

1.2 Implementation of additional features

The features I applied are the features useful talked in section 1.1.

The improvement as follow:

According the results, its obvious my improvement worked both Macro F1 score and Micro F1 score. To be specifically, the Macro F1 score improved from 21.57 to 23.51. The Micro F1 score improved from 95.53 to 95.76

The original code's result

```
### evaluation of data/twitter_dev.ner; writing
to ./twitter_dev.ner.pred
Token-wise accuracy 95.53610123949034
Token-wise F1 (macro) 21.57803753335646
Token-wise F1 (micro) 95.53610123949034
Sentence-wise accuracy 66.61016949152543
```

	precision	recall	f1-score	support
B-company	1.00	0.33	0.50	36
B-facility	0.62	0.36	0.45	28
B-geo-loc	0.82	0.30	0.44	77
B-movie	0.00	0.00	0.00	7
B-musicartist	0.00	0.00	0.00	13
B-other	1.00	0.10	0.17	63
B-person	0.70	0.29	0.41	108
B-product	1.00	0.16	0.27	19
B-sportsteam	0.00	0.00	0.00	11
B-tvshow	0.00	0.00	0.00	11
I-company	0.00	0.00	0.00	7
I-facility	0.67	0.14	0.23	29
I-geo-loc	1.00	0.07	0.13	14
I-movie	0.00	0.00	0.00	11
I-musicartist	0.00	0.00	0.00	15

I-other	0.58	0.14	0.22	81
I-person	0.92	0.20	0.32	61
I-product	1.00	0.25	0.40	16
I-sportsteam	0.00	0.00	0.00	4
I-tvshow	0.00	0.00	0.00	10
0	0.96	1.00	0.98	10916
micro avg	0.96	0.96	0.96	11537
macro avg	0.49	0.16	0.22	11537
weighted avg	0.94	0.96	0.94	11537

My improvement' s result:

```

### evaluation of data/twitter_dev.ner; writing
to ./twitter_dev.ner.pred
Token-wise accuracy 95.7614631186617
Token-wise F1 (macro) 23.514567880578184
Token-wise F1 (micro) 95.7614631186617
Sentence-wise accuracy 66.27118644067797
      precision    recall  f1-score   support

B-company      0.81      0.36      0.50        36
B-facility      0.64      0.32      0.43        28
B-geo-loc       0.78      0.38      0.51        77
B-movie         0.00      0.00      0.00         7
B-musicartist   0.00      0.00      0.00        13
B-other         1.00      0.11      0.20        63
B-person        0.68      0.46      0.55       108
B-product       0.75      0.16      0.26        19
B-sportsteam    0.00      0.00      0.00        11
B-tvshow        0.00      0.00      0.00        11

```

I-company	0.00	0.00	0.00	7
I-facility	0.31	0.14	0.19	29
I-geo-loc	1.00	0.07	0.13	14
I-movie	0.00	0.00	0.00	11
I-musicartist	0.00	0.00	0.00	15
I-other	0.60	0.15	0.24	81
I-person	0.84	0.43	0.57	61
I-product	0.80	0.25	0.38	16
I-sportsteam	0.00	0.00	0.00	4
I-tvshow	0.00	0.00	0.00	10
0	0.96	1.00	0.98	10916
micro avg	0.96	0.96	0.96	11537
macro avg	0.44	0.18	0.24	11537
weighted avg	0.94	0.96	0.95	11537