# 1.1 Feature design explanation

To begin with, I ran the default feature the script given and saved the data as follow:

# Twitter\_dev\_test.ner

```
Token-wise accuracy 91.01521047046339
Token-wise F1 (macro) 10.919538444654497
Token-wise F1 (micro) 91.01521047046339
Sentence-wise accuracy 48.64864864864865
precision recall f1-s
                                                 f1-score
                                                                support
     B-company
                                                                      109
    B-facility
                           0.56
                                         0.30
                                                                      46
159
                           0.72
0.00
     B-geo-loc
                                         0.30
                                                       0.42
                                                       0.00
        B-movie
                                         0.00
B-musicartist
                                         0.00
                                                       0.00
                                                                       33
                           0.00
       B-other
                           0.00
                                         0.00
                                                       0.00
                                                                      118
                           0.22
0.00
      B-person
                                         0.10
                                                                       96
     B-product
                                         0.00
                                                       0.00
                                                                       44
 B-sportsteam
                           0.00
                                         0.00
                                                       0.00
                                                                       31
      B-tvshow
                           0.00
                                         0.00
                                                       0.00
                                                                        4
                           0.00
                                         0.00
                                                       0.00
                                                                       26
     I-company
                                                                       60
37
    I-facility
                           0.00
                                         0.00
                                                       0.00
     I-geo-loc
I-movie
                           1.00
                                         0.03
                                                       0.05
                           0.00
                                         0.00
                                                       0.00
                           0.00
                                         0.00
                                                       0.00
 -musicartist
        I-other
                           0.62
                                         0.08
                                                       0.14
      I-person
                           0.14
0.00
                                         0.02
                                                       0.03
                                                                       58
 I-product I-sportsteam
                                                       0.00
                                                                       88
                                         0.00
                                                       0.00
                           0.00
                           0.00
                                         0.00
                                                       0.00
      I-tvshow
                           0.92
                                         1.00
                                                       0.95
                                                                   10231
     micro avg
                           0.91
                                         0.91
                                                       0.91
                                                                   11308
     macro avg
                           0.24
0.86
                                         0.09
0.91
                                                                   11308
11308
```

#### Twitter\_dev.ner

```
evaluation of data/twitter
                                               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-s
                                                        support
                                          f1-score
    B-company
                       1.00
                                   0.33
                                               0.50
                                                              36
   B-facility
                       0.62
                                   0.36
                                               0.45
                                                             28
    B-geo-loc
B-movie
                       0.82
                                               0.44
                                                              77
                                   0.30
                       0.00
                                   0.00
                                               0.00
                                   0.00
B-musicartist
                       0.00
                                               0.00
                                                             13
       B-other
                       1.00
                                   0.10
                                               0.17
                                                             63
      B-person
                       0.70
                                   0.29
                                               0.41
                                                            108
                       1.00
                                   0.16
                                                             19
    B-product
                                               0.27
                       0.00
                                   0.00
                                               0.00
 B-sportsteam
                                                             11
     B-tvshow
                       0.00
                                   0.00
                                               0.00
                                                             11
    I-company
                       0.00
                                   0.00
                                               0.00
                                                             29
   I-facility
                       0.67
                                   0.14
                                               0.23
    I-geo-loc
                       1.00
                                   0.07
                                               0.13
                                                             14
                       0.00
                                   0.00
                                               0.00
       I-movie
                                                             11
I-musicartist
                       0.00
                                   0.00
                                               0.00
                                                             15
                                   0.14
       I-other
                       0.58
                                               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
                       0.00
                                   0.00
                                               0.00
                                                             10
      I-tvshow
                                               0.98
                                                          10916
                       0.96
                                   1.00
    micro avg
                       0.96
                                   0.96
                                               0.96
                                                          11537
                       0.49
                                   0.16
                                               0.22
                                                          11537
    macro avg
                                               0.94
                       0.94
                                   0.96
 weighted avg
                                                          11537
```

The features I applied to improve F1 score as follow:

# First word

This feature finds out whether the current word is the first one of a sentence or not. In tweet, the first word usually is a named entity.

For example, Columbus B-geo-loc, according to this one, the first word 'Columbus' is a named entity.

## Numeric

Determine whether current word is a number or not, usually number not a named entity but a count of named entity. For example, "a server 2008 (I-productd) R2", "the number" 2008" belongs to named entity. Which is product type.

After I delete it from code the result as follow:

## Twitter\_dev\_test.ner

Twitter dev.ner

```
### evaluation of data/twitter_dev_test.ner; writing to ./twitter_dev_test.ner.pred
Token-wise accuracy 90.99752387690131
Token-wise F1 (macro) 10.161391313696514
Token-wise F1 (micro) 90.99752387690131
Sentence-wise accuracy 48.79089615931721
                   precision
                                                f1-score
                                                               support
                                       0.08
                                                                    109
     B-company
   B-facility
                                       0.28
0.28
                                                     0.37
                                                                     46
                          0.72
0.00
     B-geo-loc
                                                     0.40
                                                                    159
        B-movie
                                       0.00
                                                     0.00
B-musicartist
                          0.00
                                       Θ.
                                          . 00
                                                     Θ.
                                                       00
       B-other
                            . 00
                                       0.00
                                                     0.00
                            . 23
. 00
      B-person
                                        Θ
                                          08
                                                     0.12
     B-product
                                        0.00
                                                     0.00
                          0.00
 B-sportsteam
                                        0.00
                                                     Θ.
                                                       00
      B-tvshow
                            . 00
                                        0.00
                                                     0
                                                       . 00
                          0.00
     I-company
                                        0.00
                                                     0.00
    I-facility
                            . 00
                                        0.00
                                                     0.00
     I-geo-loc
                          0.00
                                        0.00
                                                     0.00
                          0.00
                                       0.00
        I-movie
                                                     0.00
                                                                     1Θ
                          0.00
0.64
                                        0.00
I-musicartist
                                                     0.00
                                                     0.10
                                       0.06
       I-other
                          0.17
0.00
                                       0.02
                                                     0.03
      I-person
     I-product
                                       0.00
                                                     0.00
                                                                     88
 I-sportsteam
                          0.00
                                       0.00
                                                     0.00
      I-tvshow
                          0.00
                                       0.00
                                                     0.00
                          0.92
                                        1.00
                                                     0.95
                                                                 10231
     micro avg
                          0.91
                                       0.91
                                                     0.91
                                                                 11308
                                                                 11308
                          0.19
                                       0.09
                                                     0.10
     macro avg
                                                                 11308
                          0.86
 weighted
                                                     0.87
            avg
```

Compared to the default result, without numeric result is worse, so numeric is an useful feature.

#### Previous word

By ad the previous word as a feature, this can make current word provides more information instead just about itself. For example, "a server 2008 (I-productd) R2" and the current word is '2008', the previous word is 'server', which is a named entity.

# Next word

By ad the next word as a feature, this can make current word provides more information instead just about itself. For example, "a server 2008 (I-productd) R2" and the current word is '2008', the next word is 'R2', which is a named entity.

# Upper case

Identify whether current word is in uppercase or not, usually if a word is in uppercase it should be a named entity. Contrast to lowercase feature this one is helpful to tweets. But its not reliable due lots of tweets still not follow this rule.

For example, 'My Oakland (B-geo-loc) line', in this tweet there are two fully uppercase

words but actually only 'Oakland' is named entity instead of 'My'.

#### Lower case

Identify whether current word is in lowercase or not, usually if a word is in lowercase its not a named entity.

## First word.

This feature finds out whether the current word is the first one of a sentence or not. In tweet, the first word usually is a named entity.

For example, 'Pedigree (B-company) Donates Dog', according to this one, the first word 'Pedigree' is a named entity.

#### Last word.

This feature finds out whether the current word is the last one of a sentence or not. In context the last word usually is a named entity. After applied this feature, based on python script evaluation I get follow data:

## twitter\_dev.ner:

	basic	advanced
accuracy	95.54	95.67
F1(macro)	21.58	22.85
F1(micro)	95.54	95.67

## twitter\_dev\_test.ner:

	basic	advanced
accuracy	91.02	91.52
F1(macro)	10.92	17.18
F1(micro)	91.02	91.52

# Stop word

This feature is the set of English words that usually appear at the end of an English sentence. These words are not named entities but they are useful to identify named entity.

## IS URL

This feature is used to identify whether the current is a web link or not by the key word 'http, one web link is not a named entity. After adding hyperlink, the result as follow:

# Twitter dev text.ner

```
test.ner; writing to ./twitter_dev_test.ner.pred
### evaluation of data/twitter_dev_test.
Token-wise accuracy 91.00636717368235
Token-wise F1 (macro) 10.885987603603533
Token-wise F1 (micro) 91.00636717368235
Sentence-wise accuracy 48.64864864864865
                     precision
                                        recall
                                                    f1-score
                                                                    support
                            0.82
0.56
0.71
0.00
     B-company
                                           0.08
                                                                          109
                                                         0.39
    B-facility
                                           0.30
                                                                          46
     B-geo-loc
B-movie
                                                                          159
                                           0.30
                                                         0.42
                                                         0.00
                                           0.00
B-musicartist
                            0.00
                                           0.00
                                                         0.00
                            0.00
                                           0.00
                                                                          118
        B-other
                                                         0.00
                            0.22
0.00
                                                                           96
44
       B-person
                                           0.10
                                                         0.14
     B-product
                                           0.00
                                                         0.00
 B-sportsteam
B-tvshow
                                           0.00
                                                                           31
                            0.00
                                                         0.00
                            0.00
                                           0.00
                                                         0.00
                                                                            4
                                                                           26
                            0.00
                                           0.00
                                                         0.00
     I-company
    I-facility
                                                                           60
                            0.00
                                           0.00
0.03
                                                         0.00
                                                                           37
10
15
      I-geo-loc
                             1.00
                                                         0.05
                            0.00
         I-movie
                                           \Theta.\Theta\Theta
                                                         0.00
                            0.00
                                           0.00
I-musicartist
                                                         0.00
                            0.62
                                                         0.14
                                           0.08
                                                                          123
58
        I-other
       I-person
                            0.14
                                           0.02
                                                         0.03
                            0.00
                                           0.00
                                                         0.00
                                                                           88
     I-product
                            0.00
                                           0.00
 I-sportsteam
                                                         0.00
       I-tvshow
                            0.00
                                           0.00
                                                         0.00
                             0.92
                                           1.00
                                                          0.95
                                                                       10231
                                           0.91
                                                         0.91
                                                                       11308
     micro avg
                                           0.09
                                                          0.11
     macro avg
                             0.24
                                                                       11308
                             0.86
                                           0.91
                                                                       11308
 weighted avg
```

#### Twitter dev.ner

```
Token-wise accuracy 95.53610123949034
Token-wise F1 (macro) 21.5780375335646
Token-wise F1 (micro) 95.53610123949034
Sentence-wise accuracy 66.61016949152543
precision recall f1-s
                                                                                                                         support
                                                                                                      0.50
0.45
0.44
                                                                             0.33
0.36
0.30
                                                                                                                                     36
28
77
7
          B-company
B-facility
B-geo-loc
B-movie
B-musicartist
B-other
                                                   0.62
0.82
                                                   0.00
                                                                             0.00
0.00
0.10
                                                                                                      0.00
0.00
0.17
                                                    1.00
          B-person
B-product
                                                                                                      0.41
0.27
                                                   0.70
1.00
                                                                             0.29
0.16
                                                                                                                                   108
                                                   0.00
0.00
0.00
                                                                                                      0.00
0.00
0.00
  B-sportsteam
B-tvshow
                                                                             0.00
B-TVSNOW
I-company
I-facility
I-geo-loc
I-movie
I-musicartist
I-other
                                                   0.67
1.00
                                                                             0.14
0.07
                                                                                                      0.23
0.13
                                                                                                      0.00
0.00
0.22
0.32
                                                   0.00
                                                                                  ΘΘ
                                                       . 00
                                                                             0
                                                                                  ΘΘ
                                                   0.58
0.92
1.00
                                                                             0.14
          I-person
I-product
                                                                             0.20
                                                                                                      0.00
0.00
0.98
   I-sportsteam
I-tvshow
                                                   0.00
                                                                             0.00
          micro avg
macro avg
                                                   0.96
                                                                                                      0.96
                                                                                                                              11537
                                                   0.49
0.94
                                                                             0.16
0.96
                                                                                                      0.22
                                                                                                                              11537
11537
   weighted avg
```

By comparing this result and default, it seems no change at all, but by combine it with lexicon and other useful features, I think it still usefull.

## Lexicon word

These features includes some sets I added to the code as follow:

Location; Business Product; Product; Tv show; Sport team; Location; Name;

The label 'name' Including 'last name' and 'first name' two features, these two features contribute to name, which is named entity.

For example, "LG Venus" in the set 'product' and 'business\_consumer\_product' . so both label 'Product' and 'Business Product' is attached and others so on.

# twitter\_dev\_test.ner:

				writing to	./twitter_dev_test.ner.pred
Token-wise acc	uracy 91.501	591793420	59		
Token-wise F1	(macro) 17.3	365538505	34905		
Token-wise F1	(micro) 91.5	015917934	2059		
Sentence-wise	accuracy 49.	359886201	991465		
	precision	recall	f1-score	support	
B-company	0.69	0.08	0.15	109	
B-facility	0.58	0.30	0.40	46	
B-geo-loc	0.76	0.45	0.56	159	
B-movie	0.00	0.00	0.00	4	
B-musicartist	Θ.ΘΘ	0.00	0.00	33	
B-other	0.00	0.00	0.00	118	
B-person	Θ.32	0.35	0.34	96	
B-product	0.50	0.02	0.04	44	
B-sportsteam	0.00	0.00	0.00	31	
B-tvshow	Θ.ΘΘ	0.00	0.00	4	
I-company	1.00	0.04	0.07	26	
I-facility	0.29	0.03	0.06	60	
I-geo-loc	0.88	0.38	0.53	37	
I-movie	0.00	0.00	0.00	10	
I-musicartist	0.00	0.00	0.00	15	
I-other	0.40	0.10	0.16	123	
I-person	0.50	0.29	0.37	58	
I-product	0.00	0.00	0.00	88	
I-sportsteam	0.00	0.00	0.00	7	
I-tvshow	0.00	0.00	0.00	9	
0	0.93	0.99	0.96	10231	
micro avg	0.92	0.92	0.92	11308	
macro avg	0.33	0.15	0.17	11308	
weighted avg	0.88	0.92	0.89	11308	

# twitter\_dev.ner:

				ng to ./twitt	ter_dev.ner.pred
Token-wise acc	curacy 95.7527	795354078	17		
Token-wise F1	(macro) 23.48	323985003	13558		
Token-wise F1	(micro) 95.75	527953540	7817		
Sentence-wise	accuracy 66.1	101694915	25424		
	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	0.76	0.38	0.50	77	
B-movie	0.00	0.00	0.00	7	
<b>B-musicartist</b>	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	<b>11</b>	
I-musicartist	0.00	0.00	0.00	15	
I-other	0.57	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	0.43	0.18	0.23	11537	
weighted avg	0.94	0.96	0.95	11537	

Its obvious that after applied lexicon features the result (especially F1) improved a lot.

# The features I applied not improve F1 score as follow:

First word is number

Counting the number appear at the beginning of sentence, which usually are the pre part of named entity. But this feature is not work well. According to the follow data, the result gets worse.

twitter\_dev\_test.ner:

```
test.ner; writing to ./twitter_dev_test.ner.pred
oken-wise accuracy 91.01521047046339
oken-wise F1 (macro) 11.020954344303274
oken-wise F1 (micro) 91.01521047046339
entence-wise accuracy 48.506401137980085
precision recall f1-sc
                                 recall
                                            f1-score
                                                          support
                                    0.08
0.33
0.30
                                                               109
   B-company
                       0.82
                                                 0.15
  B-facility
                        0.58
                                                 0.42
                                                                46
   B-geo-loc
                        0.72
                                                 0.42
                                                               159
      B-movie
                        0.00
                                    0.00
                                                 0.00
-musicartist
                        0.00
                                    0.00
                                                 0.00
      B-other
                        0.00
                                    0.00
                                                 0.00
                                                               118
                        0.22
                                    0.10
     B-person
                                                 0.14
                                                                96
   B-product
                        0.00
                                    0.00
                                                 0.00
                                                                44
                        0.00
                                    0.00
B-sportsteam
                                                 0.00
                                                                31
                        0.00
     B-tvshow
                                    0.00
                                                 0.00
                                                                 4
                        0.00
                                                                26
                                    0.00
                                                 0.00
    I-company
  I-facility
                        0.00
                                    0.00
                                                 0.00
                                                                60
    I-geo-loc
                        1.00
                                    0.03
                                                0.05
                                                                37
                       0.00
                                    0.00
      I-movie
                                                 0.00
                                                                10
                        0.00
-musicartist
                                    0.00
                                                 0.00
                                                                15
                                                0.14
                       0.62
                                    0.08
      I-other
                                                               123
     I-person
                        0.14
                                    0.02
                                                 0.03
                                                                58
                       0.00
    I-product
                                    0.00
                                                 0.00
                                                                88
I-sportsteam
                        0.00
                                    0.00
                                                0.00
     I-tvshow
                        0.00
                                    0.00
                                                0.00
                                                                 9
                                                0.95
                        0.92
                                    1.00
                                                            10231
                                                0.91
                       0.91
                                    0.91
                                                            11308
   micro avg
                       0.24
                                    0.09
                                                            11308
   macro avg
                                                 0.11
                       0.86
                                                 0.88
weighted avg
                                    0.91
                                                            11308
```

#### twitter dev.ner:

```
### evaluation of data/twitter_dev.ner; writing to ./twitter_dev.ner.pred
Token-wise accuracy 95.53610123949034
Token-wise F1 (macro) 21.530146322123827
Token-wise F1 (micro) 95.53610123949034
Sentence-wise accuracy 66.61016949152543
                   precision
                                    recall
                                              f1-score
                                                            support
                                      0.33
                                                   0.50
                                                                  36
     B-company
                         1.00
    B-facility
                         0.59
                                      0.36
                                                   0.44
                                                                  28
     B-geo-loc
                         0.82
                                      0.30
                                                                  77
                                                   0.44
       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
                         0.70
                                      0.29
      B-person
                                                   0.41
                                                                 108
                         1.00
                                                   0.27
     B-product
                                      0.16
                                                                  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
                                                                  29
    I-facility
                         0.67
                                      0.14
                                                   0.23
     I-geo-loc
                                      0.07
                         1.00
                                                   0.13
                                                                  14
                         0.00
                                      0.00
                                                   0.00
        I-movie
                                                                  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
                                      0.25
                         1.00
                                                   0.40
                                                                  16
 I-sportsteam
                         0.00
                                      0.00
                                                   0.00
                                                                   4
                                      0.00
                                                                  10
      I-tvshow
                         0.00
                                                   0.00
                         0.96
                                      1.00
                                                   0.98
                                                              10916
               0
                         0.96
                                      0.96
                                                   0.96
                                                              11537
     micro avg
     macro avg
                                                              11537
                         0.49
                                      0.16
                                                   0.22
                         0.94
                                      0.96
                                                   0.94
                                                              11537
 weighted avg
```

First character is uppercase

twitter dev test.ner:

```
### evaluation of data/twitter_dev_test.ner; writing to ./twitter_dev_test.ner.pred
Token-wise accuracy 91.05058365758755
Token-wise F1 (macro) 11.158454737121874
Token-wise F1 (micro) 91.05058365758755
Sentence-wise accuracy 48.79089615931721
                 precision
                                recall
                                          f1-score
                                                       support
    B-company
                       0.82
                                   0.08
                                               0.15
                                                            109
   B-facility
                       0.56
                                   0.33
                                               0.41
                                                            46
    B-geo-loc
                       0.72
                                   0.30
                                              0.42
                                                            159
      B-movie
                       0.00
                                   0.00
                                               0.00
                                                             4
                                                             33
B-musicartist
                       0.00
                                   0.00
                                               0.00
      B-other
                       0.00
                                   0.00
                                               0.00
                                                            118
     B-person
                       0.21
                                   0.11
                                               0.15
                                                             96
                                   0.00
                                              0.00
                                                             44
    B-product
                       0.00
B-sportsteam
                       0.00
                                   0.00
                                               0.00
                                                             31
     B-tvshow
                       0.00
                                   0.00
                                               0.00
                                                              4
                                   0.00
                                                             26
    I-company
                       0.00
                                               0.00
   I-facility
                       0.00
                                   0.00
                                               0.00
                                                             60
    I-geo-loc
                       1.00
                                   0.03
                                              0.05
                                                             37
                       0.00
                                   0.00
                                                             10
       I-movie
                                               0.00
-musicartist
                       0.00
                                   0.00
                                               0.00
                                                             15
      I-other
                       0.67
                                   0.10
                                               0.17
                                                            123
                                   0.02
     I-person
                       0.14
                                               0.03
                                                             58
                       0.00
                                   0.00
                                              0.00
                                                             88
    I-product
 I-sportsteam
                       0.00
                                   0.00
                                               0.00
     I-tvshow
                       0.00
                                   0.00
                                               0.00
                                                              9
                       0.92
                                   1.00
                                               0.96
                                                          10231
                       0.91
                                   0.91
                                              0.91
    micro avg
                                                          11308
    macro avg
                       0.24
                                   0.09
                                               0.11
                                                          11308
 weighted avg
                       0.86
                                   0.91
                                               0.88
                                                          11308
```

# twitter\_dev.ner:

```
### evaluation of data/twitter_dev.ner; writing to ./twitter_dev.ner.pred Token-wise accuracy 95.55343676865736 Token-wise F1 (macro) 21.695143061851933 Token-wise F1 (micro) 95.55343676865736 Sentence-wise accuracy 66.61016949152543
                                                                      f1-score
                             precision
                                                      recall
                                                                                           support
                                                         0.33
0.36
0.30
0.00
                                       1.00
                                                                                                     36
       B-company
                                                                              0.50
      B-facility
B-geo-loc
B-movie
                                      0.62
0.82
0.00
                                                                             0.45
0.44
0.00
                                                                                                     28
77
                                      0.00
                                                          0.00
0.10
0.31
B-musicartist
B-other
                                                                              0.00
                                                                              0.17
                                                                                                     63
         B-person
  B-product
B-sportsteam
B-tvshow
                                      1.00
                                                          0.16
                                                                             0.27
                                                                                                     19
11
                                       0.00
                                                          0.00
      I-company
I-facility
I-geo-loc
                                      0.00
                                                          0.00
0.14
                                                                              0.00
                                                                                                     29
                                                                              0.22
                                       1.00
                                                          0.07
I-movie
I-musicartist
I-other
                                      0.00
                                                          0.00
                                                                                                     11
15
                                                                              0.00
                                                                              0.00
                                                          0.15
0.20
0.25
       I-person
I-product
                                       0.86
                                                                                                     61
16
                                                                              0.40
                                       1.00
  I-sportsteam
                                       0.00
                                                          0.00
                                                                              0.00
                                                          Θ.
         I-tvshow
                                       Θ.
                                          00
                                                              ΘΘ
                                                                              0.00
                                                                                                     10
                                       0.96
                                                          1.00
                                                                              0.98
                                                                                               10916
  micro avg
macro avg
weighted avg
                                                                                               11537
11537
11537
                                                                             0.96
                                       0.96
                                                          0.96
                                                                             0.22
0.94
                                       0.48
                                                          0.16
0.96
                                       0.94
```

this result makes no difference with the default's, so it is not useful.