2020-06-02

Checklist

- ☑ Create test triples to evaluate learned relation embeddings (evaluate on relation type prediction).
- ☑ Visualization1: Use tensorboard to draw the training curves for loss L_e, L_r, and L_p on both train and dev. (note: train curves are drawn, dev curves of L_r still have some problem (need to figure out why.))
- ☑ Loss modification: Add entropy constraint for relation distribution α. We hope the α to be inclined to one label, so the entropy of α should be small.
- ☑ Try learning a weight for the loss components
- ☐ Visualization2: use TSNE to visualize α.
- ☐ May try different kinds of negative sampling strategy, eg., sample nodes with similar degeree or similar frequency.
- ☐ Hidden units for relation classifier needs to be tuned. Now the $h \in R^{100}$, $t \in R^{100}$, $W \in R^{100}$

1. Create test sets for relation type as well as alignment evaluation.

   The first figure is the flow of how I create the test set for alignment and relation type evaluations. They share the same entity sets.

   I sampled the test and valid sets from the overlap triples of CN-100K and SWOW. The total overlap triples is 9455 with 3748 entities and 33 relation types. The statistics of the original datasets, overlap triples and nodes, as well as the final data for training, evaluation and test are shown in Table1.

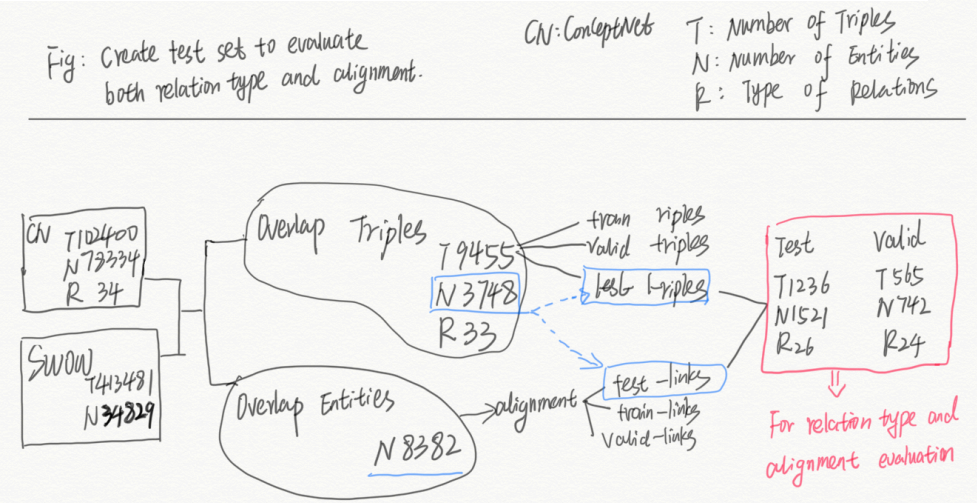

Table1: Dataset Statistics

		File name	Triples	Entities	Relation	Memos
▼ CN-100K						
	CN-100K	cn_100k_train_valid_test	102,400	78,334	34	102400-(100428+565+1236) = 161 (h,t) has multiple relations
▼ SWOW						
	SWOW	swow_freq2	413,481	34,829	1	
▼ Overlap						
	Overlap	overlap_triples	9,455	3,748	33	
	Overlap	overlap_entities		8,382		
▼ Train						
	Train	rel_triples1	100,438	78,185	34	CN, for TransE
	Train	rel_triples2	411,680	34,817	34	SWOW for TransE. (R34 = 33 CN and 1 SWOW)
	Train	ent_links_train		6,119		Entities for alignment
	Train	rel_links			33	Relations for alignment
▼ Test						
	Test	rel_triples_test	1,236	1,521	26	
	Test	ent_links_test		1,521		
▼ Valid						
	Valid	rel_triples_valid	565	742	24	
	Valid	ent_links_valid		742		

2. Table2 show the results of training with different losses combination.
Loss = Le + beta1* Lr + beta2*Lp

Le is the margin-based loss for triples using TransE
Lr is the cross entropy loss for relation_type in CN
Lp is the entropy for all relation type

Results in Table2 show:

1. When adding Lr, the performance on alignment decreased a lot. While Lp only decreased slightly. Possible reason could be the Lp updates all of the training triples, while the Lr only update triples in CN, and CN triples only take 1/5 of all triples.
2. The different combinations of beta1 and beta2 show Lp is more helpful the alignment learning. When beta1=0.1, beta2=1.0, the alignment performance excel the TransE model.
3. How different combinations of beta1 and beta2 influence the REL_ACC is still not very clear.

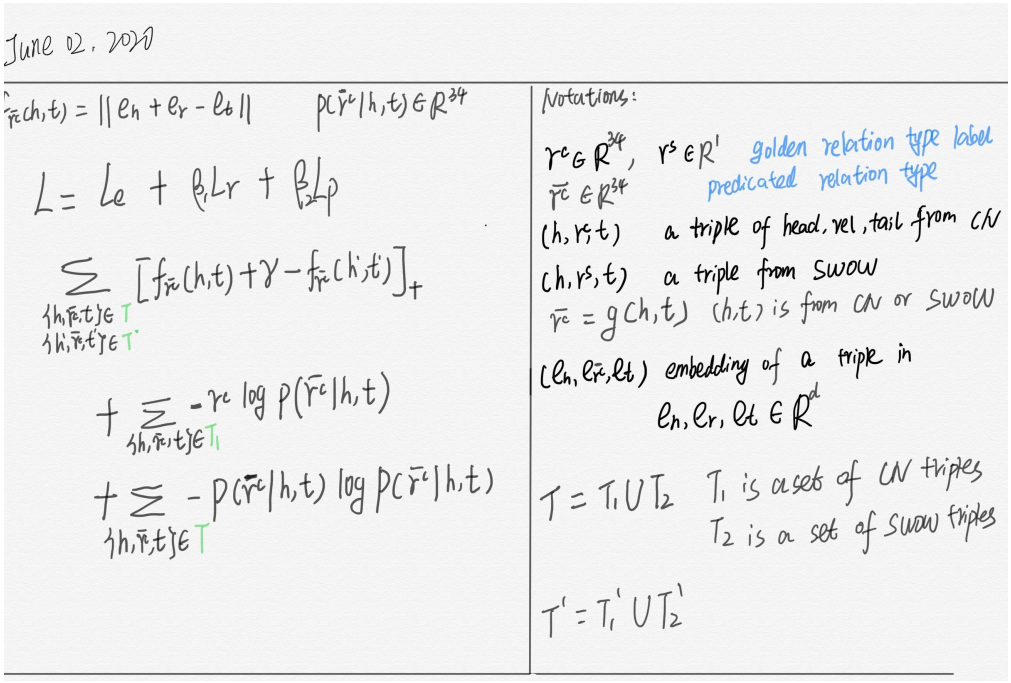

Fig2: Notation for three loss function.

Table2: Results Add relation distribution loss and relation entropy loss. Candidate rank for MR is 1521 when testing, 742 when validating.

	beta1	beta2	Hits@1	Hits@5	Hits@10	Hits@50	MR	MRR	REL_ACC	Epoch	Memos
▼ **TransE**											
	0.0	0.0	0.1760	0.3540	0.4350	0.6360	151.7615	0.2640	-		Avg
▼ **TransE + beta1*Lr**											
	1.0	0.0	0.0875	0.1745	0.2210	0.3935	259.2235	0.1369	0.3766	340-440	Avg
▼ **TransE + beta2*relation_entropy**											
	0.0	1.0	0.1650	0.3475	0.4245	0.6275	154.3560	0.2550	0.0037		Avg
▼ **TransE + beta1*Lr + beta2*Lp**											
	1.0	1.0	0.1240	0.2560	0.3370	0.5340	185.0040	0.1953	0.3794	640	Single
	0.1	1.0	0.1897	0.3730	0.4540	0.6640	137.5420	**0.2807**	0.0186	560-600	Avg
	0.2	1.0	0.1455	0.2920	0.3790	0.5915	161.1460	0.2226	0.3734		Avg
	0.3	1.0	0.1547	0.3130	0.3917	0.6037	157.1327	0.2340	**0.4048**		Avg
	0.4	1.0	0.1400	0.2720	0.3470	0.5430	186.0810	0.2080	0.3964		Single
	0.5	1.0	0.1590	0.3380	0.4160	0.6170	147.2150	0.2449	0.3827		Single
	0.6	1.0	0.1310	0.2580	0.3390	0.5240	196.0160	0.1972	0.3956		Single
	0.7	1.0	0.1140	0.2330	0.2910	0.4680	219.6150	0.1749	0.4029		Single
	0.8	1.0	0.1170	0.2500	0.3060	0.5020	200.6160	0.1846	0.3924		Single
	0.9	1.0	0.1300	0.2650	0.3300	0.5440	190.3850	0.2017	0.3811		Single
	0.4	0.8	0.1610	0.3280	0.4010	0.6010	157.6720	0.2433	0.3932		Single
	0.5	0.7	0.1530	0.3030	0.3810	0.5780	158.7250	0.2306	0.3892		Single