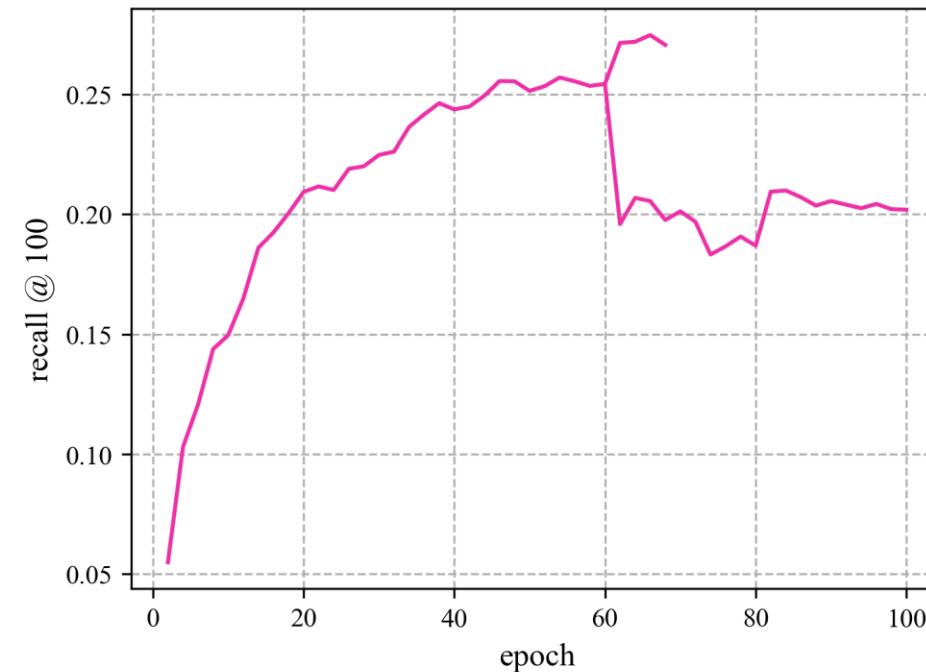
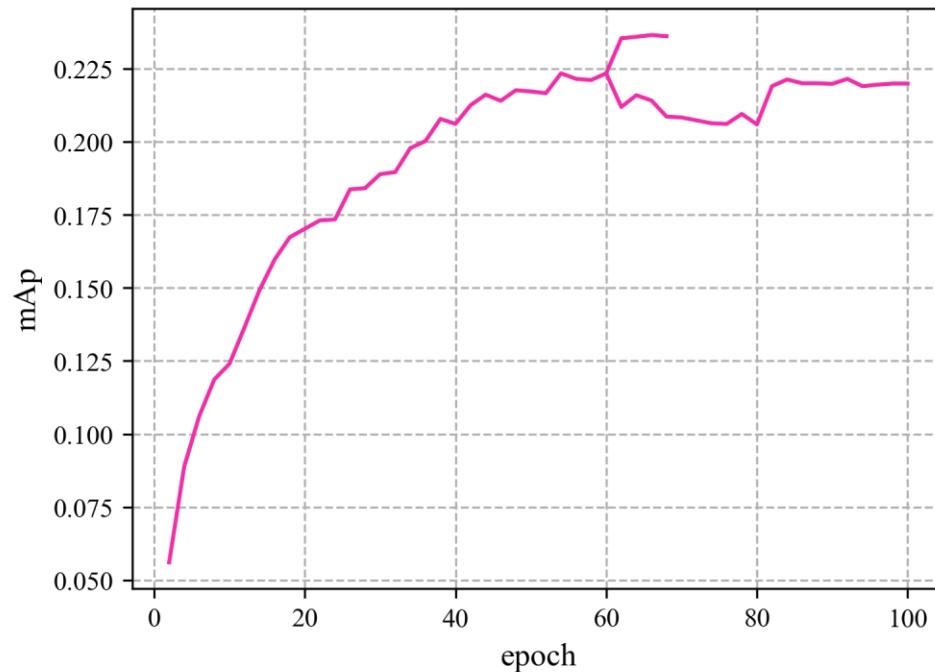
On VG dataset

Model #4: SGGTR with (1) Exknowledge (2) knowledge loss (3) addition loss for relationship



On VG dataset

Model #4: SGGTR with (1) Exknowledge (2) knowledge loss (3) addition loss for relationship

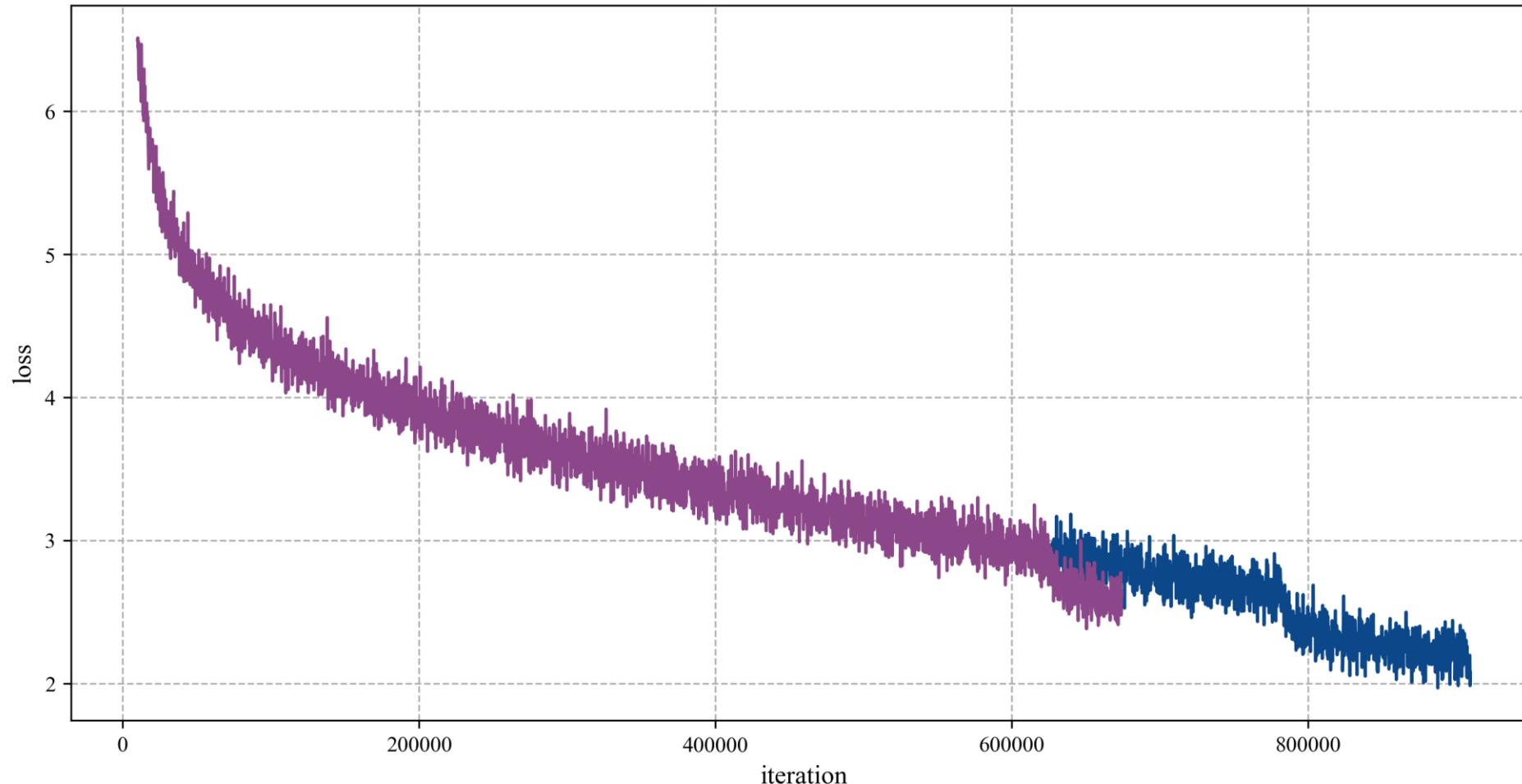


On VG dataset

Model #4: SGGTR with (1) Exknowledge
and (2) data augmentation
and (3) addition loss for relationship

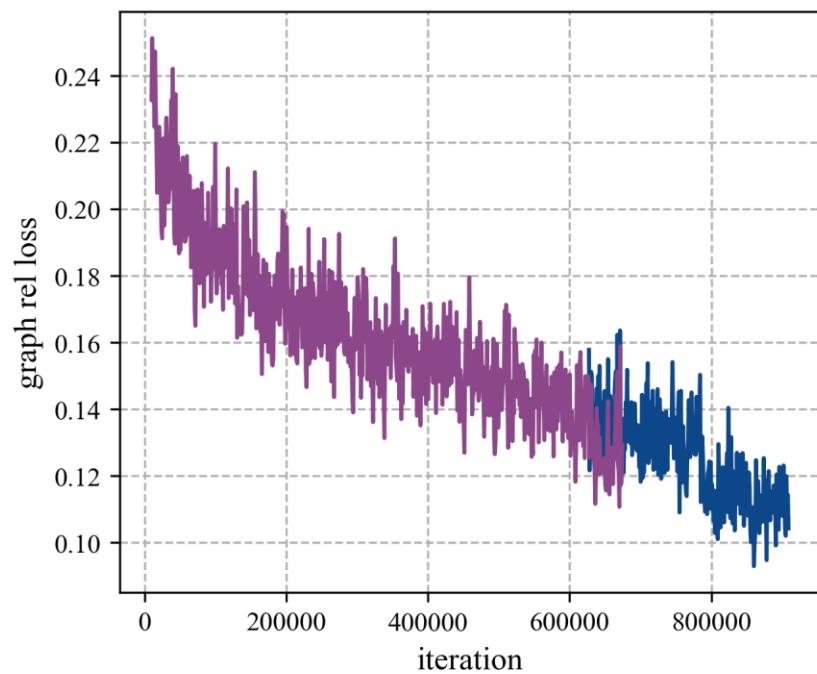
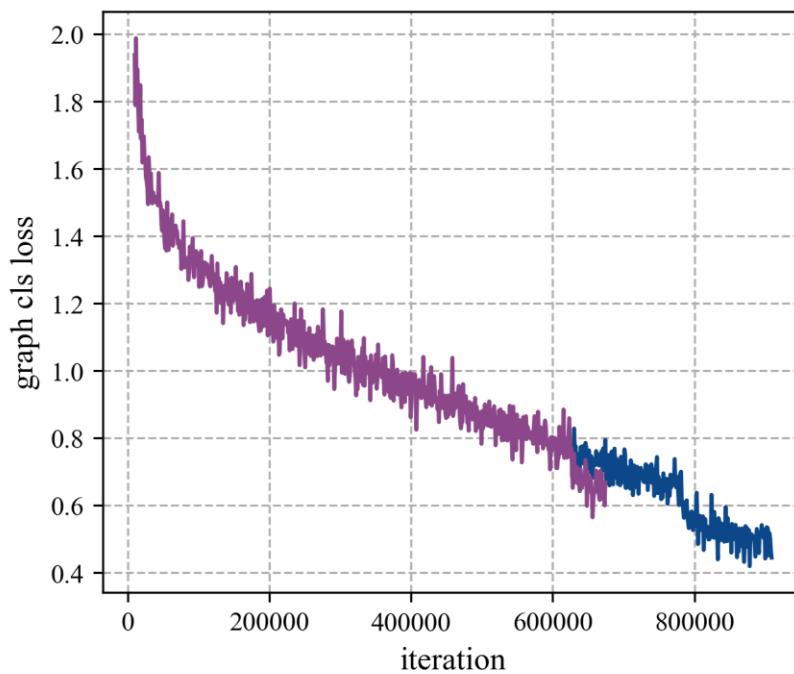
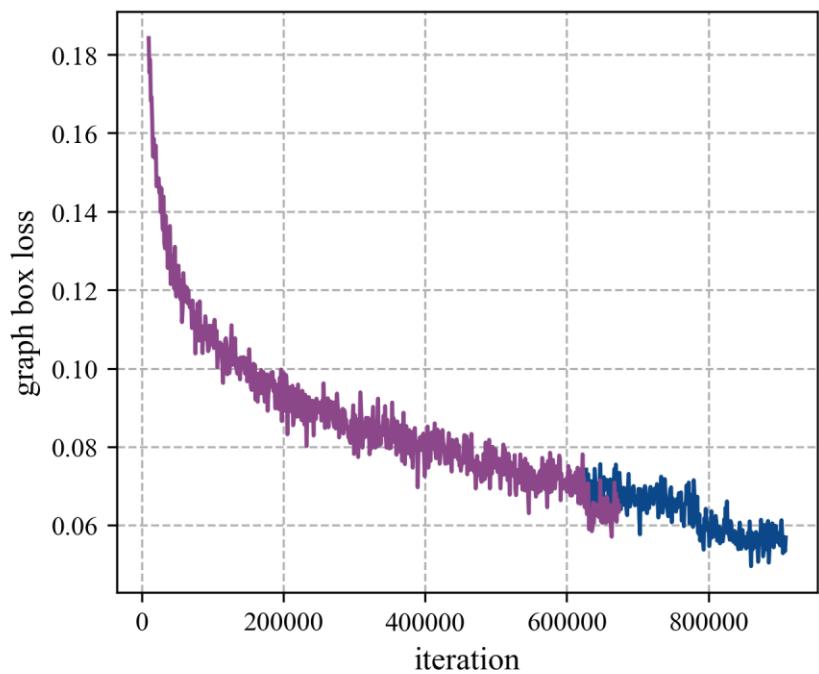
On VG dataset

Model #5: DETR-based SGGTR



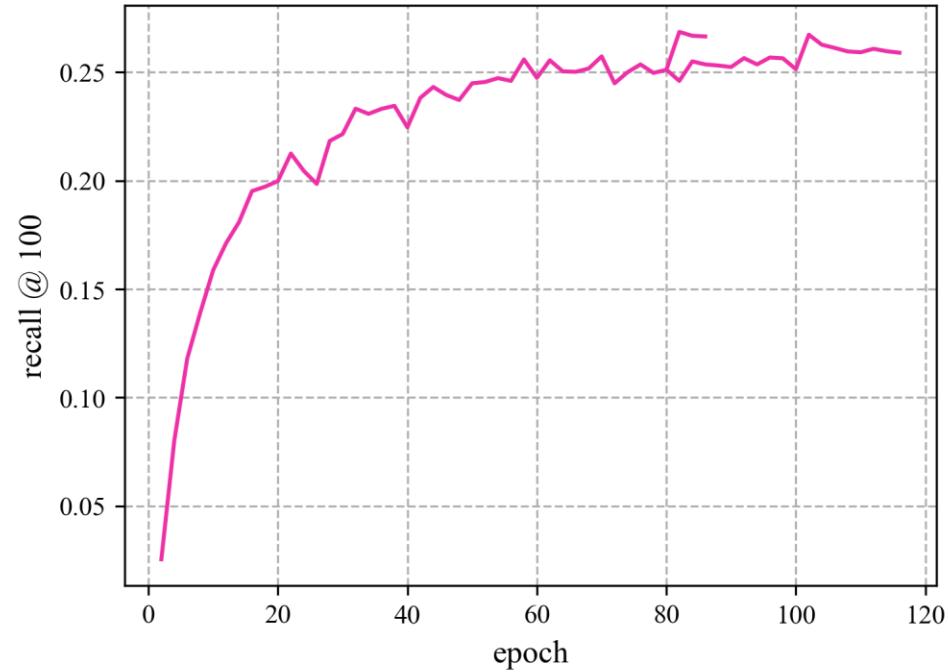
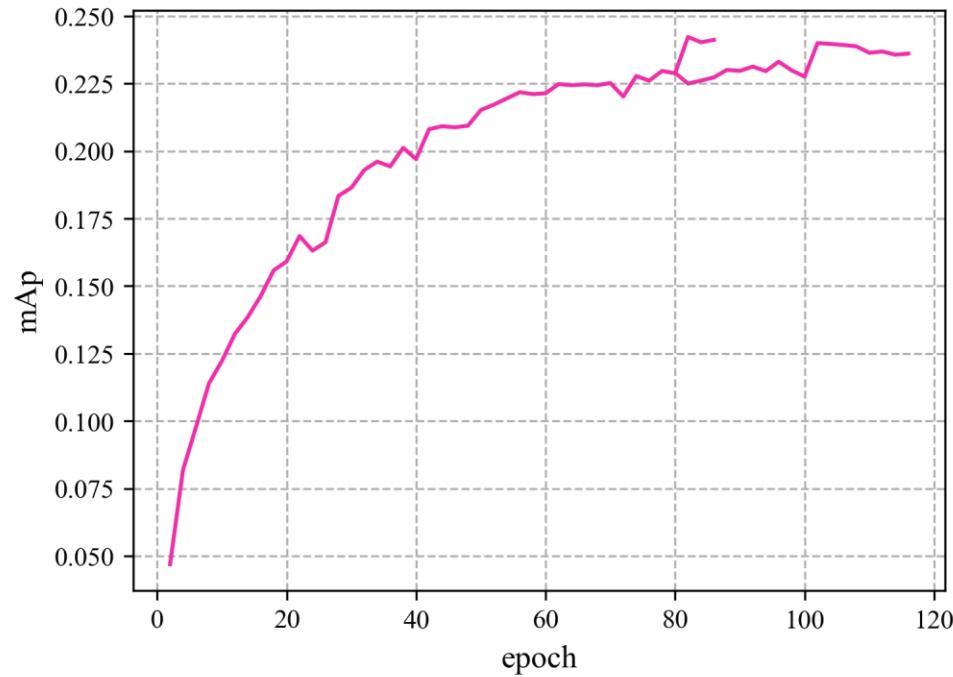
On VG dataset

Model #5: DETR-based SGGTR



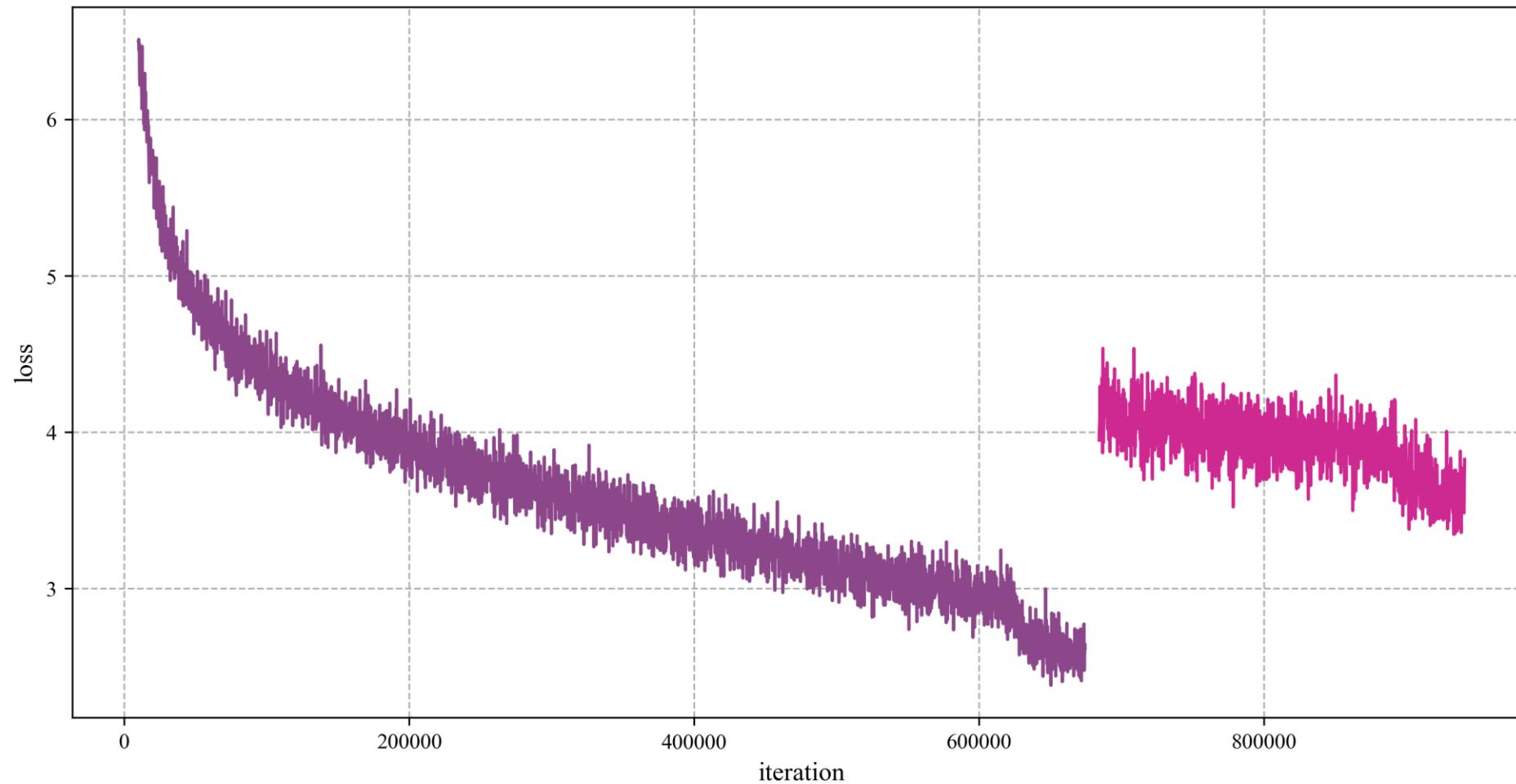
On VG dataset

Model #5: DETR-based SGGTR



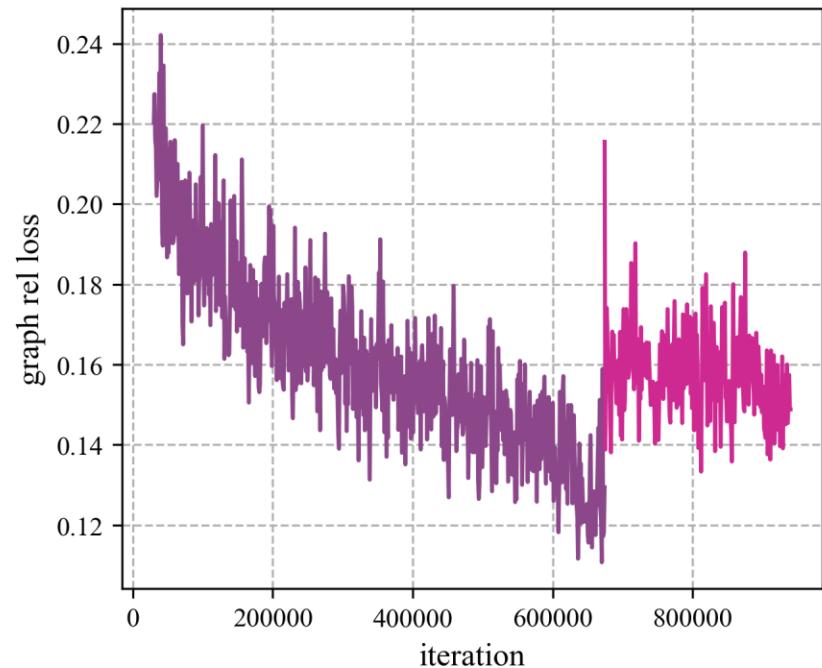
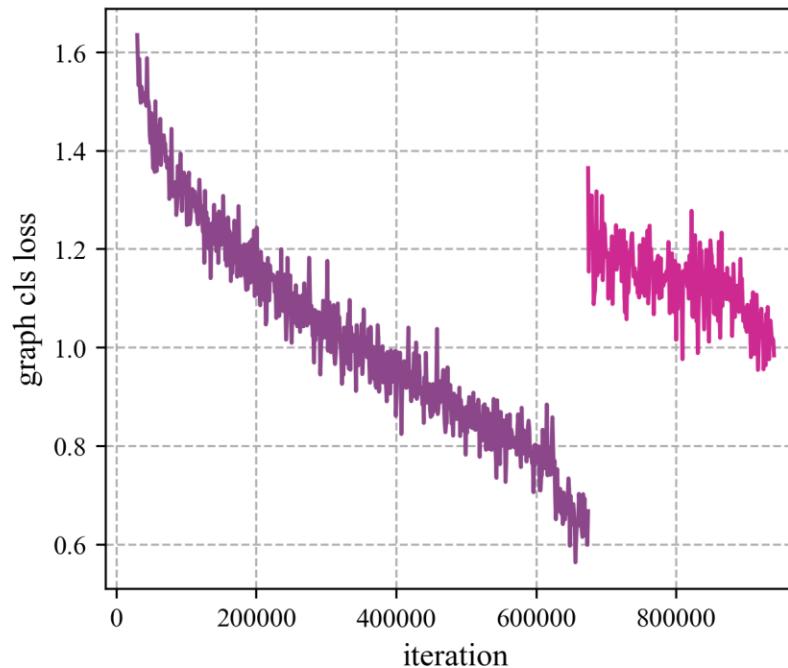
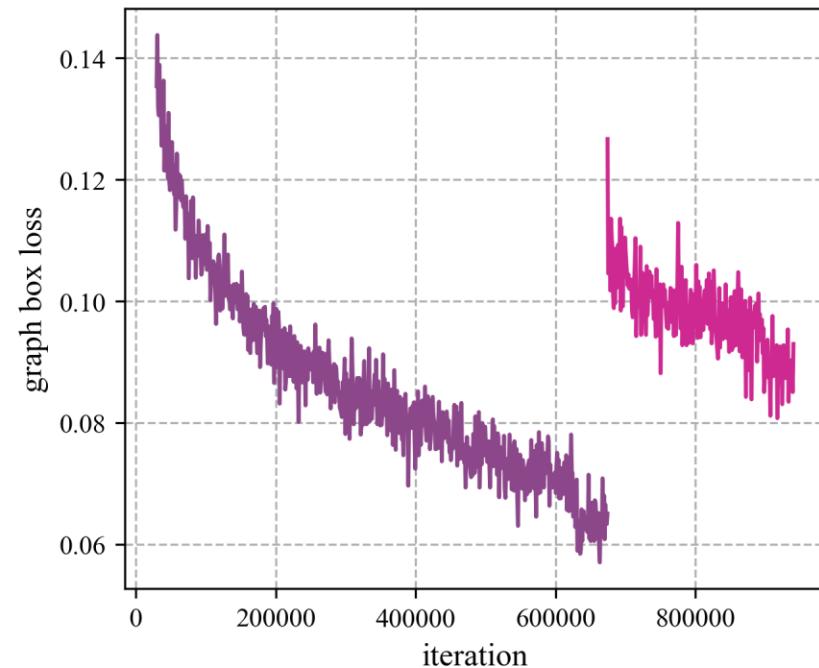
On VG dataset

Model #5: DETR-based SGGTR with data augmentation



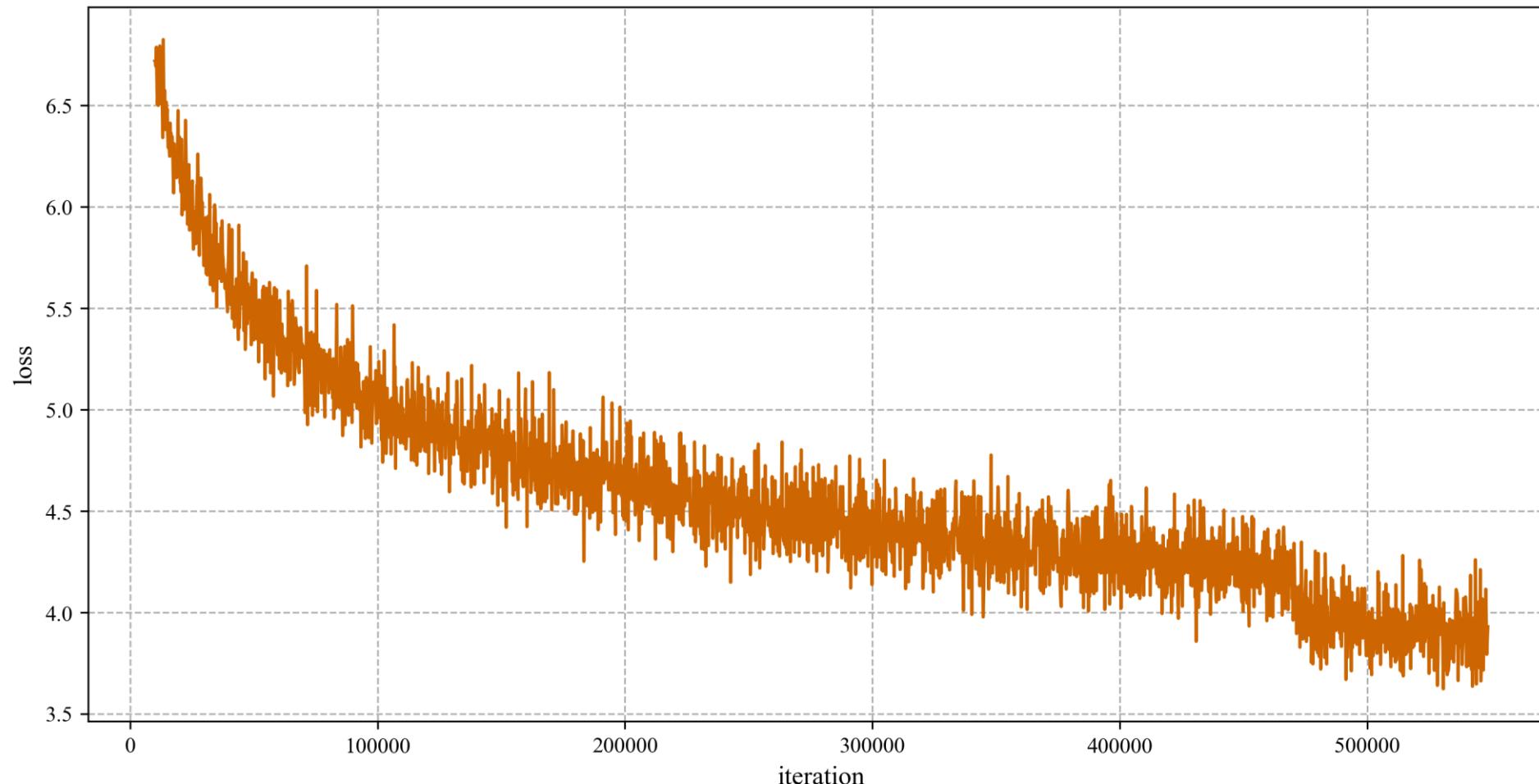
On VG dataset

Model #5: DETR-based SGGTR with data augmentation



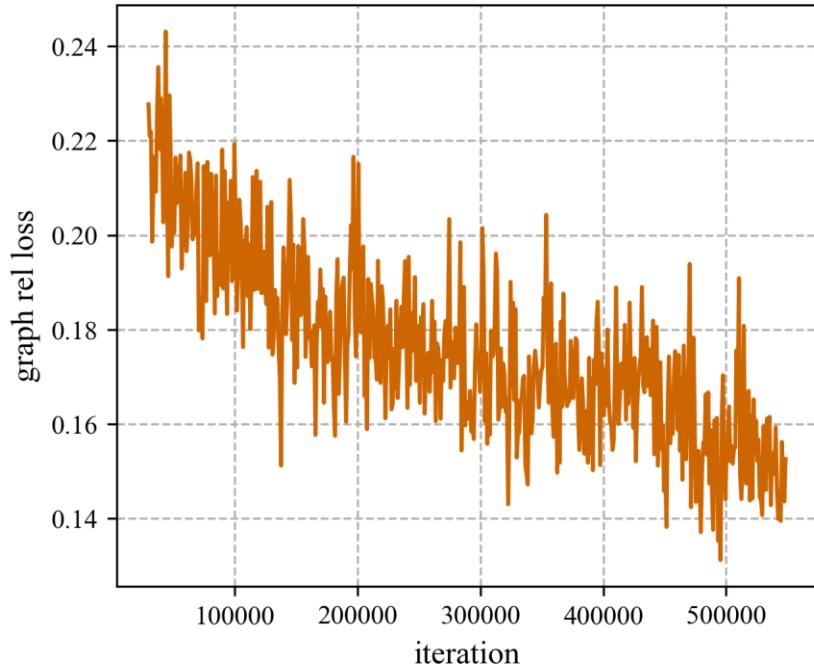
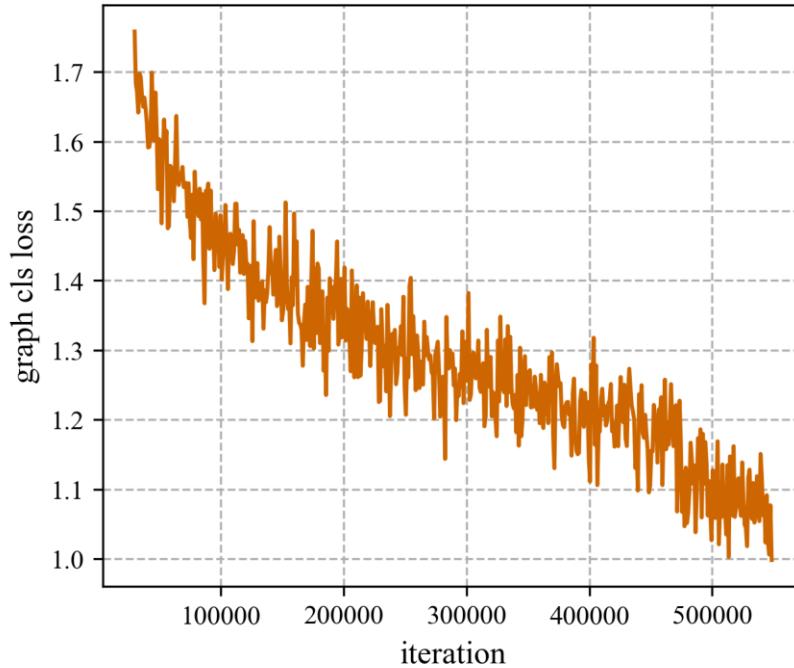
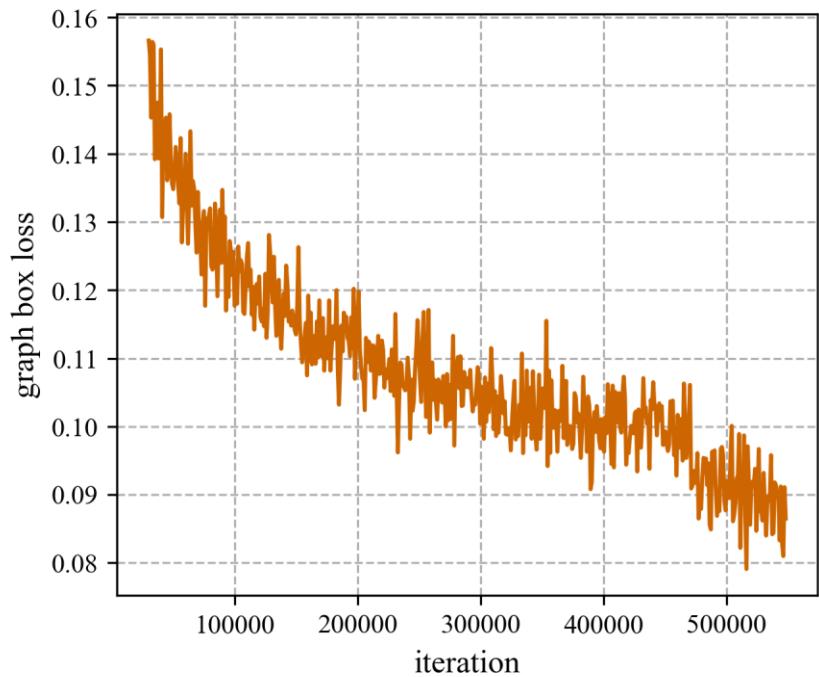
On VG dataset

Model #6: SGGTR with data augmentation



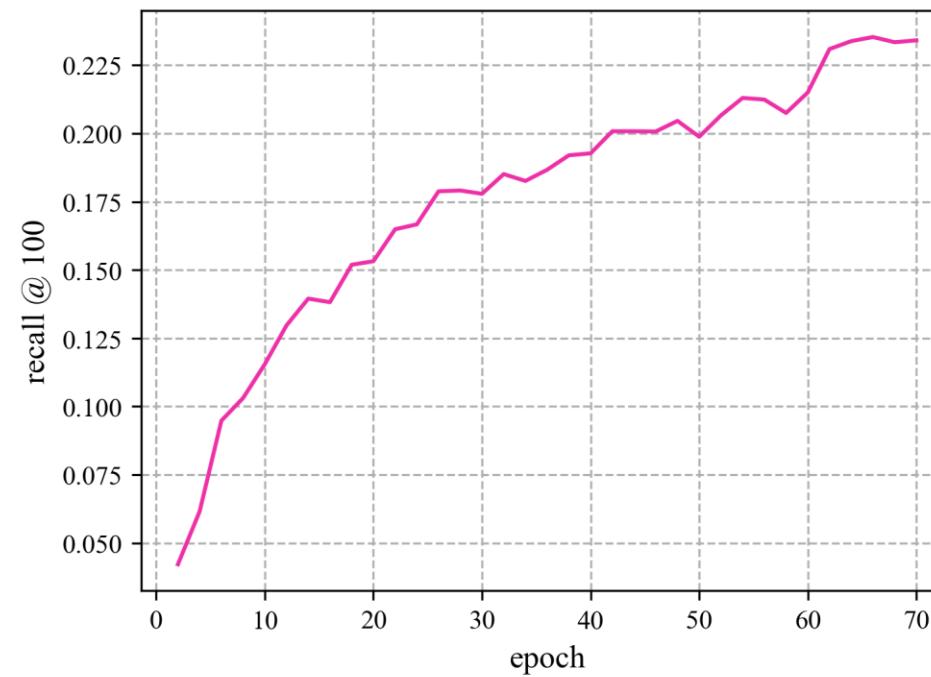
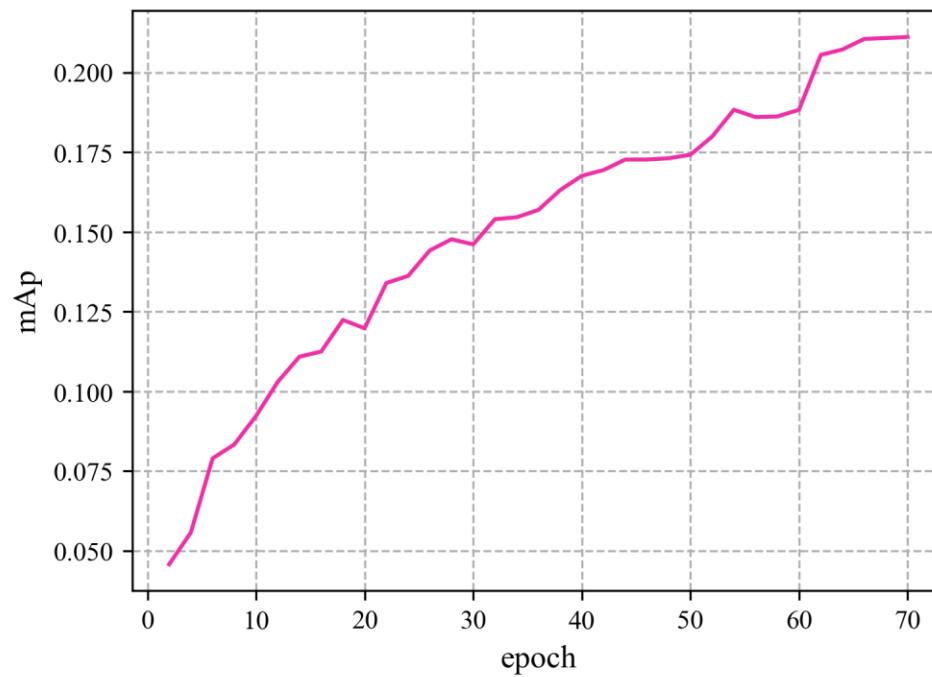
On VG dataset

Model #6: SGGTR with data augmentation



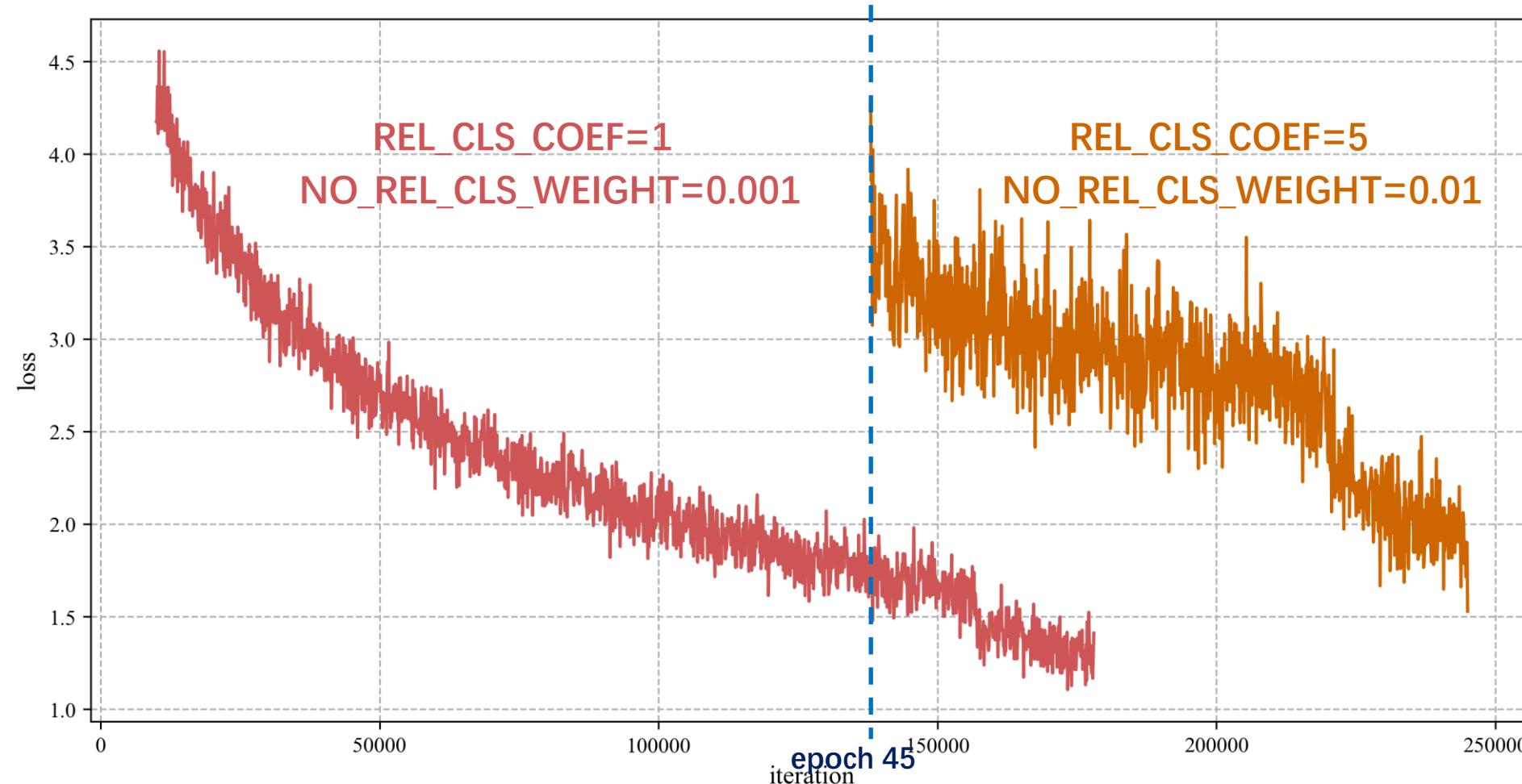
On VG dataset

Model #6: SGGTR with data augmentation



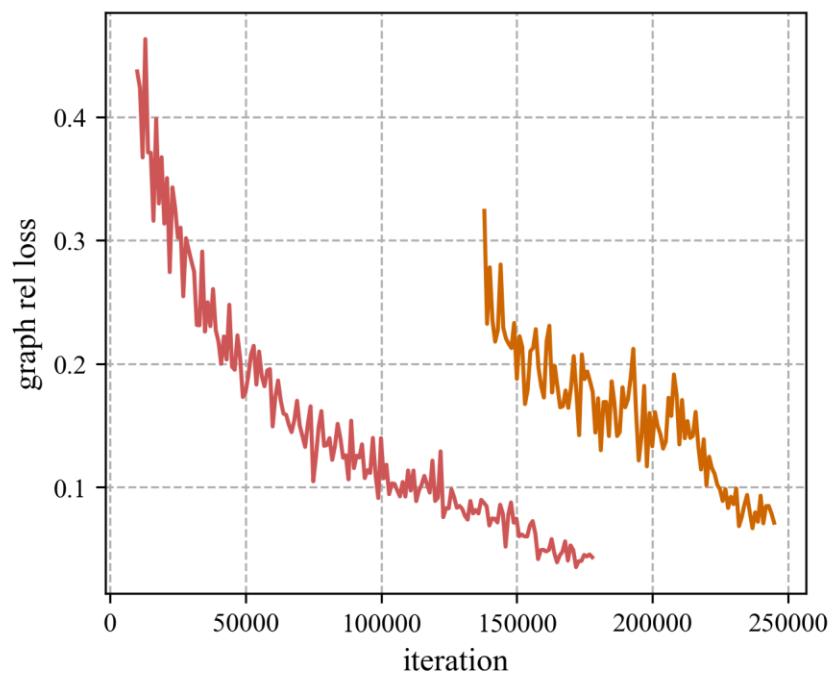
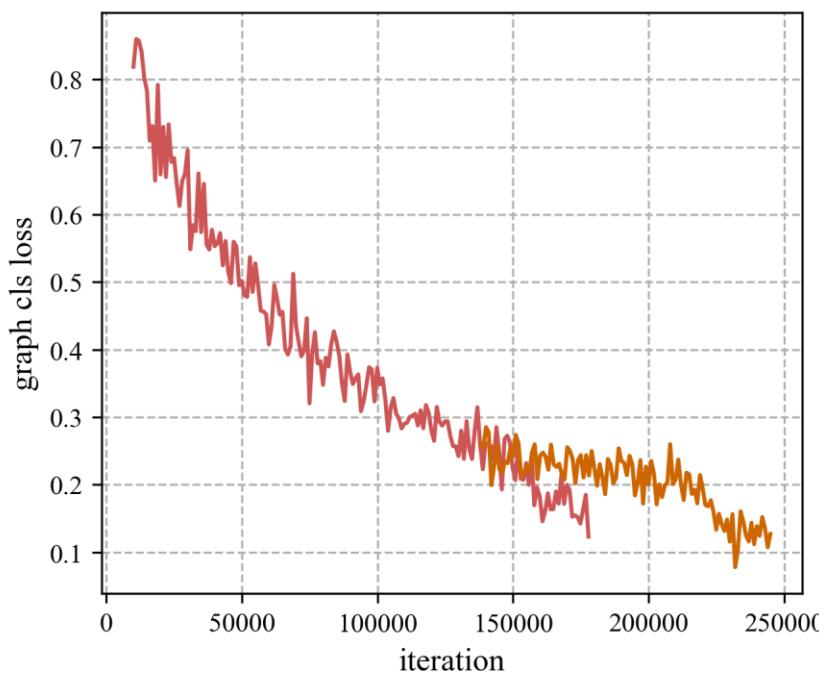
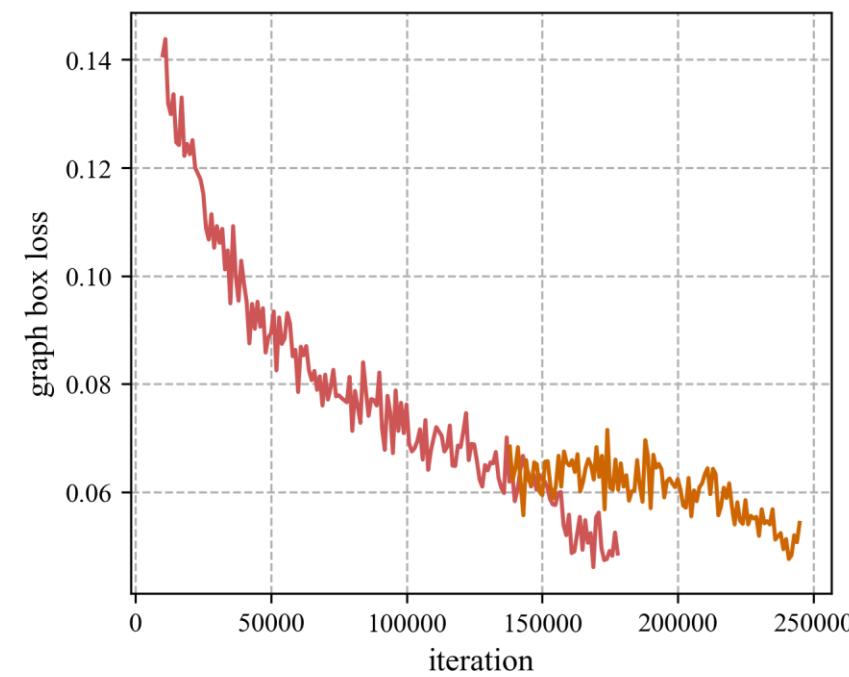
On HICO-DET dataset

Model #1: SGGTR-5



On HICO-DET dataset

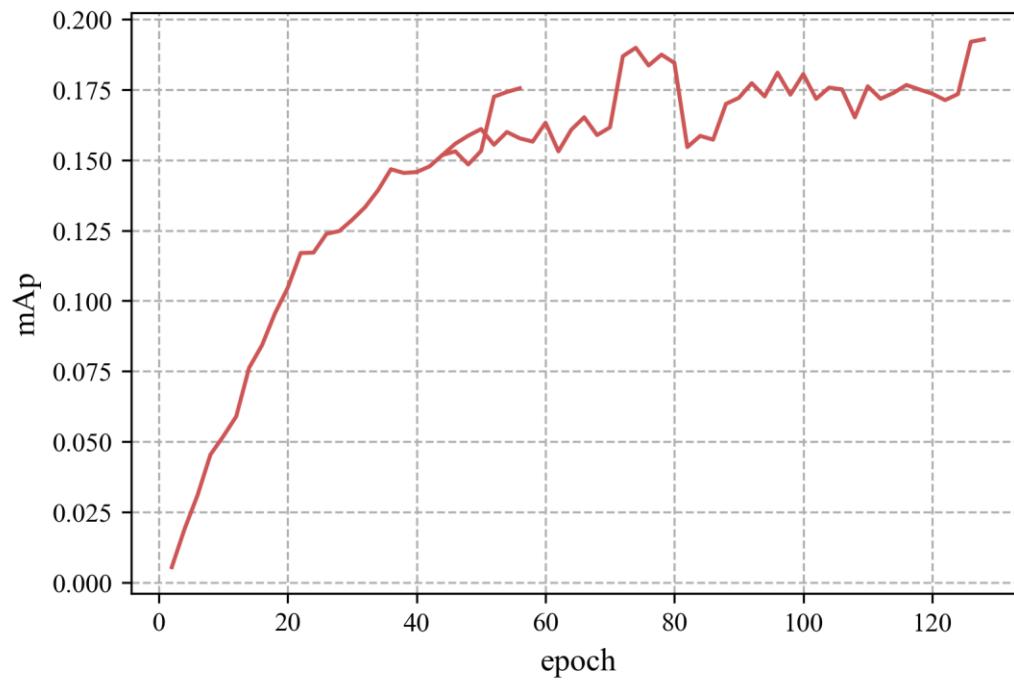
Model #1: SGGTR-5



On HICO-DET dataset

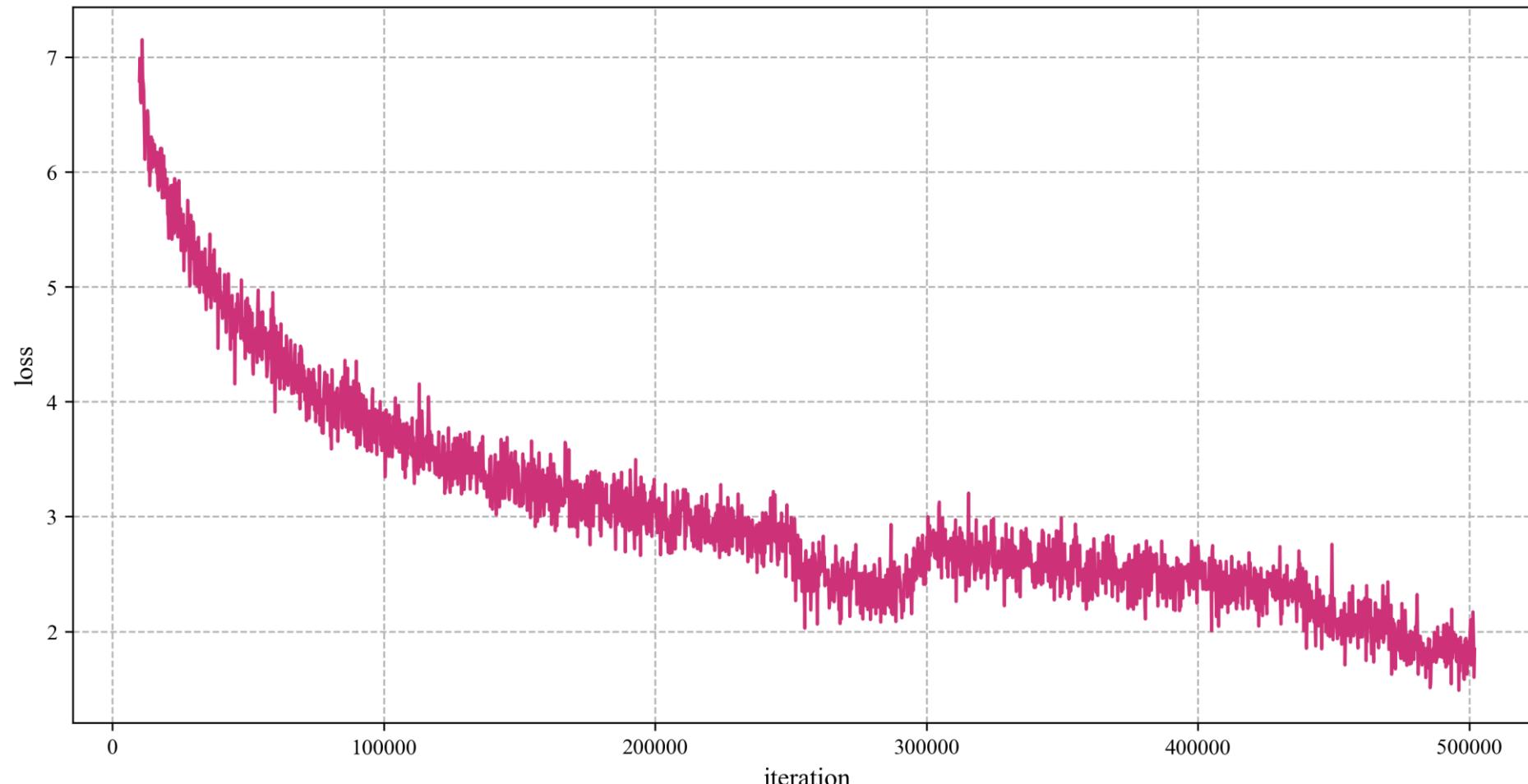
Model #1: SGGTR-5

Default (mAp)		
full	rare	non-rare
19.28	13.22	21.09



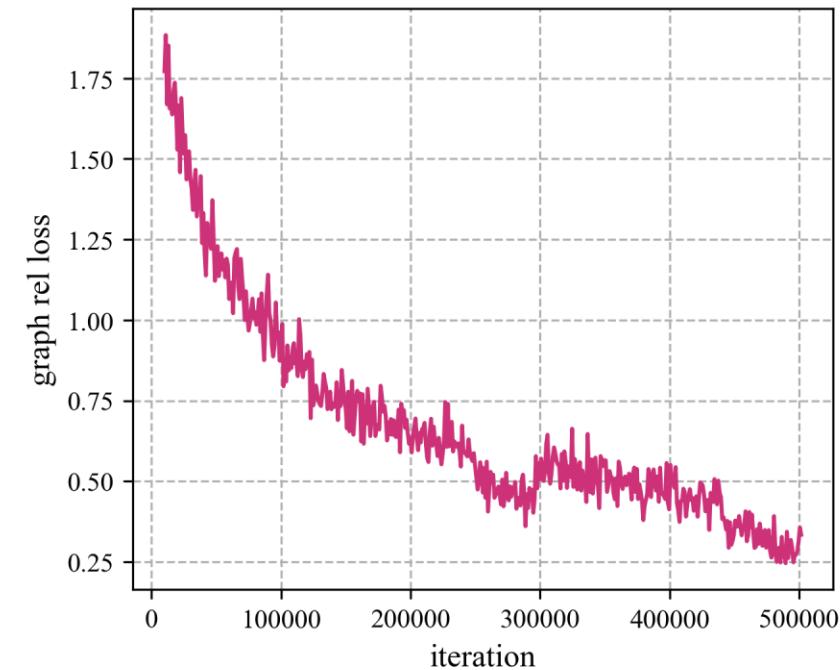
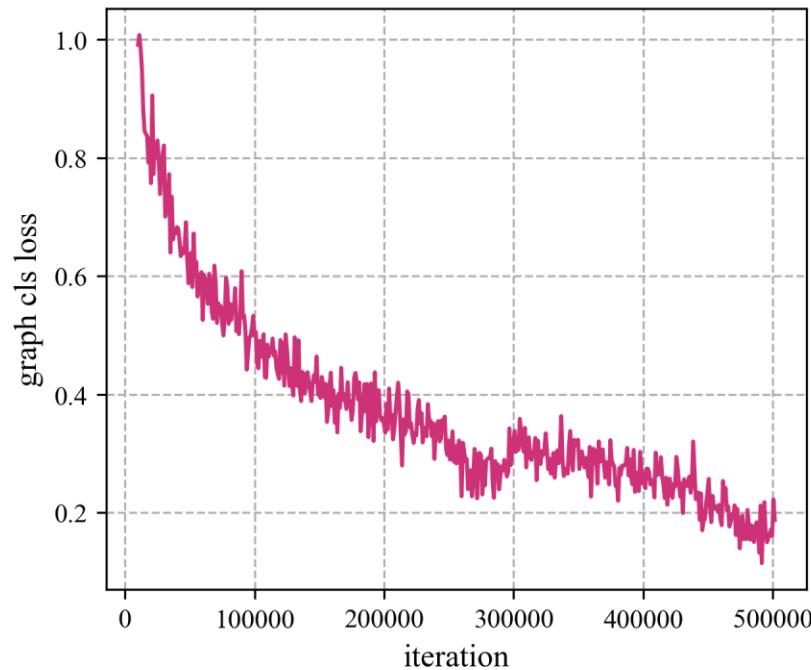
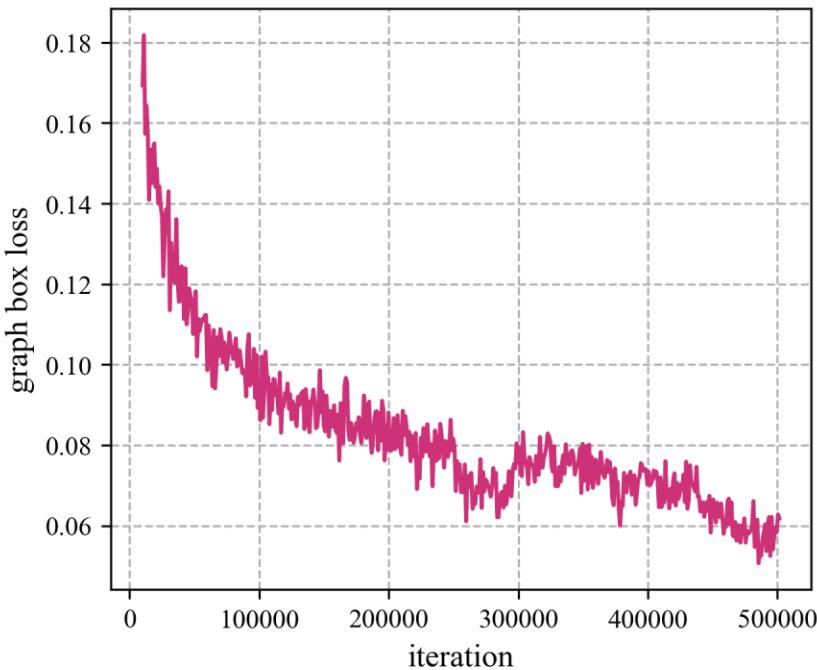
On HICO-DET dataset

Model #2: SGGTR-5 with data augmentation



On HICO-DET dataset

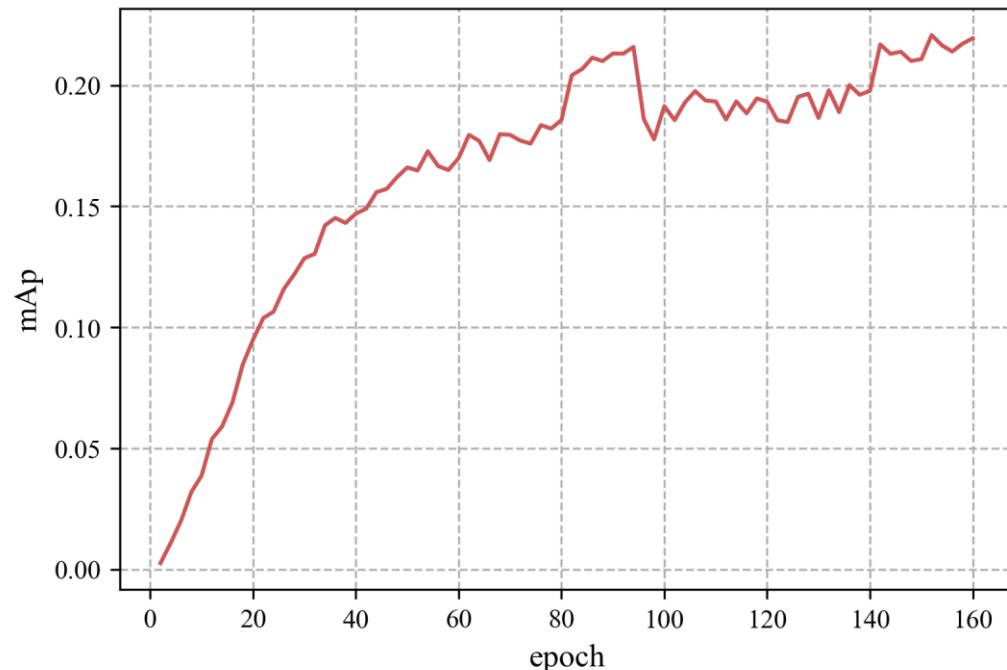
Model #2: SGGTR-5 with data augmentation



On HICO-DET dataset

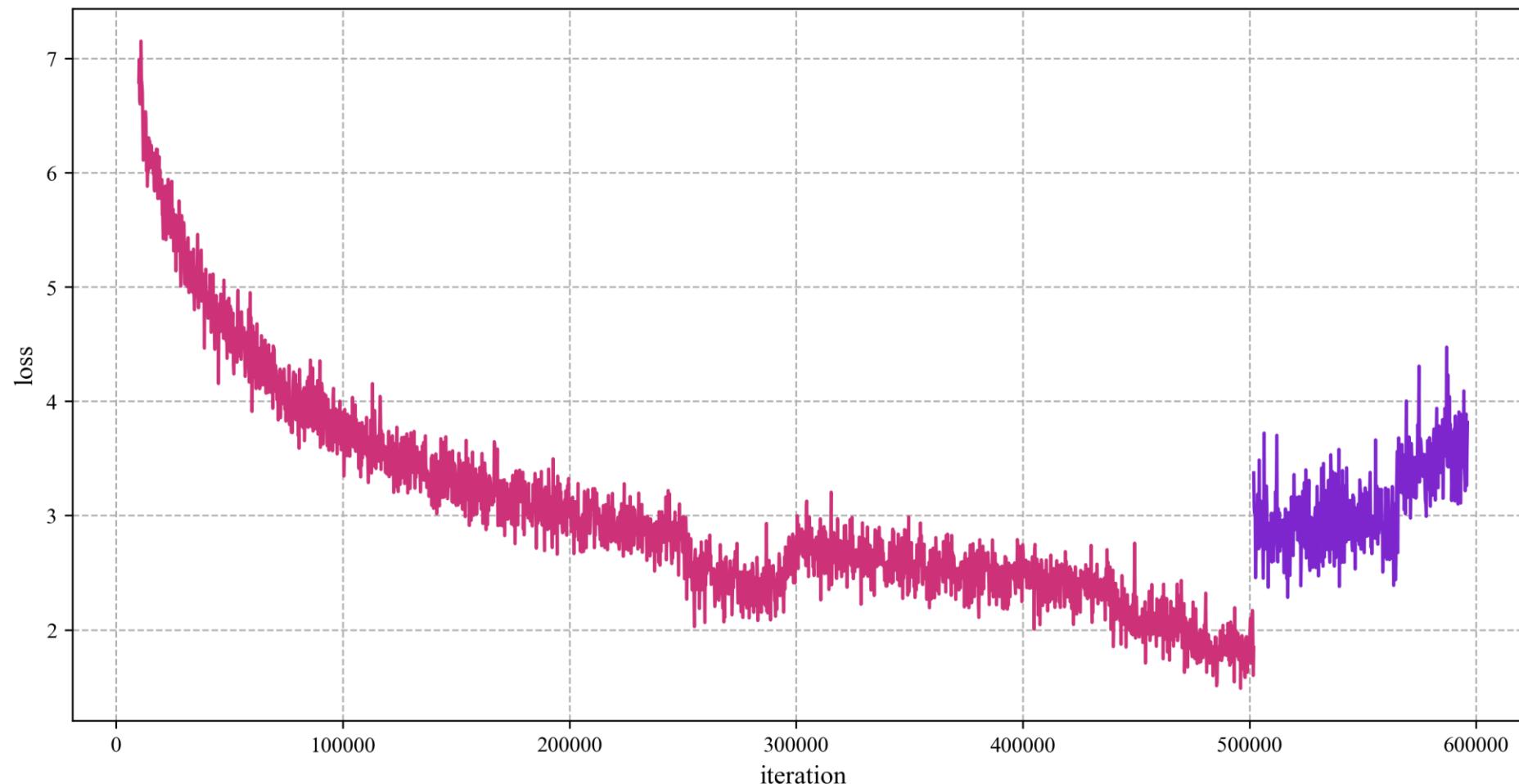
Model #2: SGGTR-5 with data augmentation

Default (mAp)		
full	rare	non-rare
21.94	17.14	23.37



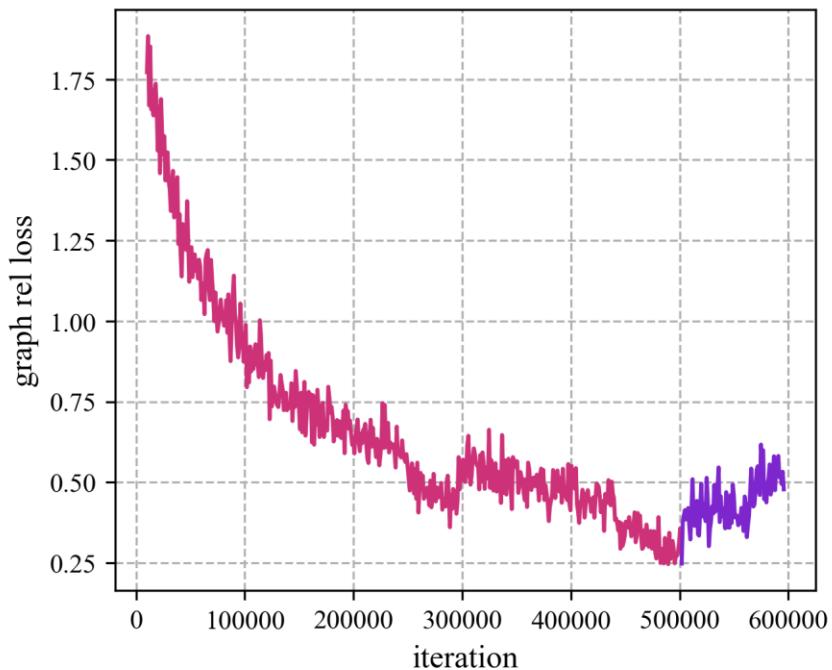
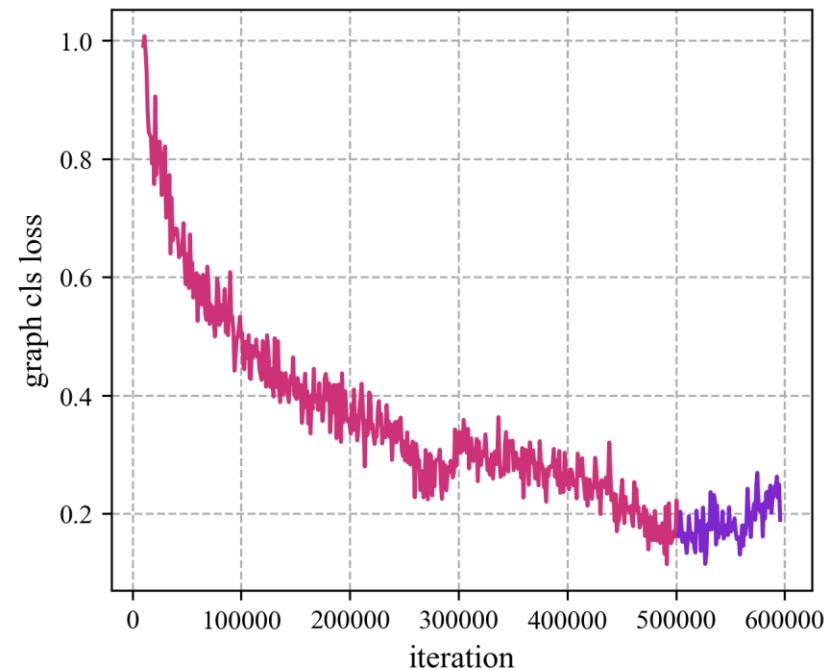
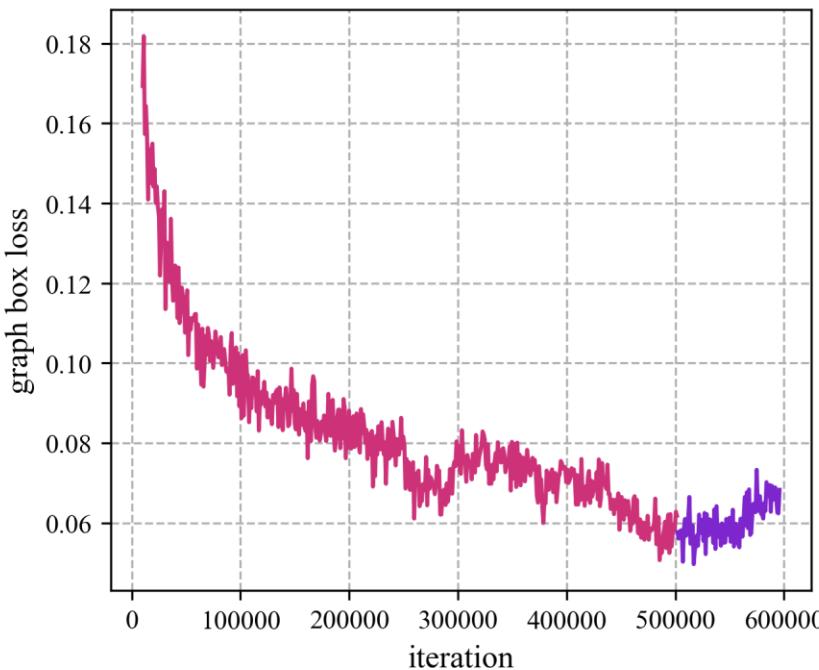
On HICO-DET dataset

Model #3: SGGTR-5 with (1) data augmentation
and (2) additional loss for relationship



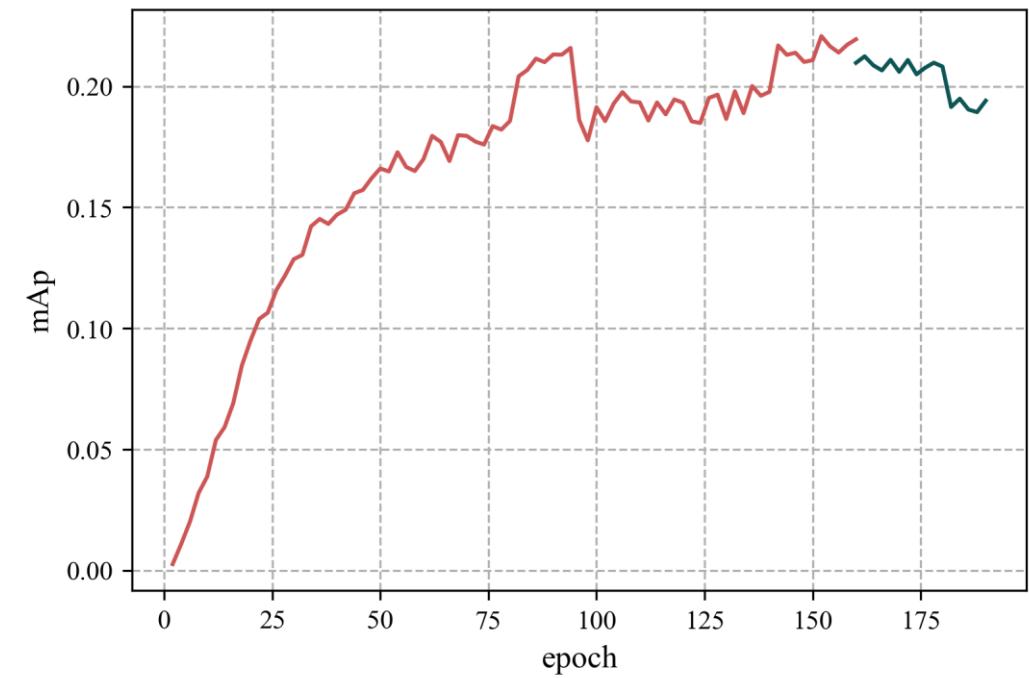
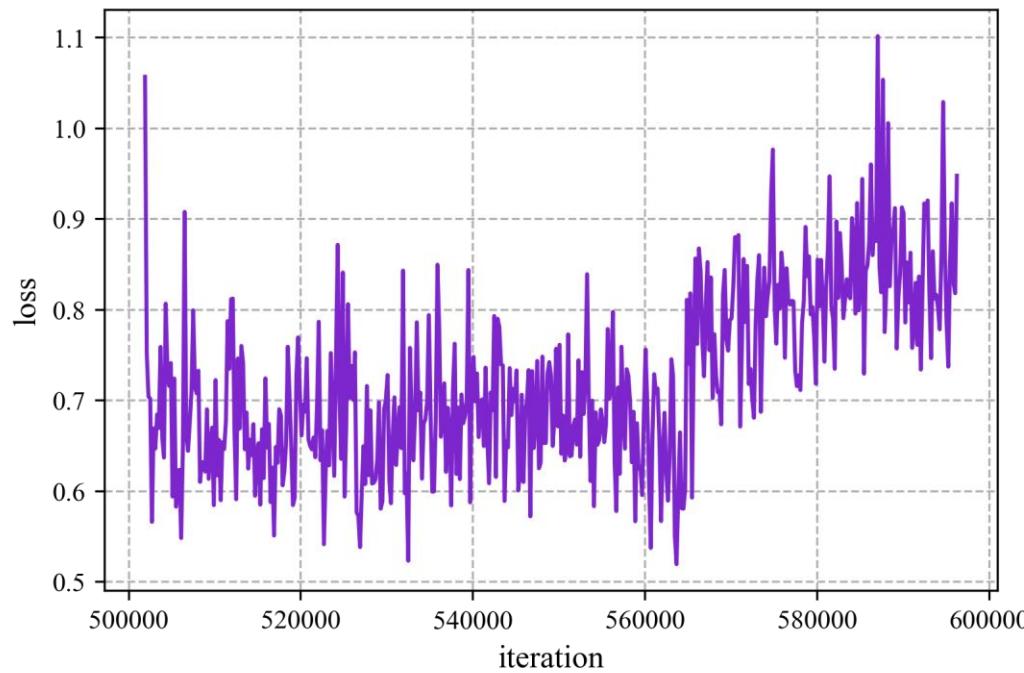
On HICO-DET dataset

Model #3: SGGTR-5 with (1) data augmentation
and (2) additional loss for relationship



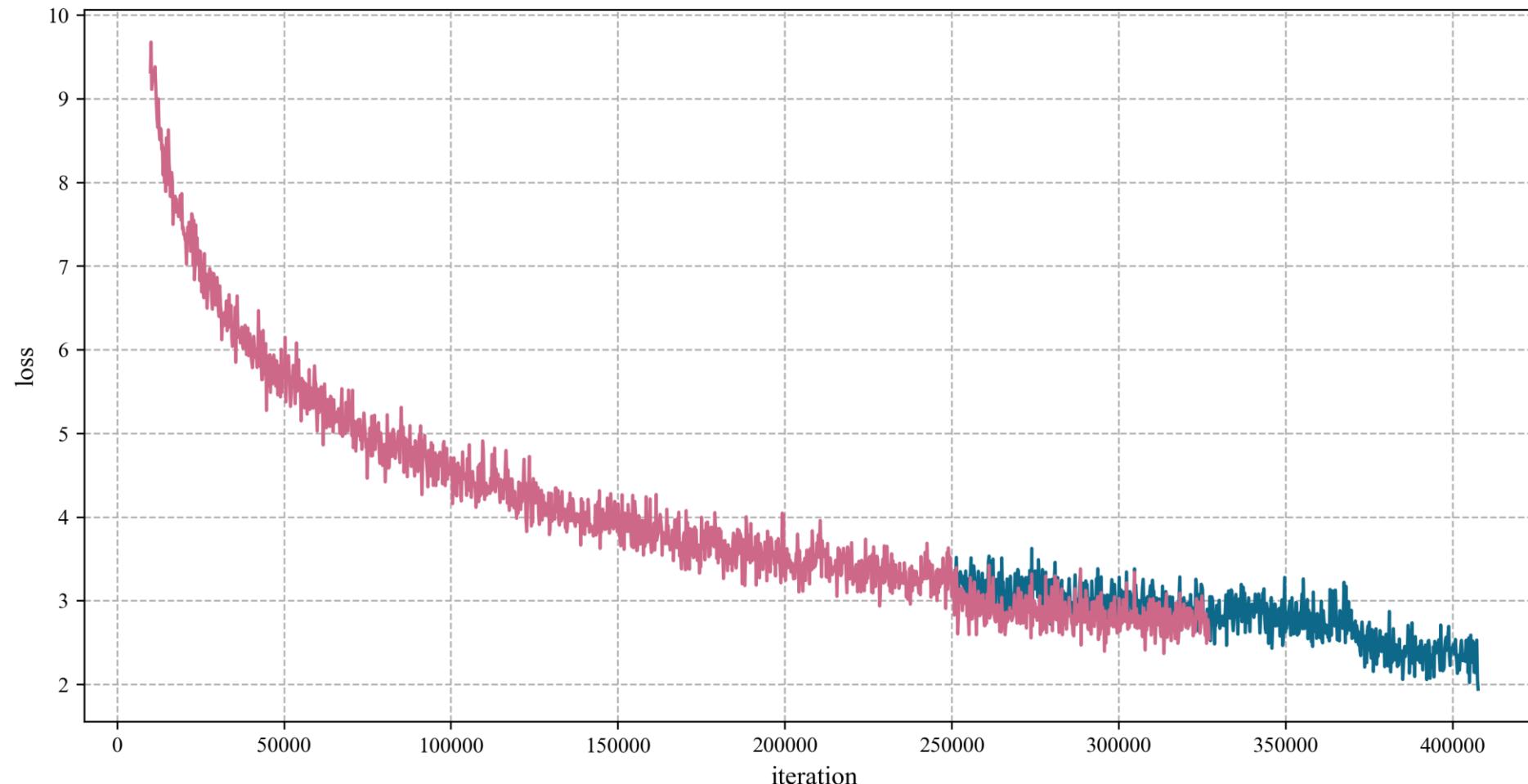
On HICO-DET dataset

Model #3: SGGTR-5 with (1) data augmentation
and (2) additional loss for relationship



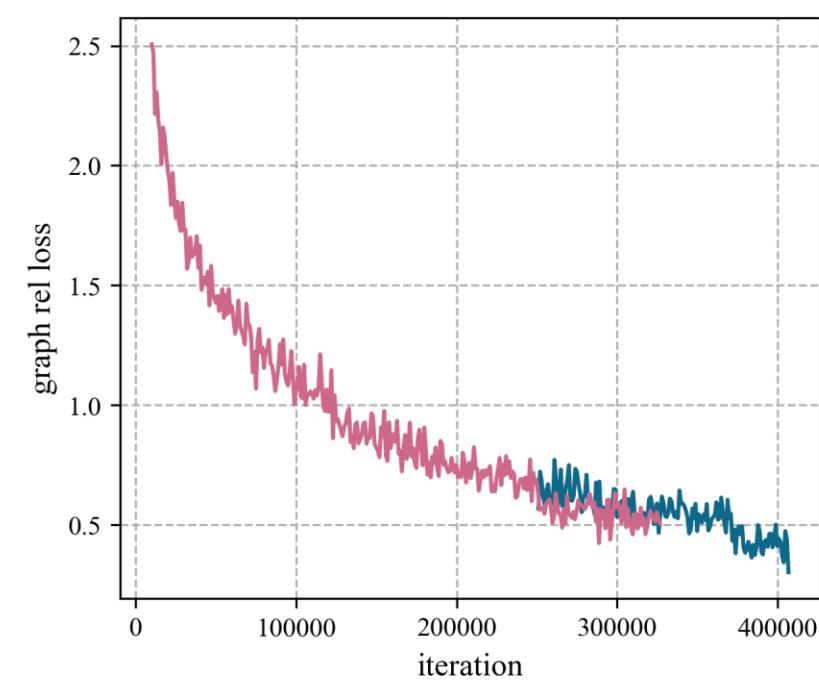
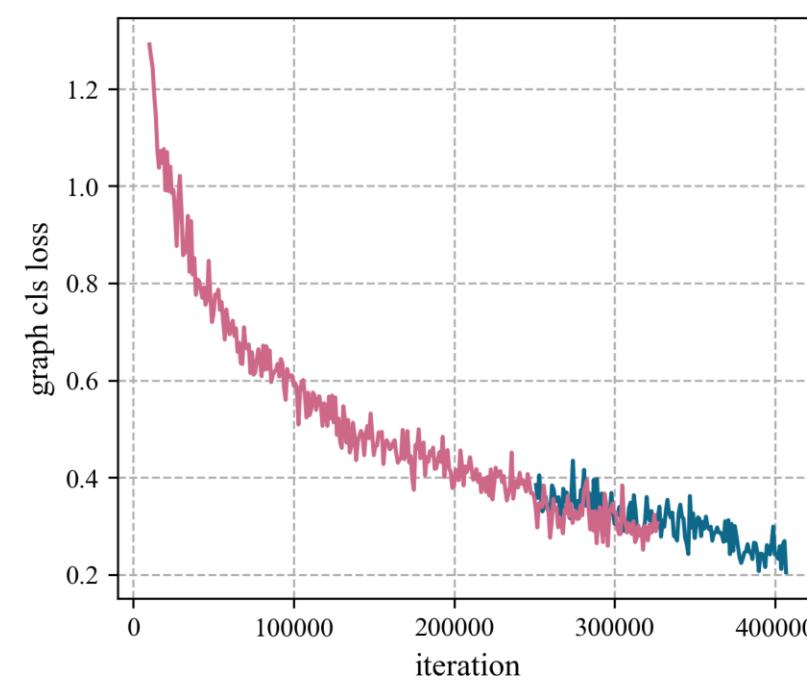
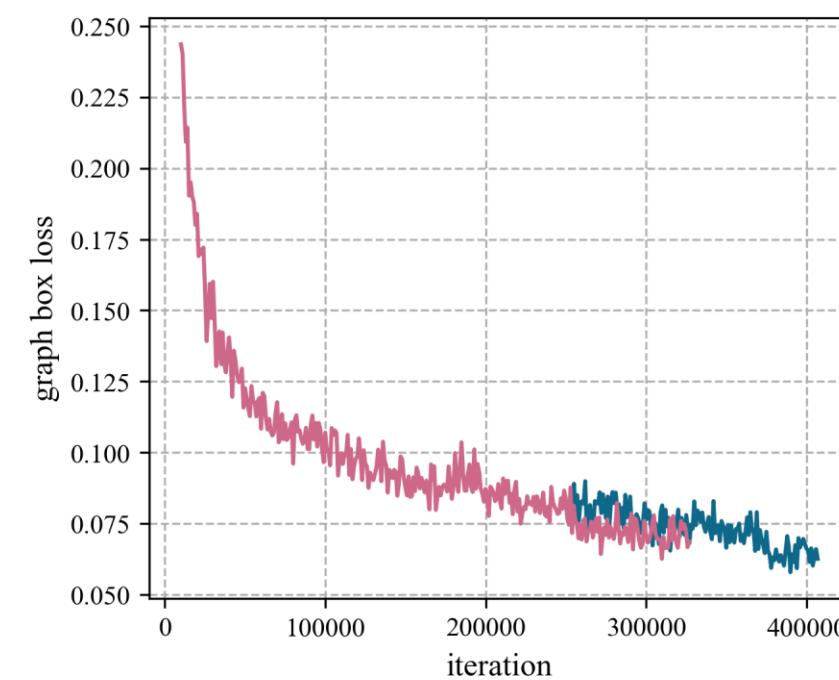
On HICO-DET dataset

Model #3: SGGTR-6 with data augmentation



On HICO-DET dataset

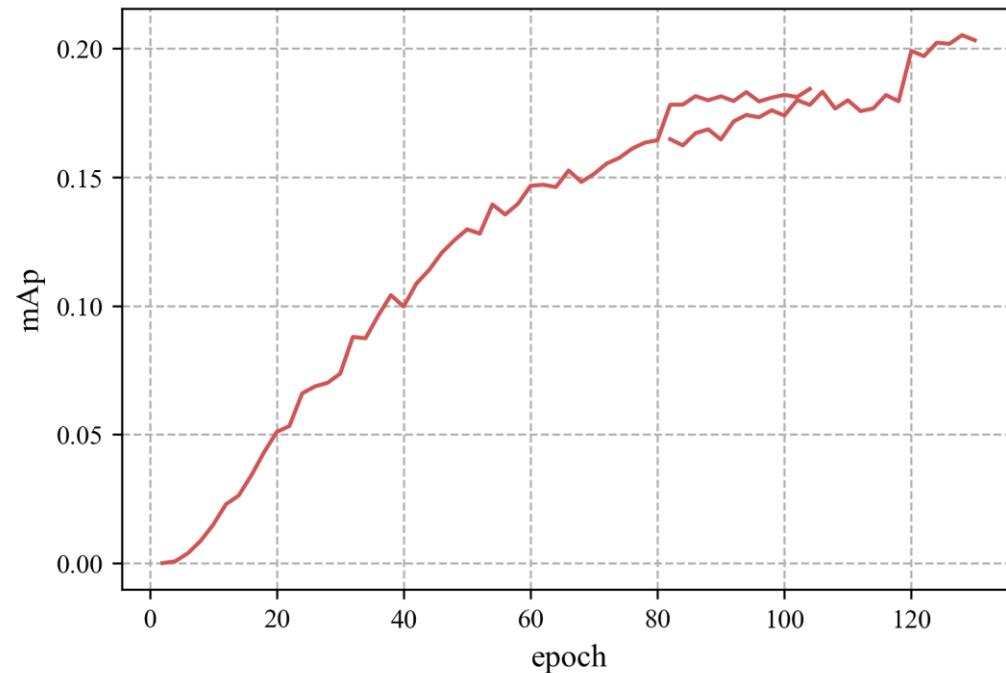
Model #3: SGGTR-6 with data augmentation



On HICO-DET dataset

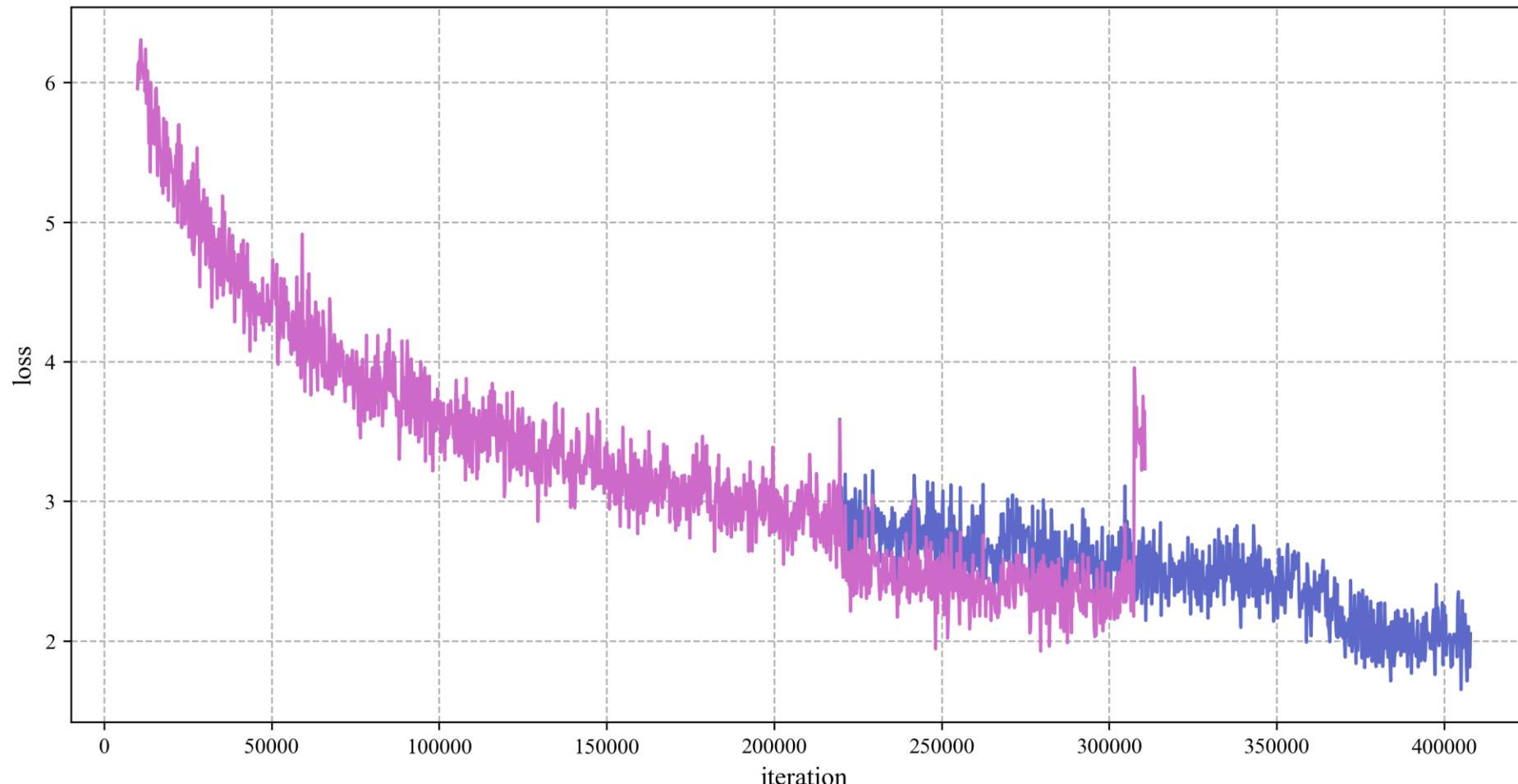
Model #3: SGGTR-6 with data augmentation

Default (mAp)		
full	rare	non-rare
20.51	15.68	21.96



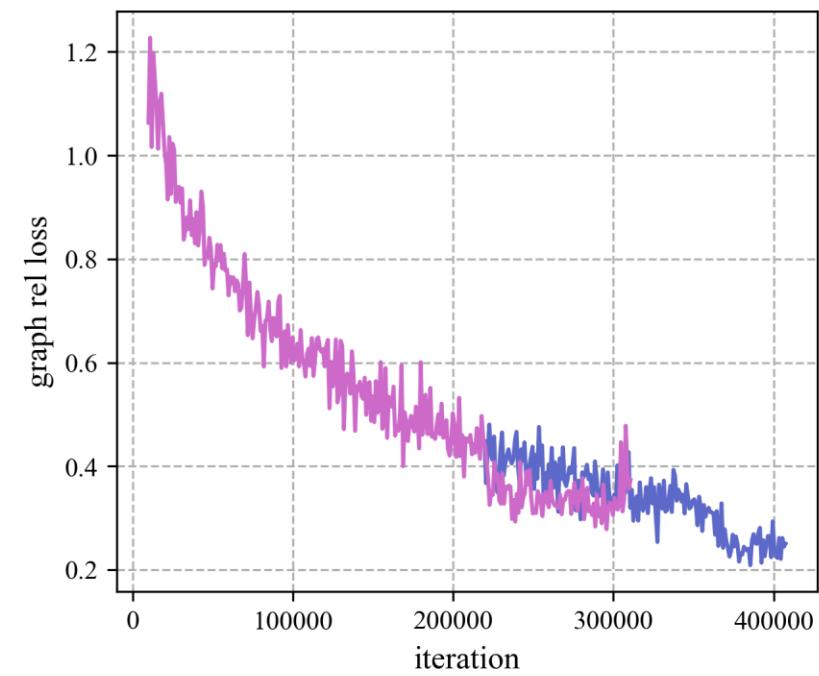
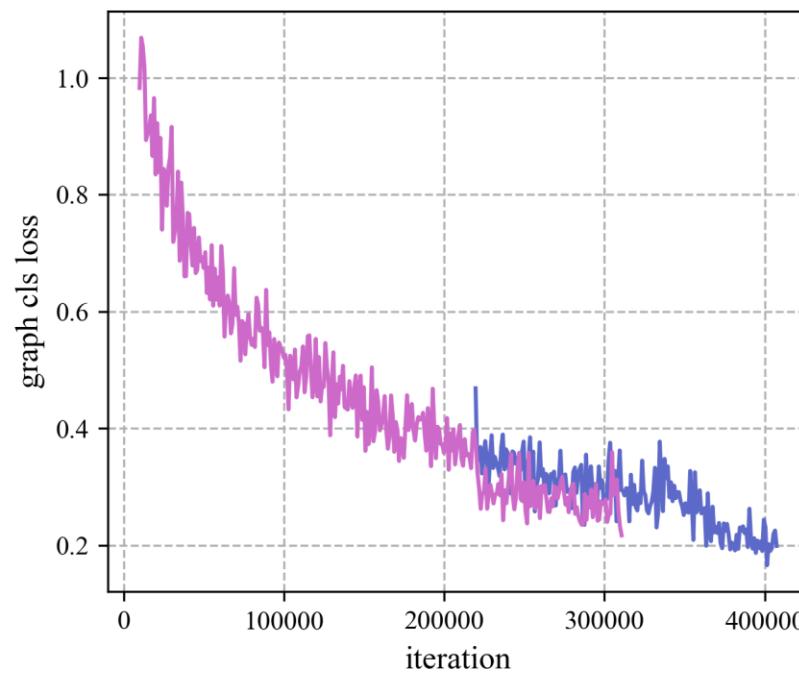
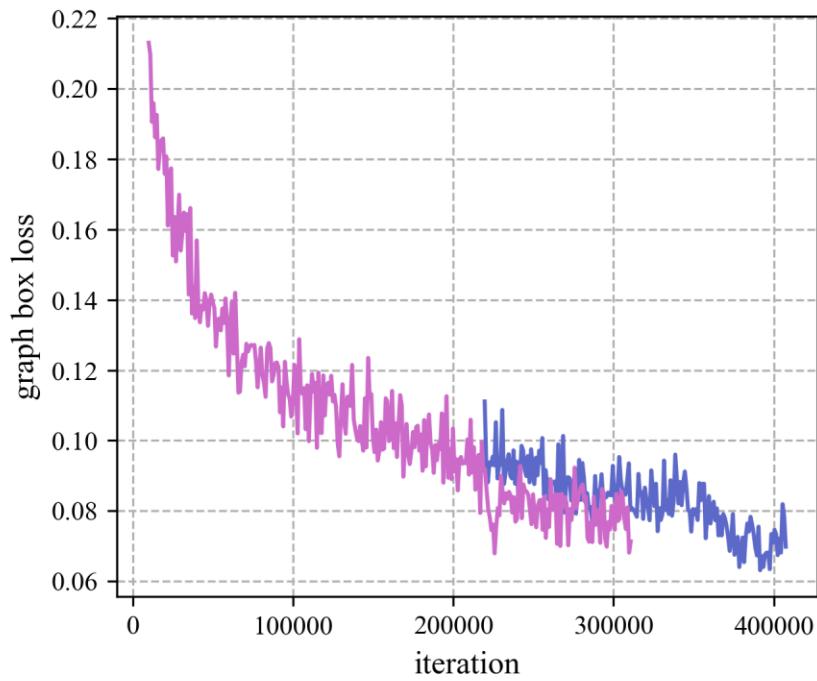
On HICO-DET dataset

Model #3: SGGTR-5 with data augmentation, q=20



On HICO-DET dataset

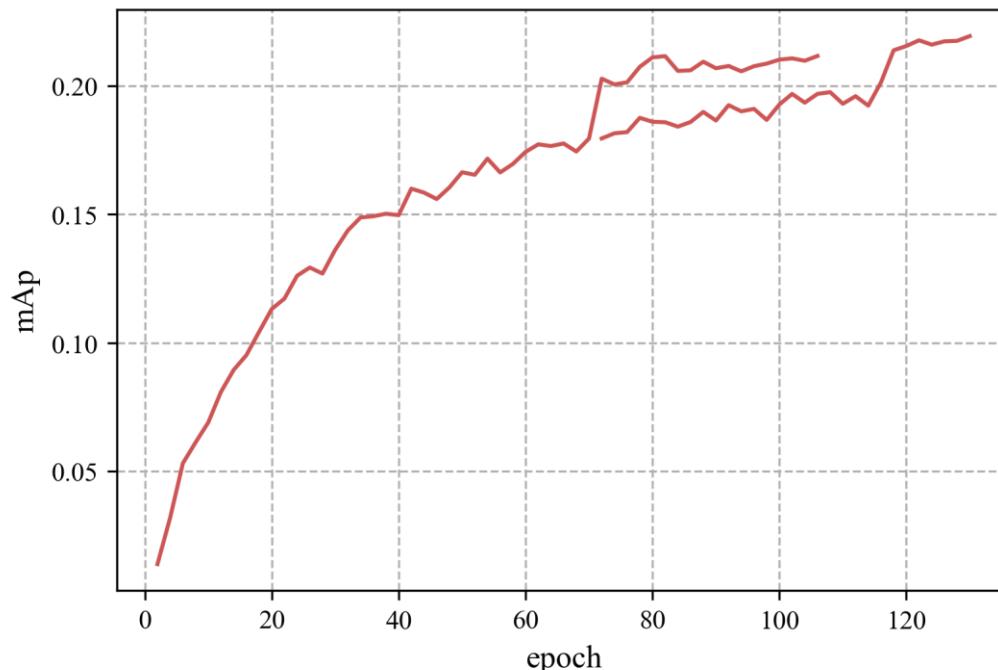
Model #3: SGGTR-5 with data augmentation, q=20



On HICO-DET dataset

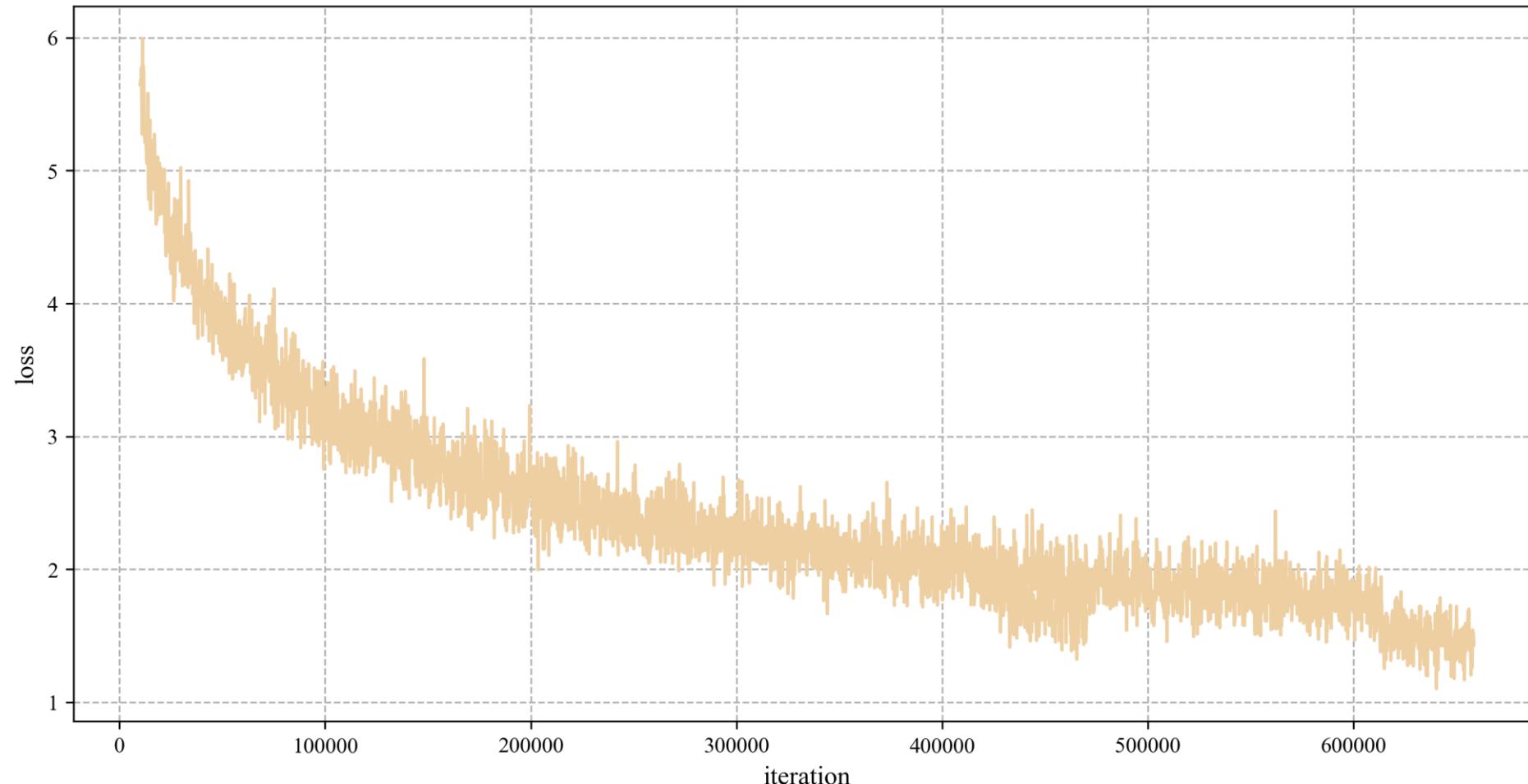
Model #3: SGGTR-5 with data augmentation, q=20

Default (mAp)		
full	rare	non-rare
21.93	18.45	22.97



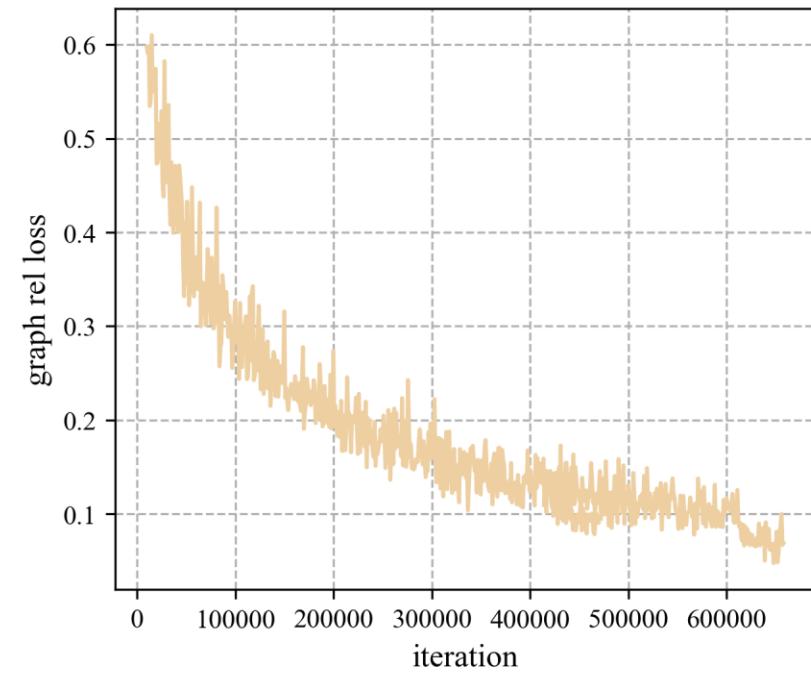
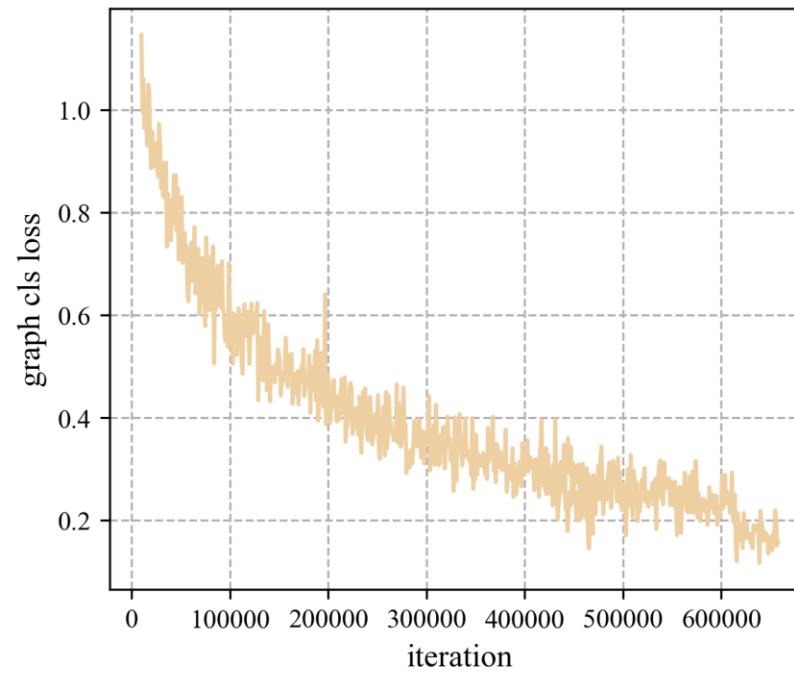
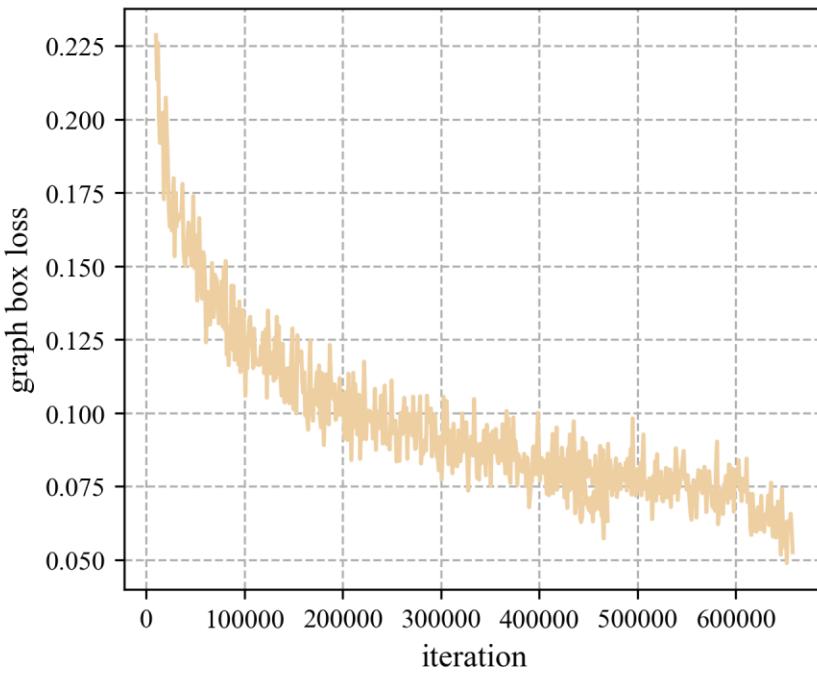
On HICO-DET dataset

Model #4: DETR-5 for SGG with data augmentation, q=20



On HICO-DET dataset

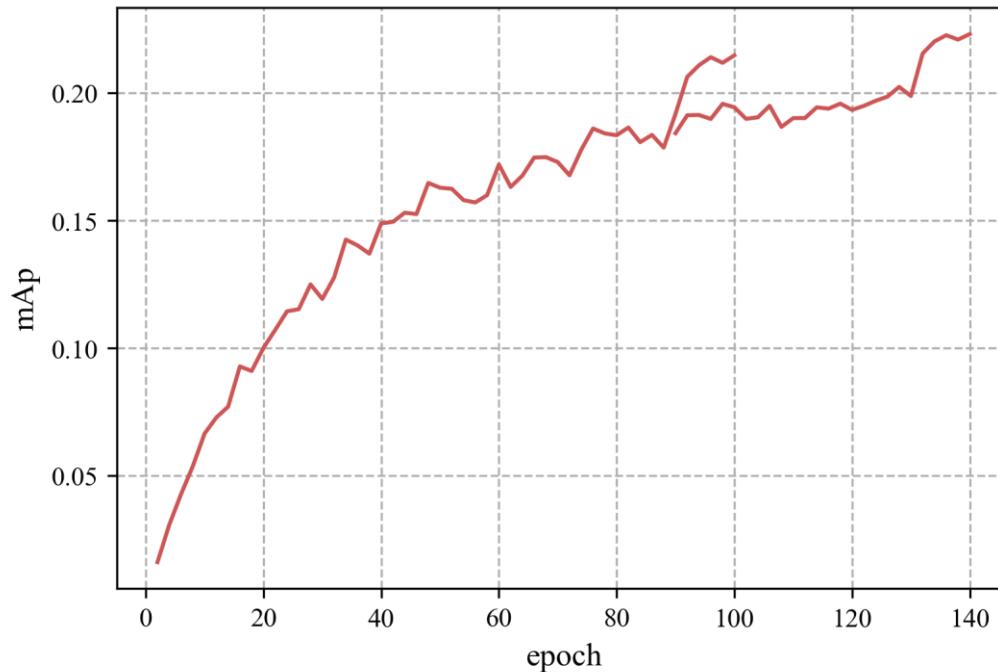
Model #4: DETR-5 for SGG with data augmentation, q=20



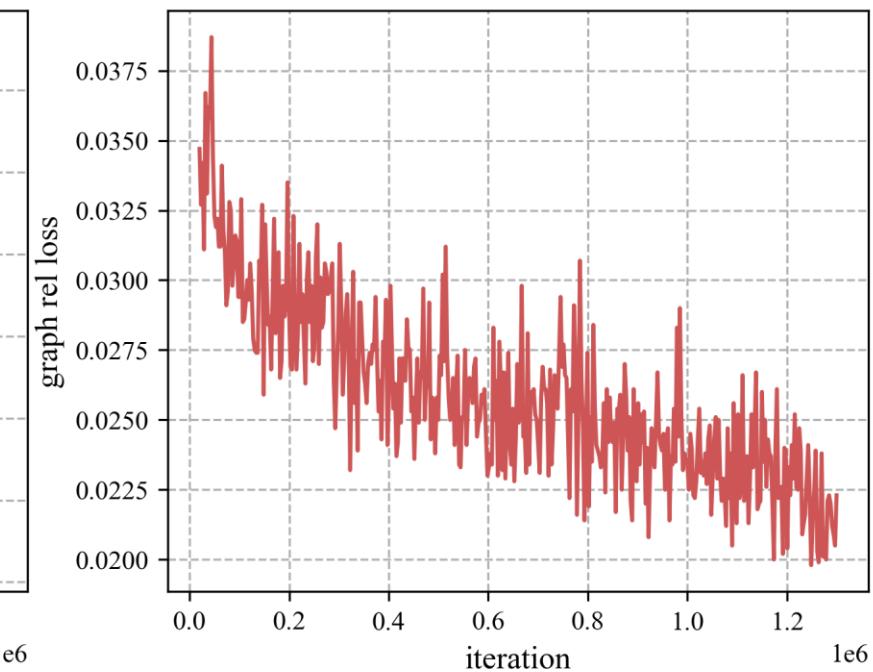
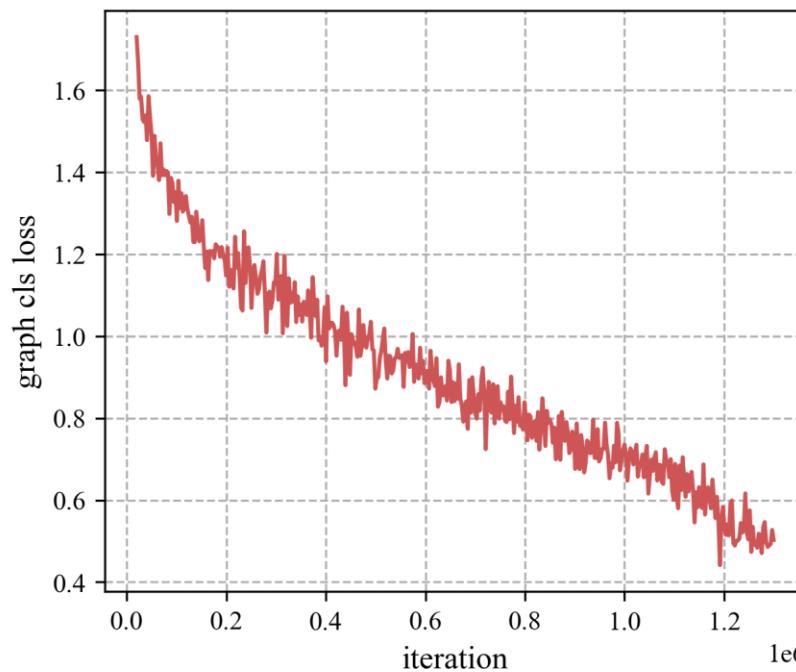
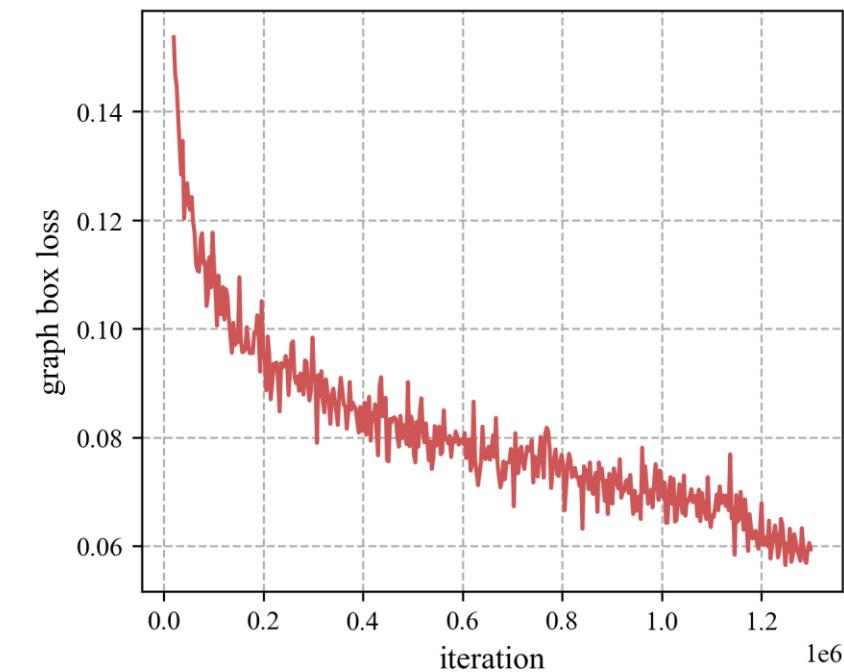
On HICO-DET dataset

Model #4: DETR-5 for SGG with data augmentation, q=20

Default (mAp)		
full	rare	non-rare
22.31	18.36	23.49

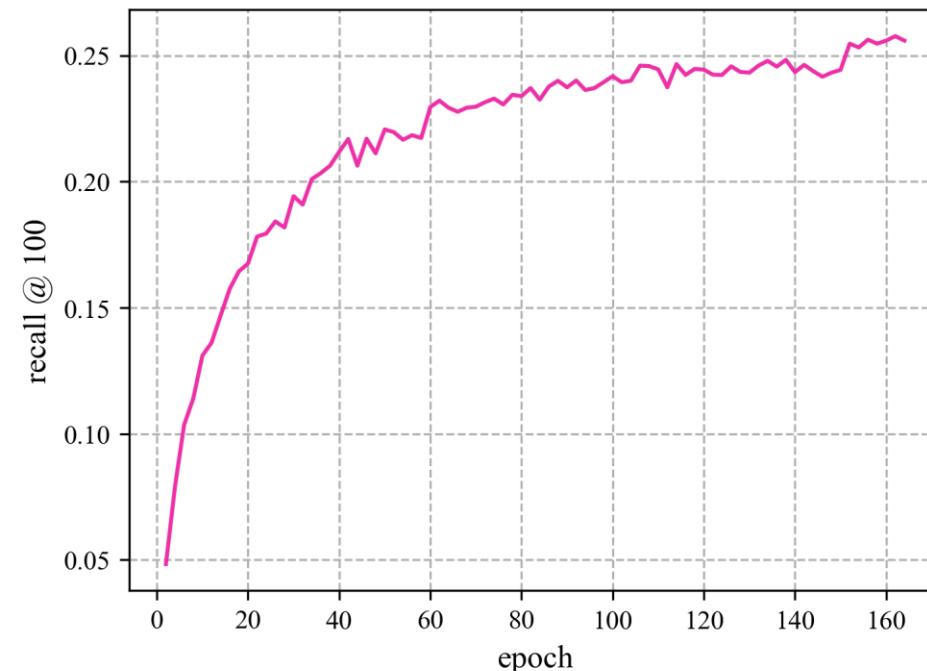
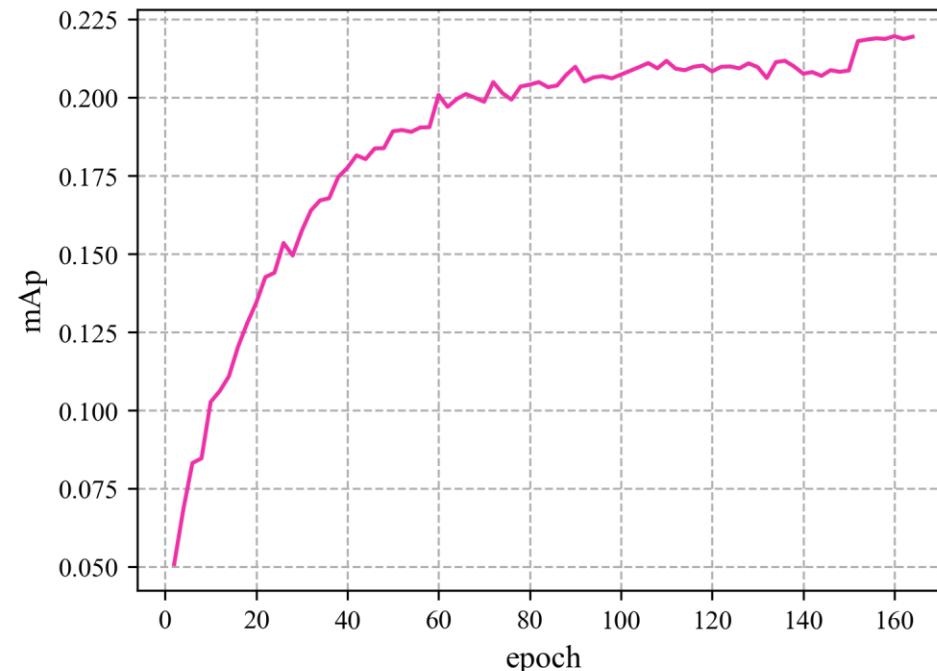


SGGTR-5 on VG dataset

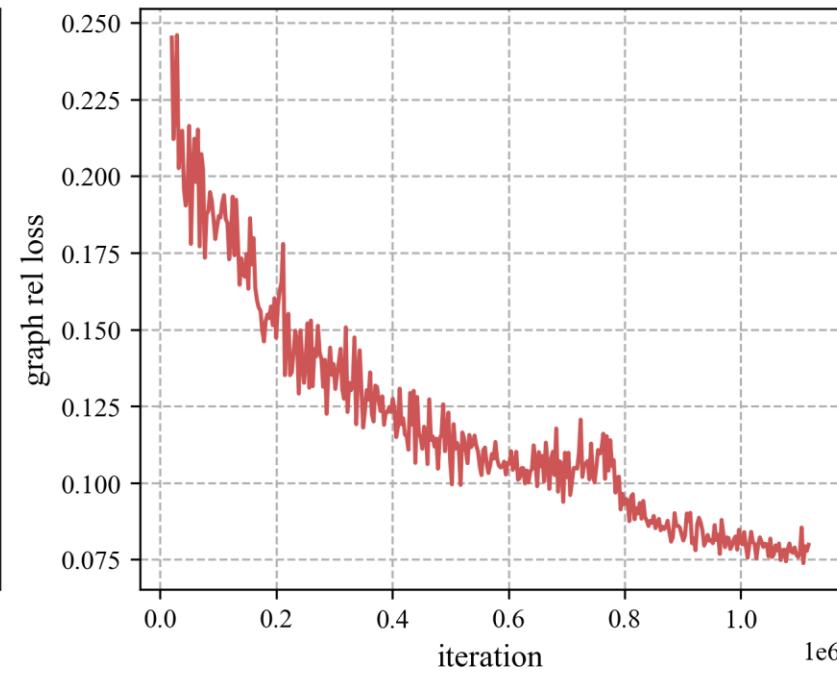
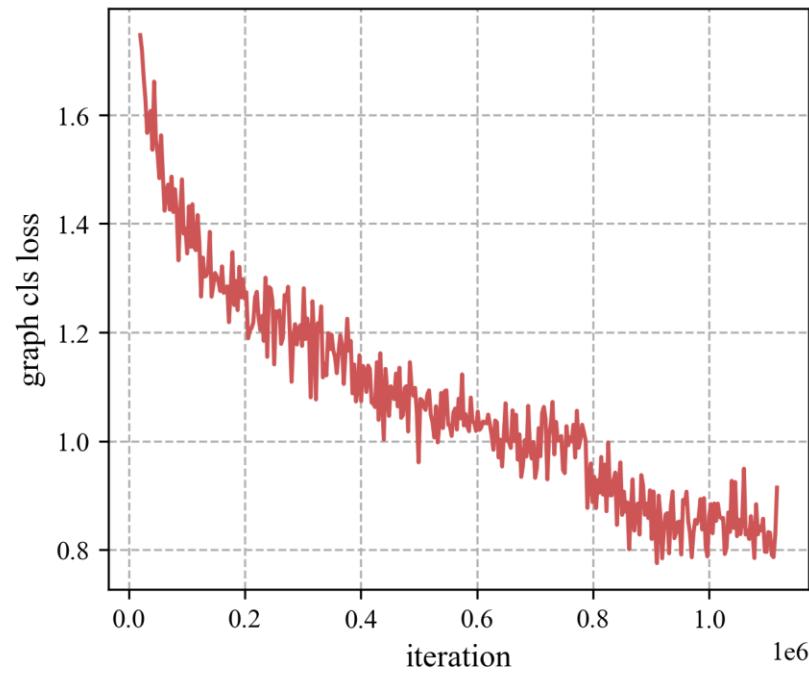
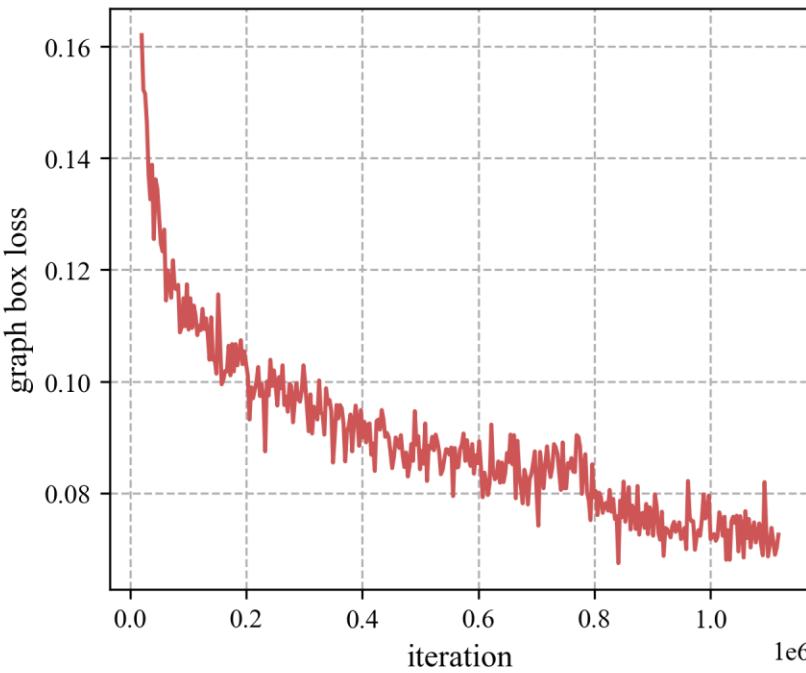


SGGTR-5 on VG dataset

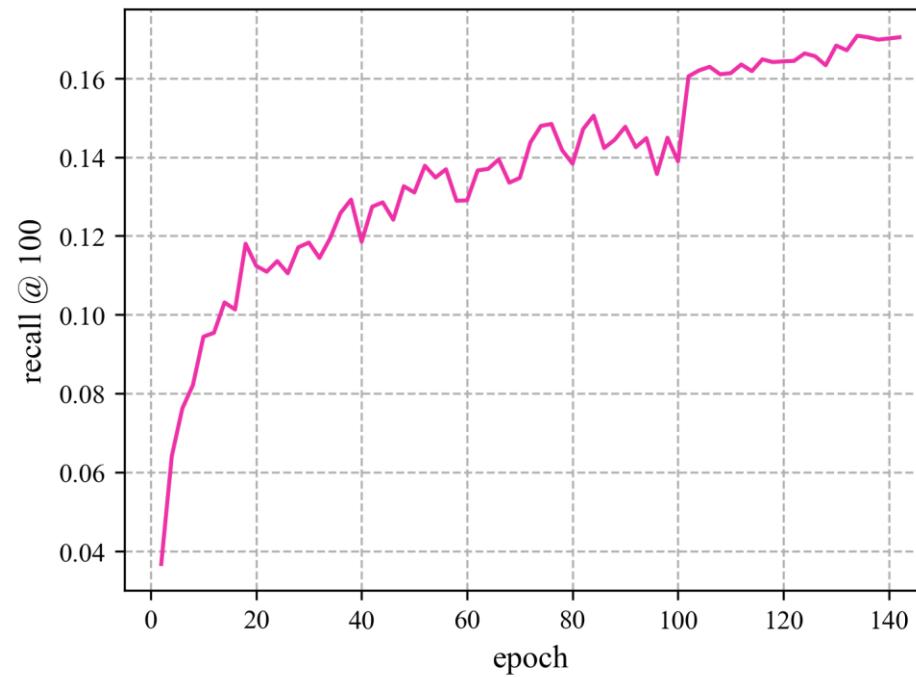
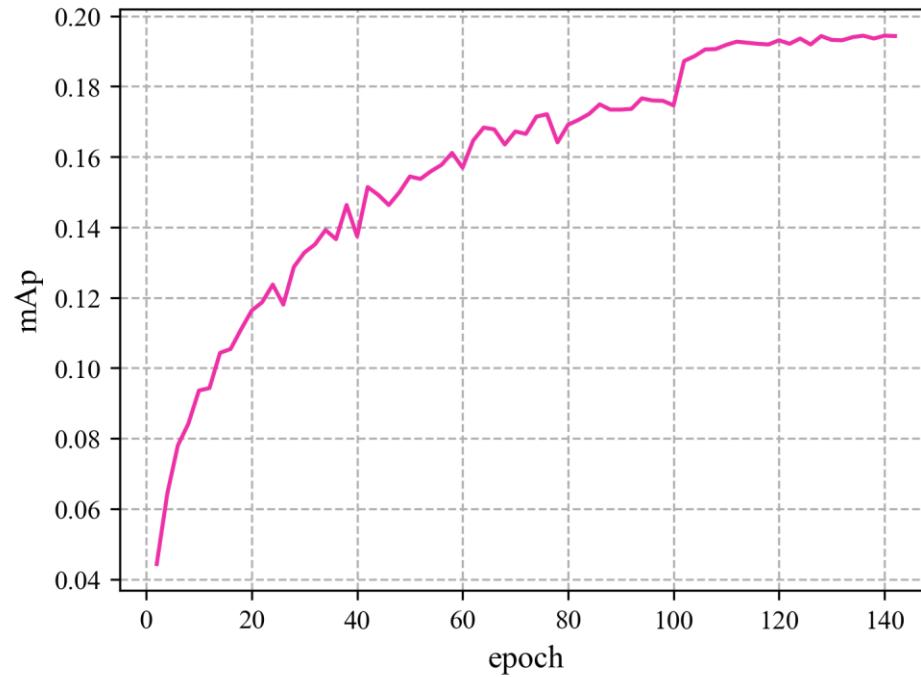
mAp	Recall@K			No-gc Recall@K			Mean Recall@K			No-gc Mean Recall@K		
	IoU=0.5	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50
21.70	16.45	21.85	25.73	19.18	25.66	30.29	3.69	5.35	6.66	5.43	8.93	12.76



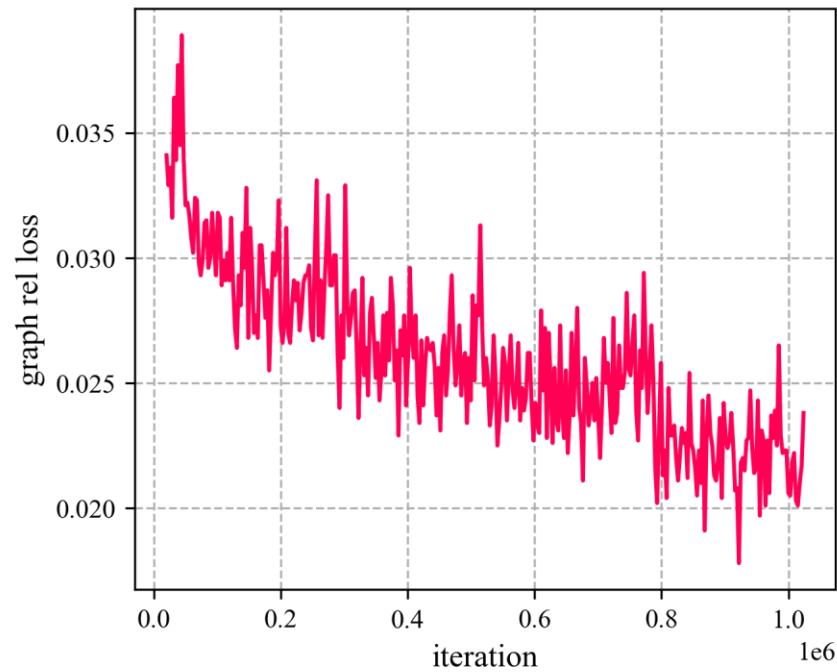
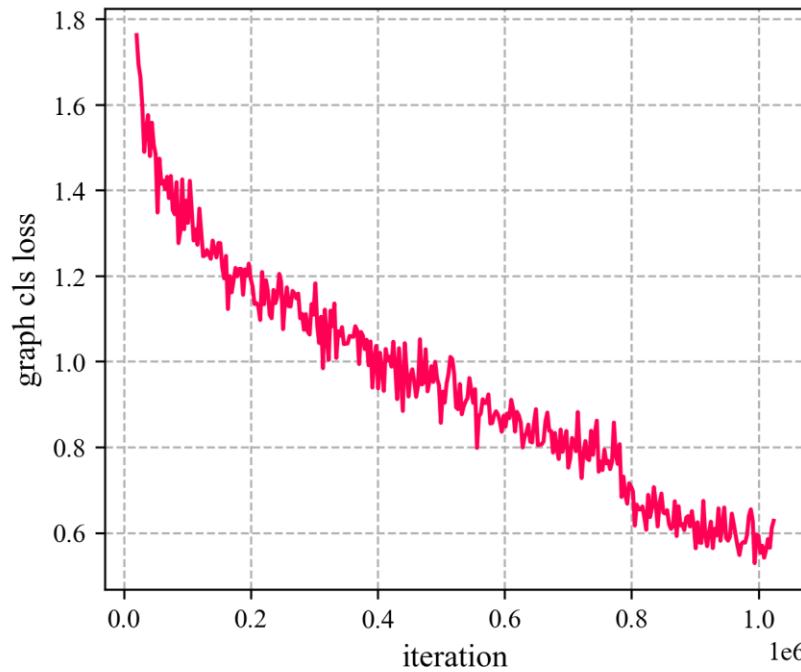
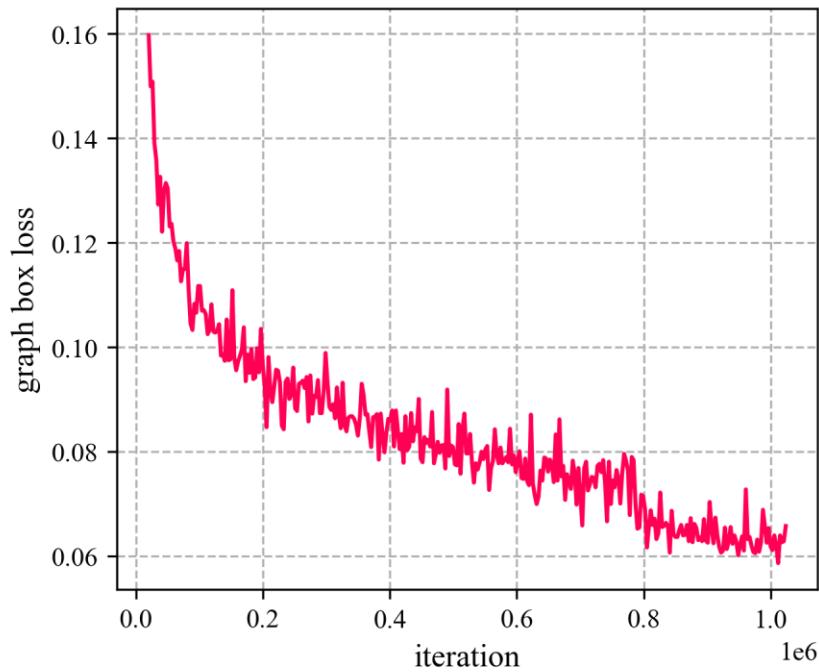
SGGTR-5 with addi_rel_loss on VG dataset



SGGTR-5 with addi_rel_loss on VG dataset



SGGTR-5 with exknowledge on VG dataset



SGGTR-5 with exknowledge on VG dataset

mAp	Recall@K			No-gc Recall@K			Mean Recall@K			No-gc Mean Recall@K		
	IoU=0.5	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50	R@100	R@20	R@50
21.27	16.65	21.89	25.66	18.98	25.47	30.12	4.03	5.59	6.82	5.53	9.12	12.96

