

```
1 "C:\School Material\  
    CSCI499_NaturalLanguageforInteractiveAI  
    \hw2\venv\Scripts\python.exe" "C:\  
School Material\  
CSCI499_NaturalLanguageforInteractiveAI  
    \hw2\train.py" --data_dir books --  
vocab_size 1200 --analogies_fn  
analogies_v3000_1309.json --outputs_dir  
outputs --batch_size 256 --num_epochs  
30 --val_every 2  
2 C:\School Material\  
CSCI499_NaturalLanguageforInteractiveAI  
    \hw2\venv\lib\site-packages\gensim\  
utils.py:1197: UserWarning: detected  
Windows; aliasing chunkize to  
chunkize_serial  
3 warnings.warn("detected Windows;  
aliasing chunkize to chunkize_serial")  
4 Using CPU  
5 read in 175181 lines from 30 files in  
directory books  
6 Sentences: 0% | 0/35036 [00  
:00<?, ?it/s]INFO: had to represent  
758899/3401903 (0.2231) tokens as unk  
with vocab limit 1200  
7 INFO: cut off 0 sentences at len 830  
before true ending  
8 INFO: encoded 175181 sentences without  
regard to order  
9 Sentences: 100% [██████████] | 35036/35036  
[00:14<00:00, 2353.66it/s]
```

```
10 finished context target transformation
11 (2545125, 4) (2545125, 1200) (282791, 4
    ) (282791, 1200)
12 CBOW_Model(
13     (embed): Embedding(1200, 10, max_norm
=1)
14     (linear): Linear(in_features=10,
        out_features=1200, bias=True)
15     (softmax): Softmax(dim=1)
16 )
17 Epoch 0
18 100%|██████████| 9942/9942 [01:17<00:00
, 127.86it/s]
19  0%|          | 0/1105 [00:00<?, ?it/s
]train loss : 1.2542028861418981 |
train acc: 0.8250911055449143
20 100%|██████████| 1105/1105 [00:05<00:00
, 187.99it/s]
21  0%|          | 0/1200 [00:00<?, ?it/s
]val loss : 1.2470960173671601 | val
acc: 0.8188591574696508
22 saving word vec to outputs\
    learned_word_vectors.txt
23 Saving word vectors to file...
24 Loading vectors from file 'outputs\
    learned_word_vectors.txt'...
25 100%|██████████| 1200/1200 [00:00<00:00
, 53276.79it/s]
26 ... done loading vectors
27 Evaluating downstream performance on
analogy task over 1309 analogies...
```

28 100% | [REDACTED] | 1309/1309 [00:00<00:00
, 10504.28it/s]

29 0% | 0/9942 [00:00<?, ?it/s]
...Total performance across all 1309 analogies: 0.0000 (Exact); 0.0006 (MRR); 1636 (MR)

30 ...Analogy performance across 969 "sem" relation types: 0.0000 (Exact); 0.0007 (MRR); 1511 (MR)

	relation	N	exact	MRR	MR
31	capitals	1	0.0000	0.0000	inf
32	binary_gender	12	0.0000	0.0017	
33		594			
34	antonym	54	0.0000	0.0005	2008
35	member	4	0.0000	0.0000	inf
36	hypernymy	542	0.0000	0.0009	
		1100			
37	similar	117	0.0000	0.0001	6914
38	partof	29	0.0000	0.0003	3372
39	instanceof	9	0.0000	0.0000	inf
40	derivedfrom	133	0.0000	0.0004	
		2365			
41	hascontext	32	0.0000	0.0000	
		31456			
42	relatedto	10	0.0000	0.0002	
		5270			
43	attributeof	11	0.0000	0.0002	
		5698			
44	causes	6	0.0000	0.0003	3432
45	entails	9	0.0000	0.0014	698
46	...Analogy performance across 340 "syn				

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46 " relation types: 0.0000 (Exact); 0.  
    0005 (MRR); 2139 (MR)  
47     relation      N   exact      MRR  MR  
48     adj_adv 22  0.0000  0.0016  616  
49     comparative 7  0.0000  0.0004  
    2736  
50     superlative 3  0.0000  0.0000  inf  
51     present_participle 62  0.0000  0.  
    0001  8226  
52     denomym 2  0.0000  0.0007  1510  
53     past_tense 64  0.0000  0.0006  
    1624  
54     plural_nouns107 0.0000  0.0003  
    3190  
55     plural_verbs73  0.0000  0.0005  
    1878  
56 saving model to outputs\model.ckpt  
57 Epoch 1  
58 100%|██████████| 9942/9942 [01:06<00:00  
    , 149.90it/s]  
59  0%|          | 0/9942 [00:00<?, ?it/s]  
    ]train loss : 1.0947068073492467 |  
    train acc: 0.833986149992633  
60 Epoch 2  
61 100%|██████████| 9942/9942 [01:11<00:00  
    , 138.65it/s]  
62 train loss : 1.0588620953506158 | train  
    acc: 0.8341087372918815  
63 100%|██████████| 1105/1105 [00:05<00:00  
    , 188.31it/s]  
64 val loss : 1.1587133183198817 | val acc
```

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64 : 0.819223384053948
65 saving word vec to outputs\
    learned_word_vectors.txt
66 Saving word vectors to file...
67 100%|██████████| 1200/1200 [00:00<00:00
, 57091.90it/s]
68 Loading vectors from file 'outputs\
    learned_word_vectors.txt'...
69  0%|           | 0/1309 [00:00<?, ?it/s
]... done loading vectors
70 Evaluating downstream performance on
    analogy task over 1309 analogies...
71 100%|██████████| 1309/1309 [00:00<00:00
, 10603.36it/s]
72  0%|           | 0/9942 [00:00<?, ?it/s
]...Total performance across all 1309
    analogies: 0.0000 (Exact); 0.0006 (MRR
); 1620 (MR)
73 ...Analogy performance across 969 "sem
    " relation types: 0.0000 (Exact); 0.
    0007 (MRR); 1503 (MR)
74     relation      N   exact      MRR  MR
75     capitals      1   0.0000   0.0000  inf
76     binary_gender 12   0.0000   0.0018
    553
77     antonym      54   0.0000   0.0005  1890
78     member        4   0.0000   0.0000  inf
79     hypernymy    542   0.0000   0.0009
    1096
80     similar       117  0.0000   0.0001  7109
81     partof        29   0.0000   0.0003  3407
```

82	instanceof	9	0.0000	0.0000
	inf			
83	derivedfrom	133	0.0000	0.0004
	2418			
84	hascontext	32	0.0000	0.0000
	31552			
85	relatedto	10	0.0000	0.0002
	5270			
86	attributeof	11	0.0000	0.0002
	5555			
87	causes	6	0.0000	0.0003
	3384			
88	entails	9	0.0000	0.0014
	697			
89	...Analogy performance across 340 "syn"			
	" relation types: 0.0000 (Exact); 0.			
	0005 (MRR); 2078 (MR)			
90	relation	N	exact	MRR MR
91	adj_adv	22	0.0000	0.0016
92	comparative	7	0.0000	0.0004
	2756			
93	superlative	3	0.0000	0.0000
	inf			
94	present_participle	62	0.0000	0.
	0001	8097		
95	denonym	2	0.0000	0.0007
96	past_tense	64	0.0000	0.0007
	1436			
97	plural_nouns	107	0.0000	0.0003
	3120			
98	plural_verbs	73	0.0000	0.0005
	1946			
99	Epoch	3		

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100 100%|██████████| 9942/9942 [01:09<00:  
00, 143.67it/s]  
101 0%|          | 0/9942 [00:00<?, ?it/  
s]train loss : 1.039860519232632 |  
train acc: 0.8341708167575267  
102 Epoch 4  
103 100%|██████████| 9942/9942 [01:13<00:  
00, 136.13it/s]  
104 0%|          | 0/1105 [00:00<?, ?it/  
s]train loss : 1.0276025564311808 |  
train acc: 0.8343405530180247  
105 100%|██████████| 1105/1105 [00:05<00:  
00, 185.43it/s]  
106 0%|          | 0/1200 [00:00<?, ?it/  
s]val loss : 1.1327976199296805 | val  
acc: 0.8193966568950214  
107 saving word vec to outputs\  
learned_word_vectors.txt  
108 Saving word vectors to file...  
109 Loading vectors from file 'outputs\  
learned_word_vectors.txt'...  
110 100%|██████████| 1200/1200 [00:00<00:  
00, 47956.37it/s]  
111 0%|          | 0/1309 [00:00<?, ?it/  
s]... done loading vectors  
112 Evaluating downstream performance on  
analogy task over 1309 analogies...  
113 100%|██████████| 1309/1309 [00:00<00:  
00, 10943.79it/s]  
114 0%|          | 0/9942 [00:00<?, ?it/  
s]...Total performance across all 1309
```

114 analogies: 0.0000 (Exact); 0.0006 (MRR); 1612 (MR)

115 ...Analogy performance across 969 "sem" relation types: 0.0000 (Exact); 0.0007 (MRR); 1497 (MR)

	relation	N	exact	MRR	MR
116	capitals	1	0.0000	0.0000	
	inf				
118	binary_gender	12	0.0000	0.0018	
	541				
119	antonym	54	0.0000	0.0005	1824
120	member	4	0.0000	0.0000	inf
121	hypernymy	542	0.0000	0.0009	
	1093				
122	similar	117	0.0000	0.0001	7215
123	partof	29	0.0000	0.0003	3410
124	instanceof	9	0.0000	0.0000	
	inf				
125	derivedfrom	133	0.0000	0.0004	
	2438				
126	hascontext	32	0.0000	0.0000	
	31392				
127	relatedto	10	0.0000	0.0002	
	5420				
128	attributeof	11	0.0000	0.0002	
	5423				
129	causes	6	0.0000	0.0003	3348
130	entails	9	0.0000	0.0015	675
131	...Analogy performance across 340 "syn" relation types: 0.0000 (Exact); 0.0005 (MRR); 2060 (MR)				

			N	exact	MRR	MR
132	relation	N	exact	MRR	MR	
133	adj_adv	22	0.0000	0.0016	616	
134	comparative	7	0.0000	0.0004		
		2808				
135	superlative	3	0.0000	0.0000		
	inf					
136	present_participle	62	0.0000	0.		
	0001	8002				
137	denonym	2	0.0000	0.0006	1560	
138	past_tense	64	0.0000	0.0007		
	1439					
139	plural_nouns	107	0.0000	0.0003		
	3080					
140	plural_verbs	73	0.0000	0.0005		
	1893					
141	Epoch	5				
142	100% [██████]	9942/9942	[01:11<00:			
	00, 138.16it/s]					
143	train loss :	1.018697134165715	train			
	acc:	0.8348124355385296				
144	saving model to	outputs\model.ckpt				
145	Epoch	6				
146	100% [██████]	9942/9942	[01:13<00:			
	00, 135.22it/s]					
147	0%	0/1105	[00:00<?, ?it/			
	s]	train loss :	1.011694619003807			
	train acc:	0.8352713520946908				
148	100% [██████]	1105/1105	[00:05<00:			
	00, 187.33it/s]					
149	val loss :	1.1190151737286493	val			
	acc:	0.8190642559345948				

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150 saving word vec to outputs\  
    learned_word_vectors.txt  
151 Saving word vectors to file...  
152 100%|██████████| 1200/1200 [00:00<00:  
    00, 55761.72it/s]  
153 Loading vectors from file 'outputs\  
    learned_word_vectors.txt'...  
154  0%|          | 0/1309 [00:00<?, ?it/  
    s]... done loading vectors  
155 Evaluating downstream performance on  
    analogy task over 1309 analogies...  
156 100%|██████████| 1309/1309 [00:00<00:  
    00, 10893.35it/s]  
157  0%|          | 0/9942 [00:00<?, ?it/  
    s]...Total performance across all 1309  
    analogies: 0.0000 (Exact); 0.0008 (MRR); 1322 (MR)  
158 ...Analogy performance across 969 "sem"  
    " relation types: 0.0000 (Exact); 0.  
    0008 (MRR); 1177 (MR)  
159      relation      N   exact      MRR  MR  
160      capitals      1   0.0000  0.0000  
      inf  
161      binary_gender 12   0.0000  0.0020  
      507  
162      antonym 54   0.0000  0.0006  1686  
163      member   4   0.0000  0.0000  inf  
164      hypernymy 542  0.0000  0.0012  
      811  
165      similar 117  0.0000  0.0001  7377  
166      partof  29   0.0000  0.0003  3408
```

167	instanceof	9	0.0000	0.0000	
	inf				
168	derivedfrom	133	0.0000	0.0004	
	2430				
169	hascontext	32	0.0000	0.0000	
	31232				
170	relatedto	10	0.0000	0.0002	
	5590				
171	attributeof	11	0.0000	0.0002	
	5302				
172	causes	6	0.0000	0.0003	3288
173	entails	9	0.0000	0.0015	667
174	...Analogy performance across 340 "syn"				
	" relation types: 0.0000 (Exact); 0.				
	0005 (MRR); 2035 (MR)				
175	relation	N	exact	MRR	MR
176	adj_adv	22	0.0000	0.0016	616
177	comparative	7	0.0000	0.0003	
	2893				
178	superlative	3	0.0000	0.0000	
	inf				
179	present_participle	62	0.0000	0.	
	0001	7889			
180	denonym	2	0.0000	0.0006	1578
181	past_tense	64	0.0000	0.0007	
	1346				
182	plural_nouns	107	0.0000	0.0003	
	3041				
183	plural_verbs	73	0.0000	0.0005	
	1968				
184	Epoch	7			

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185 100%|██████████| 9942/9942 [01:09<00:  
00, 144.04it/s]  
186 0%|          | 0/9942 [00:00<?, ?it/  
s]train loss : 1.005869021986577 |  
train acc: 0.8356402927164678  
187 Epoch 8  
188 100%|██████████| 9942/9942 [01:12<00:  
00, 136.32it/s]  
189 0%|          | 0/1105 [00:00<?, ?it/  
s]train loss : 1.0008364163505505 |  
train acc: 0.8360139482343696  
190 100%|██████████| 1105/1105 [00:05<00:  
00, 185.86it/s]  
191 val loss : 1.1099061514996835 | val  
acc: 0.8192410649560983  
192 saving word vec to outputs\  
learned_word_vectors.txt  
193 Saving word vectors to file...  
194 100%|██████████| 1200/1200 [00:00<00:  
00, 52126.90it/s]  
195 Loading vectors from file 'outputs\  
learned_word_vectors.txt'...  
196 ... done loading vectors  
197 Evaluating downstream performance on  
analogy task over 1309 analogies...  
198 100%|██████████| 1309/1309 [00:00<00:  
00, 10763.50it/s]  
199 ...Total performance across all 1309  
analogies: 0.0000 (Exact); 0.0008 (MRR)  
); 1318 (MR)  
200 ...Analogy performance across 969 "sem
```

```

200 " relation types: 0.0000 (Exact); 0.
    0009 (MRR); 1170 (MR)
201     relation      N   exact      MRR  MR
202     capitals      1   0.0000   0.0000
    inf
203     binary_gender 12   0.0000   0.0019
    514
204     antonym      54   0.0000   0.0007   1461
205     member        4   0.0000   0.0000   inf
206     hypernymy    542  0.0000   0.0012
    808
207     similar       117  0.0000   0.0001   7446
208     partof        29   0.0000   0.0003   3446
209     instanceof   9   0.0000   0.0000
    inf
210     derivedfrom  133  0.0000   0.0004
    2540
211     hascontext    32   0.0000   0.0000
    31264
212     relatedto    10   0.0000   0.0002
    5920
213     attributeof  11   0.0000   0.0002
    5269
214     causes        6   0.0000   0.0003   3282
215     entails       9   0.0000   0.0015   660
216 ...Analogy performance across 340 "syn"
    " relation types: 0.0000 (Exact); 0.
    0005 (MRR); 2056 (MR)
217     relation      N   exact      MRR  MR
218     adj_adv      22   0.0000   0.0017   594
219     comparative   7   0.0000   0.0003

```

```
219 2934
220      superlative 3    0.0000  0.0000
        inf
221      present_participle 62    0.0000  0.
0001    7662
222      denomym 2     0.0000  0.0006  1596
223      past_tense 64    0.0000  0.0007
        1351
224      plural_nouns107 0.0000  0.0003
        3208
225      plural_verbs73  0.0000  0.0005
        2035
226 Epoch 9
227 100%|██████████| 9942/9942 [01:08<00:
00, 144.63it/s]
228 train loss : 0.9963677121441361 |
train acc: 0.8363137370463141
229 Epoch 10
230 100%|██████████| 9942/9942 [01:10<00:
00, 141.36it/s]
231  0%|          | 0/1105 [00:00<?, ?it/
s]train loss : 0.9923502734323258 |
train acc: 0.8365801286773734
232 100%|██████████| 1105/1105 [00:06<00:
00, 183.89it/s]
233 val loss : 1.1022573582187498 | val
acc: 0.819371903632011
234 saving word vec to outputs\
learned_word_vectors.txt
235 Saving word vectors to file...
236 100%|██████████| 1200/1200 [00:00<00:
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236 00, 58479.61it/s]
237 Loading vectors from file 'outputs\
    learned_word_vectors.txt'...
238 ... done loading vectors
239 Evaluating downstream performance on
    analogy task over 1309 analogies...
240 100%|██████████| 1309/1309 [00:00<00:
    00, 11834.70it/s]
241 ...Total performance across all 1309
    analogies: 0.0000 (Exact); 0.0008 (MRR
    ); 1306 (MR)
242 ...Analogy performance across 969 "sem"
    " relation types: 0.0000 (Exact); 0.
    0009 (MRR); 1162 (MR)
243     relation      N   exact      MRR  MR
244     capitals       1   0.0000   0.0000
    inf
245     binary_gender   12   0.0000   0.0020
    507
246     antonym      54   0.0000   0.0008   1200
247     member        4   0.0000   0.0000   inf
248     hypernymy    542   0.0000   0.0012
    804
249     similar       17   0.0000   0.0001   7442
250     partof        29   0.0000   0.0003   3463
251     instanceof     9   0.0000   0.0000
    inf
252     derivedfrom   133   0.0000   0.0004
    2817
253     hascontext     32   0.0000   0.0000
    31264
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```
254      relatedto    10  0.0000  0.0002
6170
255      attributeof  11  0.0000  0.0002
5203
256      causes      6   0.0000  0.0003  3300
257      entails     9   0.0000  0.0015  654
258 ...Analogy performance across 340 "syn"
" relation types: 0.0000 (Exact); 0.
0005 (MRR); 2020 (MR)
259      relation     N   exact      MRR  MR
260      adj_adv     22  0.0000  0.0016  616
261      comparative   7  0.0000  0.0003
2990
262      superlative  3  0.0000  0.0000
inf
263      present_participle  62  0.0000  0.
0001  7478
264      denonym     2   0.0000  0.0006  1624
265      past_tense   64  0.0000  0.0008
1254
266      plural_nouns 107 0.0000  0.0003
3172
267      plural_verbs 73  0.0000  0.0005
2028
268 saving model to outputs\model.ckpt
269  0%|                                | 0/9942 [00:00<?, ?it/
s]Epoch 11
270 100%|██████████| 9942/9942 [01:10<00:
00, 141.48it/s]
271 train loss : 0.9887029375559462 |
train acc: 0.8368182309316832
```

```
272 Epoch 12
273 100%|██████████| 9942/9942 [01:09<00:
00, 143.48it/s]
274 train loss : 0.9853772604082989 |
train acc: 0.8370398310495555
275 100%|██████████| 1105/1105 [00:05<00:
00, 189.63it/s]
276 val loss : 1.0966991651651545 | val
acc: 0.8195628573752347
277 saving word vec to outputs\
learned_word_vectors.txt
278 Saving word vectors to file...
279 100%|██████████| 1200/1200 [00:00<00:
00, 55751.84it/s]
280 Loading vectors from file 'outputs\
learned_word_vectors.txt'...
281 0%|          | 0/1309 [00:00<?, ?it/
s]... done loading vectors
282 Evaluating downstream performance on
analogy task over 1309 analogies...
283 100%|██████████| 1309/1309 [00:00<00:
00, 11728.87it/s]
284 0%|          | 0/9942 [00:00<?, ?it/
s]...Total performance across all 1309
analogies: 0.0000 (Exact); 0.0008 (
MRR); 1305 (MR)
285 ...Analogy performance across 969 "sem
" relation types: 0.0000 (Exact); 0.
0009 (MRR); 1149 (MR)
286 relation N exact MRR MR
287 capitals 1 0.0000 0.0000
```

287	inf				
288	binary_gender	12	0.0000	0.0021	
481					
289	antonym	54	0.0000	0.0010	1012
290	member	4	0.0000	0.0000	inf
291	hypernymy	542	0.0000	0.0012	
801					
292	similar	117	0.0000	0.0001	7486
293	partof	29	0.0000	0.0003	3456
294	instanceof	9	0.0000	0.0000	
inf					
295	derivedfrom	133	0.0000	0.0003	
3061					
296	hascontext	32	0.0000	0.0000	
31264					
297	relatedto	10	0.0000	0.0002	
6390					
298	attributeof	11	0.0000	0.0002	
5082					
299	causes	6	0.0000	0.0003	3288
300	entails	9	0.0000	0.0016	639
301	...Analogy performance across 340 "syn				
" relation types: 0.0000 (Exact); 0.					
0.0005 (MRR); 2132 (MR)					
302	relation	N	exact	MRR	MR
303	adj_adv	22	0.0000	0.0015	660
304	comparative	7	0.0000	0.0003	
3044					
305	superlative	3	0.0000	0.0000	
inf					
306	present_participle	62	0.0000	0.	

```
306 0001    7455
307      denonym 2    0.0000  0.0006  1636
308      past_tense 64  0.0000  0.0007
1408
309      plural_nouns107 0.0000  0.0003
3141
310      plural_verbs73  0.0000  0.0005
2100
311 Epoch 13
312 100%|██████████| 9942/9942 [01:07<00:
00, 147.58it/s]
313  0%|          | 0/9942 [00:00<?, ?it/
s]train loss : 0.9823276245349419 |
train acc: 0.83722528363047
314 Epoch 14
315 100%|██████████| 9942/9942 [01:06<00:
00, 148.50it/s]
316  0%|          | 0/1105 [00:00<?, ?it/
s]train loss : 0.9795166614537171 |
train acc: 0.8374405972201758
317 100%|██████████| 1105/1105 [00:05<00:
00, 186.86it/s]
318 val loss : 1.0917383773833917 | val
acc: 0.8196441895251263
319 saving word vec to outputs\
learned_word_vectors.txt
320 Saving word vectors to file...
321 100%|██████████| 1200/1200 [00:00<00:
00, 45234.21it/s]
322 Loading vectors from file 'outputs\
learned_word_vectors.txt'...
```

323 0% | 0/1309 [00:00<?, ?it/
s]... done loading vectors
324 Evaluating downstream performance on
analogy task over 1309 analogies...
325 100% | [██████] 1309/1309 [00:00<00:
00, 11035.89it/s]
326 0% | 0/9942 [00:00<?, ?it/
s]...Total performance across all 1309
analogies: 0.0000 (Exact); 0.0008 (MRR); 1300 (MR)
327 ...Analogy performance across 969 "sem"
" relation types: 0.0000 (Exact); 0.
0009 (MRR); 1138 (MR)
328 relation N exact MRR MR
329 capitals 1 0.0000 0.0000
inf
330 binary_gender 12 0.0000 0.0023
426
331 antonym 54 0.0000 0.0011 935
332 member 4 0.0000 0.0000 inf
333 hypernymy 542 0.0000 0.0013
797
334 similar 117 0.0000 0.0001 7466
335 partof 29 0.0000 0.0003 3445
336 instanceof 9 0.0000 0.0000
inf
337 derivedfrom 133 0.0000 0.0003
3325
338 hascontext 32 0.0000 0.0000
31072
339 relatedto 10 0.0000 0.0001

```
339 6750
340      attributeof 11  0.0000  0.0002
      5060
341      causes   6   0.0000  0.0003  3306
342      entails  9   0.0000  0.0016  632
343 ...Analogy performance across 340 "syn"
      " relation types: 0.0000 (Exact); 0.
      0005 (MRR); 2186 (MR)
344      relation    N   exact     MRR  MR
345      adj_adv   22  0.0000  0.0016  638
346      comparative 7   0.0000  0.0003
      3107
347      superlative 3   0.0000  0.0000
      inf
348      present_participle 62  0.0000  0.
      0001    7542
349      denonym   2   0.0000  0.0006  1650
350      past_tense 64  0.0000  0.0007
      1508
351      plural_nouns107 0.0000  0.0003
      3147
352      plural_verbs73 0.0000  0.0005
      2218
353 Epoch 15
354 100%|██████████| 9942/9942 [01:09<00:
      00, 142.83it/s]
355  0%|                   | 0/9942 [00:00<?, ?it/
      s]train loss : 0.9769085904070367 |
      train acc: 0.8376264427091007
356 saving model to outputs\model.ckpt
357 Epoch 16
```

```
358 100%|██████████| 9942/9942 [01:14<00:  
00, 134.35it/s]  
359 0%|          | 0/1105 [00:00<?, ?it/  
s]train loss : 0.9744863020620746 |  
train acc: 0.8378386130347233  
360 100%|██████████| 1105/1105 [00:05<00:  
00, 184.85it/s]  
361 0%|          | 0/1200 [00:00<?, ?it/  
s]val loss : 1.0875246743810663 | val  
acc: 0.8200048799289935  
362 saving word vec to outputs\  
learned_word_vectors.txt  
363 Saving word vectors to file...  
364 100%|██████████| 1200/1200 [00:00<00:  
00, 45239.08it/s]  
365 Loading vectors from file 'outputs\  
learned_word_vectors.txt'...  
366 0%|          | 0/1309 [00:00<?, ?it/  
s]... done loading vectors  
367 Evaluating downstream performance on  
analogy task over 1309 analogies...  
368 100%|██████████| 1309/1309 [00:00<00:  
00, 10420.42it/s]  
369 ...Total performance across all 1309  
analogies: 0.0000 (Exact); 0.0008 (MRR)  
); 1299 (MR)  
370 ...Analogy performance across 969 "sem"  
" relation types: 0.0000 (Exact); 0.  
0009 (MRR); 1130 (MR)  
371 relation N exact MRR MR  
372 capitals 1 0.0000 0.0000
```

372	inf				
373	binary_gender	12	0.0000	0.0027	
	368				
374	antonym	54	0.0000	0.0011	898
375	member	4	0.0000	0.0000	inf
376	hypernymy	542	0.0000	0.0013	
	794				
377	similar	117	0.0000	0.0001	7330
378	partof	29	0.0000	0.0003	3431
379	instanceof	9	0.0000	0.0000	
	inf				
380	derivedfrom	133	0.0000	0.0003	
	3599				
381	hascontext	32	0.0000	0.0000	
	31072				
382	relatedto	10	0.0000	0.0001	
	6960				
383	attributeof	11	0.0000	0.0002	
	4950				
384	causes	6	0.0000	0.0003	3324
385	entails	9	0.0000	0.0016	625
386	...Analogy performance across 340 "syn				
	" relation types: 0.0000 (Exact); 0.				
	0.0004 (MRR); 2265 (MR)				
387	relation	N	exact	MRR	MR
388	adj_adv	22	0.0000	0.0015	660
389	comparative	7	0.0000	0.0003	
	3166				
390	superlative	3	0.0000	0.0000	
	inf				
391	present_participle	62	0.0000	0.	

```
391 0001    7471
392      denonym 2    0.0000  0.0006  1662
393      past_tense 64  0.0000  0.0007
1508
394      plural_nouns107 0.0000  0.0003
3333
395      plural_verbs73  0.0000  0.0004
2393
396 Epoch 17
397 100%|██████████| 9942/9942 [01:07<00:
00, 146.44it/s]
398  0%|          | 0/9942 [00:00<?, ?it/
s]train loss : 0.9722096739197085 |
train acc: 0.838120720986199
399 Epoch 18
400 100%|██████████| 9942/9942 [01:12<00:
00, 137.64it/s]
401 train loss : 0.9700699897988465 |
train acc: 0.8383977211335396
402 100%|██████████| 1105/1105 [00:05<00:
00, 189.27it/s]
403 val loss : 1.0839941570661726 | val
acc: 0.8201463271461963
404 saving word vec to outputs\
learned_word_vectors.txt
405 Saving word vectors to file...
406 100%|██████████| 1200/1200 [00:00<00:
00, 59944.32it/s]
407 Loading vectors from file 'outputs\
learned_word_vectors.txt'...
408  0%|          | 0/1309 [00:00<?, ?it/
```

```
408 s]... done loading vectors
409 Evaluating downstream performance on
    analogy task over 1309 analogies...
410 100%|██████████| 1309/1309 [00:00<00:
    00, 12427.41it/s]
411 0%|          | 0/9942 [00:00<?, ?it/
    s]...Total performance across all 1309
    analogies: 0.0000 (Exact); 0.0008 (
    MRR); 1287 (MR)
412 ...Analogy performance across 969 "sem"
    " relation types: 0.0000 (Exact); 0.
    0009 (MRR); 1112 (MR)
413      relation      N   exact      MRR  MR
414      capitals      1   0.0000  0.0000
        inf
415      binary_gender 12   0.0000  0.0034
        297
416      antonym 54   0.0000  0.0011  894
417      member   4   0.0000  0.0000  inf
418      hypernymy 542  0.0000  0.0013
        785
419      similar 117  0.0000  0.0001  7304
420      partof  29   0.0000  0.0003  3386
421      instanceof 9   0.0000  0.0000
        inf
422      derivedfrom 133 0.0000  0.0003
        3825
423      hascontext 32   0.0000  0.0000
        30848
424      relatedto 10   0.0000  0.0001
        7240
```

```
425      attributeof 11  0.0000  0.0002
426      causes   6   0.0000  0.0003  3318
427      entails  9   0.0000  0.0016  610
428 ...Analogy performance across 340 "syn"
" relation types: 0.0000 (Exact); 0.
0004 (MRR); 2334 (MR)
429      relation    N   exact     MRR  MR
430      adj_adv   22  0.0000  0.0014  704
431      comparative 7   0.0000  0.0003
3220
432      superlative 3   0.0000  0.0000
inf
433      present_participle 62  0.0000  0.
0001    7443
434      denonym   2   0.0000  0.0006  1684
435      past_tense 64  0.0000  0.0006
1556
436      plural_nouns107 0.0000  0.0003
3254
437      plural_verbs73  0.0000  0.0004
2541
438 Epoch 19
439 100%|██████████| 9942/9942 [01:12<00:
00, 137.96it/s]
440 train loss : 0.9680508788419523 |
train acc: 0.8387018319335986
441 Epoch 20
442 100%|██████████| 9942/9942 [01:15<00:
00, 132.47it/s]
443 train loss : 0.9661391580627613 |
```

```
443 train acc: 0.8389269682235646
444 100%|██████████| 1105/1105 [00:05<00:
00, 186.21it/s]
445 0%|          | 0/1200 [00:00<?, ?it/
s]val loss : 1.080733017252581 | val
acc: 0.8203372808894202
446 saving word vec to outputs\
learned_word_vectors.txt
447 Saving word vectors to file...
448 100%|██████████| 1200/1200 [00:00<00:
00, 47953.63it/s]
449 0%|          | 0/1309 [00:00<?, ?it/
s]Loading vectors from file 'outputs\
learned_word_vectors.txt'...
450 ... done loading vectors
451 Evaluating downstream performance on
analogy task over 1309 analogies...
452 100%|██████████| 1309/1309 [00:00<00:
00, 11668.70it/s]
453 0%|          | 0/9942 [00:00<?, ?it/
s]...Total performance across all 1309
analogies: 0.0000 (Exact); 0.0008 (
MRR); 1278 (MR)
454 ...Analogy performance across 969 "sem"
relation types: 0.0000 (Exact); 0.
0009 (MRR); 1097 (MR)
455      relation    N   exact     MRR  MR
456      capitals     1   0.0000   0.0000
inf
457      binary_gender 12   0.0000   0.0042
238
```

458	antonym	54	0.0000	0.0011	920
459	member	4	0.0000	0.0000	inf
460	hypernymy		542	0.0000	0.0013
		778			
461	similar	117	0.0000	0.0001	7272
462	partof	29	0.0000	0.0003	3322
463	instanceof	9	0.0000	0.0000	inf
464	derivedfrom	133	0.0000	0.0002	4205
465	hascontext	32	0.0000	0.0000	30848
466	relatedto	10	0.0000	0.0001	7590
467	attributeof	11	0.0000	0.0002	4719
468	causes	6	0.0000	0.0003	3258
469	entails	9	0.0000	0.0017	604
470	...Analogy performance across 340 "syn				
	" relation types: 0.0000 (Exact); 0.				
	0.0004 (MRR); 2415 (MR)				
471	relation	N	exact	MRR	MR
472	adj_adv	22	0.0000	0.0013	748
473	comparative	7	0.0000	0.0003	3263
474	superlative	3	0.0000	0.0000	inf
475	present_participle	62	0.0000	0.	0.0001
		7482			
476	denonym	2	0.0000	0.0006	1696
477	past_tense	64	0.0000	0.0006	

```
477 1642
478     plural_nouns107 0.0000 0.0003
        3336
479     plural_verbs73 0.0000 0.0004
        2544
480 saving model to outputs\model.ckpt
481 Epoch 21
482 100%|██████████| 9942/9942 [01:27<00:
    00, 114.06it/s]
483 train loss : 0.9643187998610228 |
    train acc: 0.8391371740091351
484 Epoch 22
485 100%|██████████| 9942/9942 [01:19<00:
    00, 124.33it/s]
486 train loss : 0.962582593159857 | train
    acc: 0.8393548450469034
487 100%|██████████| 1105/1105 [00:12<00:
    00, 91.26it/s]
488 val loss : 1.0777599462556624 | val
    acc: 0.8205883496999551
489 saving word vec to outputs\
    learned_word_vectors.txt
490 Saving word vectors to file...
491 100%|██████████| 1200/1200 [00:00<00:
    00, 42061.86it/s]
492 Loading vectors from file 'outputs\
    learned_word_vectors.txt'...
493 ... done loading vectors
494 Evaluating downstream performance on
    analogy task over 1309 analogies...
495 100%|██████████| 1309/1309 [00:00<00:
```

```

495 00, 11624.70it/s]
496 0% | 0/9942 [00:00<?, ?it/
    s]...Total performance across all 1309
    analogies: 0.0000 (Exact); 0.0008 (
    MRR); 1257 (MR)
497 ...Analogy performance across 969 "sem"
    " relation types: 0.0000 (Exact); 0.
    0009 (MRR); 1075 (MR)
498   relation      N   exact      MRR  MR
499   capitals      1   0.0000  0.0000
    inf
500   binary_gender 12   0.0000  0.0057
    174
501   antonym      54   0.0000  0.0010  987
502   member        4   0.0000  0.0000  inf
503   hypernymy     542  0.0000  0.0013
    774
504   similar       117  0.0000  0.0001  7140
505   partof        29   0.0000  0.0003  3217
506   instanceof    9   0.0000  0.0000
    inf
507   derivedfrom   133  0.0000  0.0002
    4304
508   hascontext    32   0.0000  0.0000
    30688
509   relatedto     10   0.0000  0.0001
    7760
510   attributeof   11   0.0000  0.0002
    4631
511   causes        6   0.0000  0.0003  3222
512   entails       9   0.0000  0.0016  625

```

```
513 ...Analogy performance across 340 "syn"
      " relation types: 0.0000 (Exact); 0.
      0004 (MRR); 2426 (MR)
514     relation      N   exact      MRR  MR
515     adj_adv    22  0.0000  0.0014  726
516     comparative  7  0.0000  0.0003
      3297
517     superlative 3  0.0000  0.0000
      inf
518     present_participle 62  0.0000  0.
      0001    7414
519     denonym   2  0.0000  0.0006  1706
520     past_tense 64  0.0000  0.0006
      1688
521     plural_nouns107 0.0000  0.0003
      3251
522     plural_verbs73  0.0000  0.0004
      2666
523 Epoch 23
524 100%|██████████| 9942/9942 [01:22<00:
      00, 120.32it/s]
525 train loss : 0.9609213153545201 |
      train acc: 0.8395650508324739
526 Epoch 24
527 100%|██████████| 9942/9942 [01:13<00:
      00, 135.22it/s]
528 train loss : 0.9593297808409169 |
      train acc: 0.8397092480722951
529 100%|██████████| 1105/1105 [00:14<00:
      00, 77.03it/s]
530 val loss : 1.0750064112482027 | val
```

```
530 acc: 0.8207722310823188
531 saving word vec to outputs\
    learned_word_vectors.txt
532 Saving word vectors to file...
533 100%|██████████| 1200/1200 [00:00<00:
    00, 42818.32it/s]
534 Loading vectors from file 'outputs\
    learned_word_vectors.txt'...
535 ... done loading vectors
536 Evaluating downstream performance on
    analogy task over 1309 analogies...
537 100%|██████████| 1309/1309 [00:00<00:
    00, 12514.63it/s]
538 0%|          | 0/9942 [00:00<?, ?it/
    s]...Total performance across all 1309
    analogies: 0.0000 (Exact); 0.0008 (
    MRR); 1244 (MR)
539 ...Analogy performance across 969 "sem"
    " relation types: 0.0000 (Exact); 0.
    0009 (MRR); 1061 (MR)
540      relation      N   exact      MRR  MR
541      capitals      1   0.0000  0.0000
    inf
542      binary_gender 12   0.0000  0.0067
    149
543      antonym 54   0.0000  0.0010  1041
544      member   4   0.0000  0.0000  inf
545      hypernymy 542  0.0000  0.0013
    768
546      similar 117  0.0000  0.0001  6988
547      partof  29  0.0000  0.0003  3180
```

548	instanceof	9	0.0000	0.0000
	inf			
549	derivedfrom	133	0.0000	0.0002
	4806			
550	hascontext	32	0.0000	0.0000
	30528			
551	relatedto	10	0.0000	0.0001
	8020			
552	attributeof	11	0.0000	0.0002
	4532			
553	causes	6	0.0000	0.0003
				3168
554	entails	9	0.0000	0.0016
				631
555	...Analogy performance across 340 "syn"			
	" relation types: 0.0000 (Exact); 0.			
	0004 (MRR); 2451 (MR)			
556	relation	N	exact	MRR
557		adj_adv	22	0.0000
				0.0013
558		comparative	7	0.0000
				0.0003
		3316		
559		superlative	3	0.0000
		inf		
560		present_participle	62	0.0000
		0.0001		0.
		7349		
561		denonym	2	0.0000
562		past_tense	64	0.0000
				0.0006
		1685		
563		plural_nouns	107	0.0000
		3288		0.0003
564		plural_verbs	73	0.0000
		2695		0.0004
565	Epoch	25		

```
566 100%|██████████| 9942/9942 [01:18<00:  
00, 127.25it/s]  
567 train loss : 0.9578014875868393 |  
train acc: 0.8399198467658759  
568 saving model to outputs\model.ckpt  
569 Epoch 26  
570 100%|██████████| 9942/9942 [01:09<00:  
00, 142.62it/s]  
571 train loss : 0.9563317856326282 |  
train acc: 0.8400958695545405  
572 100%|██████████| 1105/1105 [00:11<00:  
00, 95.87it/s]  
573 0%|          | 0/1200 [00:00<?, ?it/  
s]val loss : 1.0725643365631277 | val  
acc: 0.8212142536360775  
574 saving word vec to outputs\  
learned_word_vectors.txt  
575 Saving word vectors to file...  
576 Loading vectors from file 'outputs\  
learned_word_vectors.txt'...  
577 100%|██████████| 1200/1200 [00:00<00:  
00, 37465.87it/s]  
578 ... done loading vectors  
579 Evaluating downstream performance on  
analogy task over 1309 analogies...  
580 100%|██████████| 1309/1309 [00:00<00:  
00, 12219.72it/s]  
581 0%|          | 0/9942 [00:00<?, ?it/  
s]...Total performance across all 1309  
analogies: 0.0000 (Exact); 0.0008 (MRR); 1223 (MR)
```

582	...Analogy performance across 969 "sem " relation types: 0.0000 (Exact); 0. 0010 (MRR); 1037 (MR)
583	relation N exact MRR MR
584	capitals 1 0.0000 0.0000
	inf
585	binary_gender 12 0.0000 0.0081
	123
586	antonym 54 0.0000 0.0009 1068
587	member 4 0.0000 0.0000 inf
588	hypernymy 542 0.0000 0.0013
	761
589	similar 117 0.0000 0.0001 6756
590	partof 29 0.0000 0.0003 3113
591	instanceof 9 0.0000 0.0000
	inf
592	derivedfrom 133 0.0000 0.0002
	4786
593	hascontext 32 0.0000 0.0000
	30336
594	relatedto 10 0.0000 0.0001
	8270
595	attributeof 11 0.0000 0.0002
	4433
596	causes 6 0.0000 0.0003 3120
597	entails 9 0.0000 0.0015 672
598	...Analogy performance across 340 "syn " relation types: 0.0000 (Exact); 0. 0004 (MRR); 2499 (MR)
599	relation N exact MRR MR
600	adj_adv 22 0.0000 0.0012 814

```
601      comparative 7    0.0000  0.0003
        3332
602      superlative 3    0.0000  0.0000
        inf
603      present_participle 62  0.0000  0.
        0001    7317
604      denomym 2    0.0000  0.0006  1700
605      past_tense 64   0.0000  0.0006
        1681
606      plural_nouns107 0.0000  0.0003
        3314
607      plural_verbs73  0.0000  0.0004
        2712
608 Epoch 27
609 100%|██████████| 9942/9942 [01:16<00:
        00, 129.96it/s]
610  0%|          | 0/9942 [00:00<?, ?it/
        s]train loss : 0.9549057352857028 |
        train acc: 0.8402337802661952
611 Epoch 28
612 100%|██████████| 9942/9942 [01:05<00:
        00, 152.10it/s]
613  0%|          | 0/1105 [00:00<?, ?it/
        s]train loss : 0.9535382153869898 |
        train acc: 0.8403583321054958
614 100%|██████████| 1105/1105 [00:11<00:
        00, 98.47it/s]
615  0%|          | 0/1200 [00:00<?, ?it/
        s]val loss : 1.069934148216679 | val
        acc: 0.8213981350184412
616 saving word vec to outputs\
```

```
616 learned_word_vectors.txt
617 Saving word vectors to file...
618 100%|██████████| 1200/1200 [00:00<00:
  00, 41339.82it/s]
619  0%|          | 0/1309 [00:00<?, ?it/
  s]Loading vectors from file 'outputs\learned_word_vectors.txt'...
620 ... done loading vectors
621 Evaluating downstream performance on
  analogy task over 1309 analogies...
622 100%|██████████| 1309/1309 [00:00<00:
  00, 11728.45it/s]
623  0%|          | 0/9942 [00:00<?, ?it/
  s]...Total performance across all 1309
  analogies: 0.0000 (Exact); 0.0009 (
  MRR); 1160 (MR)
624 ...Analogy performance across 969 "sem"
  " relation types: 0.0000 (Exact); 0.
  0010 (MRR); 976 (MR)
625     relation      N   exact      MRR  MR
626     capitals      1   0.0000   0.0000
  inf
627     binary_gender 12   0.0000   0.0126
  79
628     antonym      54   0.0000   0.0009   1075
629     member        4   0.0000   0.0000   inf
630     hypernymy    542  0.0000   0.0013
  757
631     similar       117  0.0000   0.0002   6193
632     partof        29  0.0000   0.0003   3017
633     instanceof    9  0.0000   0.0000
```

633 inf
634 derivedfrom 133 0.0000 0.0002
4965
635 hascontext 32 0.0000 0.0000
30048
636 relatedto 10 0.0000 0.0001
8510
637 attributeof 11 0.0000 0.0002
4268
638 causes 6 0.0000 0.0003 3060
639 entails 9 0.0000 0.0014 710
640 ...Analogy performance across 340 "syn"
" relation types: 0.0000 (Exact); 0.
0004 (MRR); 2507 (MR)
641 relation N exact MRR MR
642 adj_adv 22 0.0000 0.0012 814
643 comparative 7 0.0000 0.0003
3358
644 superlative 3 0.0000 0.0000
inf
645 present_participle 62 0.0000 0.
0002 6415
646 denomym 2 0.0000 0.0006 1694
647 past_tense 64 0.0000 0.0006
1676
648 plural_nouns 107 0.0000 0.0003
3463
649 plural_verbs 73 0.0000 0.0004
2748
650 Epoch 29
651 100% | [REDACTED] | 9942/9942 [01:16<00:

```
651 00, 129.79it/s]
652 train loss : 0.9522195933174976 |
    train acc: 0.8405410343303374
653
654 Process finished with exit code 0
655
```