Project Report: Semantic Role Labelling Using Hindi PropBank

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Introduction:

Semantic Role Labelling (SRL) is a fundamental task in Natural Language Processing (NLP) aimed at identifying and classifying the semantic roles of constituents in a sentence, particularly with respect to a predicate or verb. In this project, we focused on the task of Argument Identification for Hindi Semantic Role Labelling. The goal was to determine whether a word in a sentence serves as an argument to a verb or not our next step is to proceed with Argument Classification, where we will assign semantic labels to the identified arguments using a multi-class classifier.

Dataset:

We utilized the Hindi PropBank Dataset for training and evaluation purposes. This dataset comprises hand-annotated sentences with Propbank labels, which represent various semantic roles such as Agent, Theme, Location, Time, Purpose, Reason, Cause, etc. Here we have Read any.pb file format from HINDI PropBank, Preprocess the Data using ssfapi.py

Sentence in Hindi contain 1600

Create a word embedding using Word2Vec and FastText Word2Vec-emb_w2v.csv FastText-emb.csv

Identification- Identification is done using label column of emb.csv of both methods(word2vec and fasttext) by 2 models(logistic regression and SVC) and using different labels(head, dependency, chunk, etc).

Classification- Classification is done using srl column of emb.csv of both methods(word2vec and fasttext) by 2 models(logistic regression and SVC) and using different labels(head, dependency, chunk, etc).

Combination with Different Parameter for Identification and Classification Logistic Regression Using FastText

Chunk

Confusion Matrix: [[2176 492] [942 754]]

Classification Report:										
precision recall f1-score support										
0 0.70 0.82 0.75 2668										
1 0.61 0.44 0.51 1696										
accuracy 0.67 4364										
macro avg 0.65 0.63 0.63 4364										
weighted avg 0.66 0.67 0.66 4364										
Classification Report:										
precision recall f1-score support										
1 0.56 0.29 0.38 303										
2 0.59 0.32 0.41 572										
3 0.00 0.00 0.00 41										
4 0.00 0.00 0.00 118										
5 0.00 0.00 0.00 18										
6 0.00 0.00 0.00 17										
7 0.00 0.00 0.00 11										
8										
10 0.60 0.13 0.21 23										
10 0.00 0.13 0.21 23 11 0.00 0.00 7										
12 0.00 0.00 0.00 29										
13 0.00 0.00 0.00 26										
14 0.30 0.04 0.08 201										
15 0.00 0.00 0.00 112										
16 0.00 0.00 0.00 16										
17 0.00 0.00 0.00 1										
18 0.00 0.00 0.00 3										
19 0.00 0.00 0.00 35										
20 0.00 0.00 0.00 1										
21 0.53 0.21 0.30 97										
22 0.66 0.93 0.77 2694										
accuracy 0.65 4364										
macro avg 0.15 0.09 0.10 4364										
weighted avg 0.55 0.65 0.57 4364										

Dependency-Head, Dependency

Confusion Matrix:

[[2126 548]

[182 1508]]

Classification Report:

precision recall f1-score support									
0 0.92 0.80 0.85 2674									
1 0.73 0.89 0.81 1690									
accuracy 0.83 4364									
macro avg 0.83 0.84 0.83 4364									
weighted avg 0.85 0.83 0.83 4364									
Classification Report:									
precision recall f1-score support									
ARG-UNDEF 0.00 0.00 0.00 1									
ARGO 0.63 0.79 0.70 303									
ARG1 0.65 0.80 0.72 599									
ARG2 0.00 0.00 0.00 59									
ARG2-ATR 0.66 0.18 0.29 104									
ARG2-GOL 0.00 0.00 0.00 15									
ARG2-LOC 0.00 0.00 0.00 17									
ARG2-SOU 0.00 0.00 0.00 11									
ARG3 0.00 0.00 0.00 3									
ARGM-ADV 0.46 0.14 0.22 42									
ARGM-CAU 0.40 0.08 0.14 24									
ARGM-DIR 0.00 0.00 0.00 5									
ARGM-DIS 0.52 0.39 0.44 31									
ARGM-EXT 0.29 0.06 0.11 31									
ARGM-LOC 0.49 0.64 0.55 200									
ARGM-MNR 0.56 0.43 0.49 104									
ARGM-MNS 0.00 0.00 0.00 7									
ARGM-NEG 0.00 0.00 0.00 2									
ARGM-PRP 0.50 0.55 0.52 33									
ARGM-PRX 0.00 0.00 0.00 2									
ARGM-TMP 0.65 0.76 0.70 95									
accuracy 0.61 1699									
accuracy 0.61 1688									
macro avg 0.28 0.23 0.23 1688 weighted avg 0.55 0.61 0.56 1688									
weignten avg 0.55 0.01 0.50 1088									

Dependency-Head

Confusion Matrix:

[[1836 826]

[18 1684]]

Classifica	Classification Report:										
precision recall f1-score support											
0	0.99	0.69	0.81	2662							
1	0.67	0.99	0.80	1702							

accuracy			0.81	436	54					
macro avg	; C	.83	0.84	0.81	4364					
weighted av	/g	0.87	0.81	0.81	4364					
Classificatio	Classification Report:									
pred	precision recall f1-score support									
	0.00	0.00								
	0.53	0.47								
	0.51	0.48								
	0.00	0.00								
	0.67	0.02								
	0.00	0.00								
	0.00	0.00								
	0.00	0.00								
	0.50	0.03								
	0.33	0.0			22					
	0.00	0.0			5					
	0.00	0.0			24					
	0.50	0.0			29					
14	0.50	0.1	9 0.2	7 2	12					
15	0.25	0.0	5 0.0	9 1	13					
16	0.00	0.0	0.0	0 1	.2					
17	0.00	0.0	0.0	0 :	2					
18	0.00	0.0	0.0	0 :	1					
19	0.00	0.0	0.0	0 4	16					
20	0.00	0.0	0.0	0 :	2					
21	0.47	0.2	8 0.3	5 9	8					
22	0.71	0.9	0 0.7	9 26	545					
accuracy			0.66							
macro avg		.23	0.12	0.13	4364					
weighted av	weighted avg 0.60 0.66 0.61 4364									

Dependency:

Confusion Matrix:

[[2141 546]

[725 952]]

Classi	Classification Report:															
	precision recall f1-score support															
	0	0.75	0.80	0.77	268	37										
	1	0.64	0.57	0.60	167	7										
acc	urac	СУ		0.71	4364	1										
mac	cro a	vg 0).69	0.68	0.69	4364										
weigh	nted	avg	0.70	0.71	0.71	4364										

```
Classification Report:
       precision recall f1-score support
          0.55
                  0.45
                         0.49
                                 314
      1
     2
          0.57
                  0.43
                         0.49
                                 583
      3
          1.00
                  0.02
                         0.04
                                 45
      4
          0.60
                         0.06
                                 99
                  0.03
     5
          0.00
                  0.00
                         0.00
                                 14
     6
                                 19
          0.00
                  0.00
                         0.00
     7
          0.00
                         0.00
                  0.00
                                  18
     8
          0.00
                  0.00
                         0.00
                                  1
     9
                                 45
          0.00
                  0.00
                         0.00
                                  30
     10
                  0.07
           0.67
                          0.12
     11
           0.00
                  0.00
                          0.00
                                  4
     12
           0.00
                  0.00
                          0.00
                                  31
     13
           0.00
                  0.00
                          0.00
                                  24
     14
           0.23
                  0.02
                          0.04
                                  224
                                  104
     15
           0.43
                  0.03
                          0.05
           0.00
                  0.00
                          0.00
                                  19
     16
     17
           0.00
                  0.00
                          0.00
                                  1
                                  3
     18
                  0.00
                          0.00
           0.00
     19
                  0.00
                          0.00
                                  46
           0.00
     20
           0.00
                  0.00
                          0.00
                                  1
                          0.29
     21
           0.43
                  0.22
                                  89
     22
           0.67
                  0.91
                          0.77
                                 2650
  accuracy
                        0.65
                                4364
 macro avg
               0.23
                      0.10
                             0.11
                                     4364
weighted avg
                0.58
                       0.65
                               0.58
                                      4364
```

Head_POS:

Confusion Matrix:

[[2141 539]

[997 687]]

Classification Report:									
precision	recall f1-score support								
0 0.68	0.80 0.74 2680								
1 0.56	0.41 0.47 1684								
accuracy	0.65 4364								
macro avg 0.	.62 0.60 0.60 4364								
weighted avg (0.64 0.65 0.63 4364								
Classification Rep	ort:								
precision	recall f1-score support								

```
0.45
                  0.16
                         0.24
      1
                                 312
     2
          0.58
                  0.30
                         0.40
                                 587
     3
          0.00
                  0.00
                         0.00
                                 57
      4
          0.38
                  80.0
                         0.13
                                 77
      5
          0.00
                  0.00
                         0.00
                                 21
     6
          0.00
                  0.00
                         0.00
                                  15
     7
          0.00
                  0.00
                         0.00
                                  13
     8
          0.00
                  0.00
                         0.00
                                  1
     9
          0.00
                  0.00
                         0.00
                                 43
                  0.03
     10
           0.33
                          0.06
                                  31
     11
           0.00
                  0.00
                          0.00
                                  3
     12
           0.00
                  0.00
                          0.00
                                  31
     13
           0.00
                  0.00
                          0.00
                                  39
     14
           0.21
                  0.02
                          0.04
                                  185
     15
           0.00
                  0.00
                          0.00
                                  115
     16
           0.00
                  0.00
                          0.00
                                  10
     17
           0.00
                  0.00
                          0.00
                                  1
     18
           0.00
                  0.00
                          0.00
                                  3
                                  37
     19
           0.00
                  0.00
                          0.00
     20
                  0.00
                          0.00
                                  1
           0.00
     21
           0.53
                  0.18
                          0.26
                                  108
     22
           0.65
                  0.94
                          0.77
                                 2674
                                4364
  accuracy
                        0.63
                      0.08
                             0.09
 macro avg
               0.14
                                     4364
weighted avg
                0.54
                       0.63
                               0.55
                                      4364
```

Head

Confusion Matrix:

[[2238 461]

[966 699]]

Classification Report:										
precision recall f1-score support										
0 0.83	0.76	2699								
0 0.42	0.49	1665								
	0.67	4364								
0.65).62 0.	63 4	1364							
0.66	0.67	0.66	4364							
Report:										
on recal	f1-score	supp	port							
F 04F	0.22	200								
6 0.28	0.38	583								
0.00	0.00	52								
7 0.03	0.06	117								
0.00	0.00	17								
i 7 5 F i 4 5 O 5	0.65 (0.66 Report: ion recall 15 0.15 66 0.28 00 0.00 67 0.03	0.67 0.65 0.66 0.67 0.66 0.67 0.66 0.67 0.66 0.67 0.66 0.67 0.68 0.15 0.23 0.66 0.28 0.38 00 0.00 0.00 0.00	0.65 0.62 0.63 4 0.66 0.67 0.66 Report: ion recall f1-score supplements ion of the second of the se							

```
6
          0.00
                 0.00
                         0.00
                                 18
     7
          0.00
                 0.00
                         0.00
                                 12
     8
          0.00
                 0.00
                         0.00
                                 1
     9
          0.00
                                 46
                 0.00
                         0.00
                                  30
     10
           0.50
                  0.07
                         0.12
     11
           0.00
                  0.00
                         0.00
                                  10
                                  29
     12
           0.00
                  0.00
                         0.00
                  0.04
                         0.08
                                  25
     13
           1.00
     14
           0.09
                  0.01
                         0.01
                                 199
     15
                  0.02
           0.67
                         0.04
                                 102
     16
           0.00
                  0.00
                         0.00
                                  13
     17
           0.00
                  0.00
                         0.00
                                  1
                                  3
     18
           0.00
                  0.00
                         0.00
     19
                                  35
           0.00
                  0.00
                         0.00
     21
           0.50
                  0.25
                         0.33
                                 105
     22
                  0.94
           0.64
                         0.76
                                 2668
                        0.63
                               4364
  accuracy
                      0.09
                             0.10
                                    4364
 macro avg
              0.24
weighted avg
                       0.63
                              0.54
                                     4364
               0.56
```

Postposition

Confusion Matrix:

[[2157 495]

[975 737]]

```
12
           0.00
                  0.00
                          0.00
                                  29
     13
           0.00
                  0.00
                          0.00
                                  25
     14
           0.00
                  0.00
                          0.00
                                  208
     15
                  0.00
                          0.00
                                  98
           0.00
     16
           0.00
                  0.00
                          0.00
                                  11
     17
           0.00
                  0.00
                          0.00
                                   1
     18
           0.00
                  0.00
                          0.00
                                   2
     19
           0.00
                  0.00
                          0.00
                                  38
     21
           0.00
                  0.00
                          0.00
                                  114
     22
                  0.98
                          0.76
           0.63
                                 2662
                         0.63
                                4364
  accuracy
               0.06
                      0.06
                              0.05
                                     4364
 macro avg
weighted avg
                0.47
                       0.63
                               0.51
                                      4364
```

Combination with Different Parameter For Identification and Classification Logistic Regression Using Word2Vec

Chunk Result

Confusion Matrix:

[[2349 362]

[1428 225]]

```
Classification Report:
       precision recall f1-score support
     0
          0.62
                  0.87
                         0.72
                                 2711
          0.38
      1
                  0.14
                         0.20
                                 1653
                        0.59
                                4364
  accuracy
               0.50
                      0.50
                             0.46
                                     4364
 macro avg
weighted avg
                0.53
                       0.59
                               0.53
                                      4364
```

```
Classification Report:
       precision recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  291
      2
           0.00
                  0.00
                          0.00
                                  575
      3
           0.00
                          0.00
                  0.00
                                  60
      4
           0.00
                  0.00
                          0.00
                                  107
      5
           0.00
                  0.00
                          0.00
                                  13
      6
           0.00
                  0.00
                          0.00
                                  18
      7
           0.00
                  0.00
                          0.00
                                  11
      8
           0.00
                  0.00
                          0.00
                                   1
      9
           0.00
                  0.00
                          0.00
                                  31
     10
           0.00
                   0.00
                          0.00
                                   26
     11
           0.00
                   0.00
                          0.00
                                   3
                   0.00
                          0.00
                                   28
     12
           0.00
     13
           0.00
                   0.00
                          0.00
                                   27
     14
                   0.00
           0.00
                          0.00
                                   200
```

```
15
           0.00
                   0.00
                          0.00
                                  125
     16
           0.00
                   0.00
                          0.00
                                   15
     19
           0.00
                   0.00
                          0.00
                                   33
     20
                                   1
           0.00
                   0.00
                          0.00
     21
           0.00
                   0.00
                          0.00
                                  104
     22
           0.62
                   1.00
                          0.76
                                  2695
                         0.62
                                4364
  accuracy
                                      4364
 macro avg
               0.03
                      0.05
                              0.04
weighted avg
                0.38
                        0.62
                               0.47
                                       4364
```

Dependency-head, Dependency

Confusion Matrix: [[2141 533]

[199 1491]]

```
Classification Report:
       precision recall f1-score support
     0
          0.91
                  0.80
                         0.85
                                 2674
      1
          0.74
                  0.88
                         0.80
                                 1690
  accuracy
                         0.83
                                4364
 macro avg
               0.83
                      0.84
                              0.83
                                     4364
                       0.83
                               0.83
                                      4364
weighted avg
                0.85
```

```
Classification Report:
       precision recall f1-score support
 ARG-UNDEF
                0.00
                       0.00
                              0.00
                                      1
    ARG0
            0.11
                   0.01
                          0.02
                                  303
   ARG1
            0.47
                   0.94
                          0.63
                                  599
    ARG2
            0.00
                   0.00
                          0.00
                                  59
              0.00
 ARG2-ATR
                     0.00
                            0.00
                                    104
  ARG2-GOL
               0.00
                      0.00
                             0.00
                                     15
  ARG2-LOC
               0.00
                      0.00
                             0.00
                                     17
  ARG2-SOU
               0.00
                      0.00
                             0.00
                                     11
    ARG3
            0.00
                   0.00
                          0.00
                                   3
                0.00
                       0.00
                              0.00
                                      42
  ARGM-ADV
  ARGM-CAU
                0.00
                       0.00
                              0.00
                                      24
  ARGM-DIR
               0.00
                      0.00
                             0.00
                                     5
                      0.00
               0.00
                                     31
  ARGM-DIS
                             0.00
               0.00
                      0.00
 ARGM-EXT
                             0.00
                                     31
               0.33
                      0.56
                             0.41
                                     200
  ARGM-LOC
  ARGM-MNR
                0.00
                       0.00
                              0.00
                                      104
 ARGM-MNS
                0.00
                       0.00
                              0.00
                                      7
  ARGM-NEG
                0.00
                       0.00
                              0.00
                                      2
  ARGM-PRP
               0.16
                             0.25
                                     33
                      0.61
```

```
ARGM-PRX
               0.00
                      0.00
                             0.00
                                      2
  ARGM-TMP
                0.00
                       0.00
                              0.00
                                      95
                       0.41
                              1688
 accuracy
                            0.06
 macro avg
              0.05
                     0.10
                                   1688
weighted avg
               0.23
                      0.41
                             0.28
                                    1688
```

Dependency-head

Confusion Matrix:

[[1796 840]

[20 1708]]

```
Classification Report:
       precision recall f1-score support
                  0.68
                         0.81
     0
          0.99
                                 2636
          0.67
                  0.99
      1
                         0.80
                                 1728
                        0.80
                                4364
  accuracy
 macro avg
               0.83
                      0.83
                             0.80
                                     4364
weighted avg
                0.86
                       0.80
                               0.80
                                      4364
```

```
Classification Report:
       precision recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  321
      2
           0.24
                  0.19
                          0.21
                                  575
      3
           0.00
                  0.00
                          0.00
                                  45
      4
           0.00
                  0.00
                          0.00
                                  102
      5
                          0.00
           0.00
                  0.00
                                  22
      6
           0.00
                  0.00
                          0.00
                                  15
      7
           0.00
                  0.00
                          0.00
                                   14
      8
           0.00
                  0.00
                          0.00
                                   1
      9
           0.00
                  0.00
                          0.00
                                  40
     10
                   0.00
                          0.00
                                   23
           0.00
     11
           0.00
                   0.00
                          0.00
                                   11
     12
           0.00
                   0.00
                          0.00
                                   28
     13
           0.00
                   0.00
                          0.00
                                   25
     14
           0.00
                   0.00
                          0.00
                                   221
     15
           0.00
                   0.00
                          0.00
                                   110
     16
           0.00
                   0.00
                          0.00
                                   15
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   2
                          0.00
                                   39
     19
           0.00
                   0.00
     21
           0.00
                   0.00
                          0.00
                                   102
     22
           0.63
                   0.93
                          0.75
                                  2652
```

accuracy		0.59 4364					
macro avg	0.04	0.05	0.05	4364			
weighted avg	0.41	0.59	0.48	4364			

Dependency

Confusion Matrix:

[[1940 742]

[994 688]]

```
Classification Report:
                  recall f1-score support
       precision
                  0.72
     0
           0.66
                          0.69
                                 2682
      1
          0.48
                  0.41
                          0.44
                                 1682
  accuracy
                         0.60
                                4364
                      0.57
                              0.57
                                     4364
 macro avg
               0.57
                0.59
                        0.60
                               0.60
                                       4364
weighted avg
```

```
Classification Report:
       precision recall f1-score support
                          0.00
     0
           0.00
                  0.00
                                   1
      1
          0.00
                  0.00
                                  308
                          0.00
      2
           0.00
                  0.00
                          0.00
                                  624
      3
           0.00
                  0.00
                          0.00
                                  53
      4
           0.00
                  0.00
                          0.00
                                  102
      5
           0.00
                  0.00
                          0.00
                                   22
      6
           0.00
                  0.00
                          0.00
                                   13
      7
           0.00
                  0.00
                          0.00
                                   19
     8
           0.00
                  0.00
                          0.00
                                   1
     9
           0.00
                  0.00
                          0.00
                                   33
     10
                   0.00
           0.00
                          0.00
                                   18
     11
           0.00
                   0.00
                           0.00
                                    4
     12
           0.00
                   0.00
                           0.00
                                   19
     13
                   0.00
                           0.00
                                   19
           0.00
                           0.00
     14
           0.00
                   0.00
                                   178
     15
                   0.00
                           0.00
           0.00
                                   112
     16
           0.00
                   0.00
                           0.00
                                   16
     17
           0.00
                   0.00
                           0.00
                                    1
     18
           0.00
                   0.00
                           0.00
                                    1
     19
           0.00
                   0.00
                           0.00
                                   22
     20
           0.00
                   0.00
                           0.00
                                    1
     21
           0.00
                   0.00
                           0.00
                                   102
     22
           0.62
                   1.00
                           0.76
                                  2695
                         0.62
                                 4364
  accuracy
               0.03
                       0.04
                              0.03
                                      4364
 macro avg
weighted avg
                0.38
                        0.62
                                0.47
                                       4364
```

head_POS

Confusion Matrix: [[2323 362]

[1437 242]]

```
Classification Report:
       precision recall f1-score support
     0
          0.62
                 0.87
                         0.72
                                2685
      1
          0.40
                 0.14
                         0.21
                                1679
                        0.59
                               4364
  accuracy
 macro avg
              0.51
                      0.50
                             0.47
                                    4364
weighted avg
               0.53
                       0.59
                              0.53
                                     4364
```

```
Classification Report:
       precision recall f1-score support
                  0.00
                         0.00
      1
          0.00
                                  314
      2
          0.00
                  0.00
                         0.00
                                  615
     3
          0.00
                  0.00
                         0.00
                                  52
     4
          0.00
                  0.00
                         0.00
                                  97
      5
          0.00
                                  22
                  0.00
                         0.00
     6
          0.00
                  0.00
                         0.00
                                  22
     7
          0.00
                  0.00
                         0.00
                                  15
     8
          0.00
                  0.00
                         0.00
                                  2
     9
          0.00
                  0.00
                         0.00
                                  31
     10
           0.00
                  0.00
                                   21
                          0.00
     11
           0.00
                   0.00
                          0.00
                                   5
     12
           0.00
                   0.00
                          0.00
                                   27
     13
           0.00
                   0.00
                          0.00
                                   33
     14
           0.00
                  0.00
                          0.00
                                  188
     15
           0.00
                   0.00
                          0.00
                                   98
     16
           0.00
                   0.00
                          0.00
                                   13
     18
           0.00
                  0.00
                          0.00
                                   4
     19
           0.00
                   0.00
                          0.00
                                   30
     20
                                   2
           0.00
                   0.00
                          0.00
     21
           0.00
                   0.00
                          0.00
                                   92
     22
           0.61
                   1.00
                          0.76
                                  2681
                         0.61
                                4364
  accuracy
                      0.05
                              0.04
 macro avg
               0.03
                                     4364
                       0.61
weighted avg
                0.38
                               0.47
                                       4364
```

head

Confusion Matrix:

[[2702 0]

[1662 0]]

```
Classification Report:
       precision recall f1-score support
     0
          0.62
                  1.00
                         0.76
                                 2702
          0.00
                  0.00
                         0.00
                                 1662
      1
  accuracy
                         0.62
                                4364
 macro avg
               0.31
                      0.50
                             0.38
                                     4364
                       0.62
                               0.47
                                      4364
weighted avg
                0.38
```

```
Classification Report:
       precision recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  308
      2
           0.00
                  0.00
                          0.00
                                  575
      3
           0.00
                  0.00
                          0.00
                                  55
      4
           0.00
                  0.00
                          0.00
                                  111
      5
          0.00
                  0.00
                          0.00
                                  19
      6
           0.00
                  0.00
                          0.00
                                  16
      7
          0.00
                  0.00
                          0.00
                                  14
      8
           0.00
                  0.00
                          0.00
                                   2
      9
           0.00
                  0.00
                          0.00
                                  36
     10
           0.00
                  0.00
                          0.00
                                   27
                   0.00
                          0.00
                                   3
     11
           0.00
     12
           0.00
                   0.00
                          0.00
                                   26
     13
           0.00
                   0.00
                          0.00
                                   27
     14
           0.00
                   0.00
                          0.00
                                  194
     15
           0.00
                   0.00
                          0.00
                                  104
                   0.00
     16
           0.00
                          0.00
                                   13
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
           0.00
                   0.00
                          0.00
                                   38
     20
           0.00
                   0.00
                          0.00
                                   1
     21
           0.00
                   0.00
                          0.00
                                   94
                          0.76
     22
           0.62
                   1.00
                                  2697
  accuracy
                         0.62
                                4364
 macro avg
               0.03
                      0.05
                              0.03
                                      4364
weighted avg
                0.38
                        0.62
                               0.47
                                       4364
```

Postposition

Confusion Matrix:

[[2703 0]

[1661 0]]

```
Classification Report:

precision recall f1-score support

0 0.62 1.00 0.76 2703
```

```
1
          0.00
                 0.00
                        0.00
                               1661
  accuracy
                        0.62
                               4364
                     0.50
                            0.38
 macro avg
              0.31
                                   4364
weighted avg
               0.38
                      0.62
                              0.47
                                     4364
```

```
Classification Report:
       precision recall f1-score support
      0
           0.00
                  0.00
                         0.00
                                   1
           0.00
      1
                  0.00
                         0.00
                                  304
      2
          0.00
                  0.00
                         0.00
                                  580
      3
           0.00
                  0.00
                         0.00
                                  59
      4
           0.00
                  0.00
                                  109
                         0.00
      5
          0.00
                  0.00
                         0.00
                                  17
      6
          0.00
                  0.00
                         0.00
                                  11
      7
           0.00
                  0.00
                         0.00
                                  13
      9
           0.00
                  0.00
                          0.00
                                  41
     10
           0.00
                   0.00
                          0.00
                                   22
     11
           0.00
                   0.00
                          0.00
                                   7
                                   27
     12
           0.00
                   0.00
                          0.00
                                   29
     13
           0.00
                   0.00
                          0.00
                   0.00
                          0.00
     14
           0.00
                                  216
           0.00
     15
                   0.00
                          0.00
                                  100
                          0.00
                                   8
     16
           0.00
                   0.00
                   0.00
                          0.00
                                   3
     18
           0.00
     19
           0.00
                   0.00
                          0.00
                                   38
                          0.00
     21
           0.00
                   0.00
                                  103
     22
           0.61
                   1.00
                          0.76
                                  2676
  accuracy
                         0.61
                                4364
                              0.04
 macro avg
               0.03
                      0.05
                                     4364
weighted avg
                0.38
                               0.47
                        0.61
                                       4364
```

Combination with Different Parameter For Identification and Classification Support Vector Classifier Using FastText

Dependecy-head, Dependency

Confusion Matrix:

[[2108 536]

[209 1511]]

```
Classification Report:

precision recall f1-score support

0 0.91 0.80 0.85 2644
```

```
1
          0.74 0.88
                       0.80
                               1720
 accuracy
                       0.83
                              4364
                                   4364
 macro avg
              0.82
                            0.83
                     0.84
weighted avg
               0.84
                      0.83
                             0.83
                                    4364
```

```
Classification Report:
       precision recall f1-score support
           0.00
                  0.00
                         0.00
      1
                                  305
      2
          0.43
                  0.89
                         0.58
                                  618
      3
          0.00
                  0.00
                         0.00
                                  51
      4
          0.00
                  0.00
                         0.00
                                  93
      5
          0.00
                  0.00
                         0.00
                                  14
      6
          0.00
                  0.00
                         0.00
                                   6
      7
          0.00
                  0.00
                         0.00
                                   8
     8
          0.00
                  0.00
                          0.00
                                   2
     9
           0.00
                  0.00
                          0.00
                                  38
     10
           0.00
                  0.00
                          0.00
                                   24
     11
           0.00
                  0.00
                          0.00
                                   5
     12
           0.00
                   0.00
                          0.00
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
     14
                   0.01
           0.29
                          0.02
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
           0.00
                   0.00
                          0.00
                                   12
     16
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                  0.00
                          0.00
                                   3
     19
           0.00
                   0.00
                          0.00
                                   39
     20
           0.00
                   0.00
                          0.00
                                   2
     21
           0.00
                  0.00
                          0.00
                                   91
     22
           0.78
                   0.91
                          0.84
                                  2644
  accuracy
                         0.68
                                4364
 macro avg
               0.07
                      80.0
                              0.07
                                     4364
weighted avg
                0.55
                        0.68
                               0.59
                                       4364
```

Chunk

Confusion Matrix:

[[2644 0]

```
Classification Report:
    precision recall f1-score support

0 0.61 1.00 0.75 2644
1 0.00 0.00 1720
```

accuracy 0.61 4364 macro avg 0.30 0.50 0.38 4364 weighted avg 0.37 0.61 0.46 4364

	Classification Report: precision recall f1-score support								
р	recision	recall	t1-score	support					
1	0.00	0.00	0.00	305					
2	0.00	0.00	0.00	618					
3	0.00	0.00	0.00	51					
3 4	0.00	0.00	0.00	93					
5	0.00	0.00	0.00	93 14					
6	0.00	0.00	0.00	6					
7	0.00	0.00	0.00	8					
8	0.00	0.00	0.00	2					
9	0.00	0.00	0.00	38					
10	0.00	0.00	0.00	24					
11	0.00	0.00	0.00	5					
12	0.00	0.00	0.00	34					
13	0.00	0.00	0.00	31					
14	0.00	0.00	0.00	214					
15	0.00	0.00	0.00	129					
16	0.00	0.00	0.00	12					
17	0.00	0.00	0.00	1					
18	0.00	0.00	0.00	3					
19	0.00	0.00	0.00	39					
20	0.00	0.00	0.00	2					
21	0.00	0.00	0.00	91					
22	0.61	1.00	0.75	2644					
accura	су		0.61	1364					
macro a	•	03 0	.05 0.0	3 4364					
weighted	eighted avg 0.37 0.61 0.46 4364								

Dependency-head

Confusion Matrix:

[[1804 840]

[23 1697]]

```
Classification Report:
       precision recall f1-score support
     0
          0.99
                  0.68
                         0.81
                                2644
                  0.99
      1
          0.67
                         0.80
                                1720
  accuracy
                        0.80
                               4364
               0.83
                      0.83
                             0.80
                                    4364
 macro avg
weighted avg
                0.86
                       0.80
                              0.80
                                     4364
```

```
Classification Report:
       precision
                  recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  305
      2
           0.00
                  0.00
                          0.00
                                  618
      3
           0.00
                  0.00
                          0.00
                                   51
      4
           0.00
                  0.00
                          0.00
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
     8
                                   2
           0.00
                  0.00
                          0.00
     9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.00
                   0.00
                          0.00
                                   24
     11
           0.00
                   0.00
                          0.00
                                    5
     12
           0.00
                   0.00
                           0.00
                                   34
     13
           0.00
                   0.00
                           0.00
                                   31
     14
           0.00
                   0.00
                           0.00
                                   214
     15
           0.00
                   0.00
                           0.00
                                   129
     16
           0.00
                   0.00
                           0.00
                                   12
     17
           0.00
                   0.00
                           0.00
                                    1
     18
           0.00
                   0.00
                           0.00
                                    3
     19
           0.00
                   0.00
                           0.00
                                   39
     20
           0.00
                   0.00
                           0.00
                                    2
     21
                   0.00
                           0.00
                                   91
           0.00
     22
           0.61
                   1.00
                           0.75
                                  2644
                         0.61
                                 4364
  accuracy
                       0.05
                              0.03
 macro avg
               0.03
                                      4364
                                0.46
                                       4364
weighted avg
                0.37
                        0.61
```

Dependency

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
                  1.00
     0
          0.61
                         0.75
                                 2644
      1
          0.00
                  0.00
                         0.00
                                 1720
                                4364
  accuracy
                         0.61
                      0.50
 macro avg
               0.30
                              0.38
                                     4364
weighted avg
                0.37
                       0.61
                               0.46
                                       4364
```

```
Classification Report:

precision recall f1-score support
```

1	0.00	0.00	0.00	305					
2	0.00	0.00	0.00	618					
3	0.00	0.00	0.00	51					
4	0.00	0.00	0.00	93					
5	0.00	0.00	0.00	14					
6	0.00	0.00	0.00	6					
7	0.00	0.00	0.00	8					
8	0.00	0.00	0.00	2					
9	0.00	0.00	0.00	38					
10	0.00	0.00	0.00	24					
11	0.00	0.00	0.00	5					
12	0.00	0.00	0.00	34					
13	0.00	0.00	0.00	31					
14	0.00	0.00	0.00	214					
15	0.00	0.00	0.00	129					
16	0.00	0.00	0.00	12					
17	0.00	0.00	0.00	1					
18	0.00	0.00	0.00	3					
19	0.00	0.00	0.00	39					
20	0.00	0.00	0.00	2					
21	0.00	0.00	0.00	91					
22	0.61	1.00	0.75	2644					
accurac	•		0.61	4364					
	macro avg 0.03 0.05 0.03 4364								
weighted	weighted avg 0.37 0.61 0.46 4364								

Head_both dependency

Confusion Matrix: [[2169 475] [255 1465]]

Classification Report:									
precision	recall f1-so	ore suppo	ort						
0 0.89	0.82 0.8	6 2644							
1 0.76	0.85 0.8	0 1720							
accuracy	0.83	4364							
macro avg 0	.82 0.84	0.83 43	64						
weighted avg	0.84 0.83	0.83 4	364						

Classification Report:

```
precision recall f1-score support
          0.56
                  0.67
                         0.61
     1
                                 305
     2
          0.58
                  0.70
                         0.64
                                 618
      3
          0.00
                  0.00
                                  51
                         0.00
     4
          0.24
                         0.07
                  0.04
                                 93
     5
          0.00
                  0.00
                         0.00
                                  14
     6
          0.00
                  0.00
                         0.00
                                  6
     7
          0.00
                  0.00
                         0.00
                                  8
                                  2
     8
          0.00
                  0.00
                         0.00
     9
          0.00
                  0.00
                         0.00
                                  38
     10
           0.50
                  0.04
                          0.08
                                  24
     11
           0.00
                  0.00
                          0.00
                                   5
     12
           0.33
                  0.03
                          0.05
                                  34
     13
           0.00
                  0.00
                          0.00
                                  31
     14
           0.27
                  0.01
                          0.03
                                  214
     15
           0.40
                  0.02
                          0.03
                                  129
     16
           0.00
                  0.00
                          0.00
                                  12
     17
           0.00
                  0.00
                          0.00
                                   1
     18
           0.00
                  0.00
                          0.00
                                   3
     19
           0.00
                  0.00
                          0.00
                                  39
     20
                  0.00
                          0.00
                                   2
           0.00
     21
           0.47
                  0.21
                          0.29
                                  91
     22
           0.76
                  0.91
                          0.83
                                 2644
  accuracy
                        0.70
                                4364
               0.19
                      0.12
                             0.12
                                     4364
 macro avg
weighted avg
                0.63
                       0.70
                               0.65
                                      4364
```

Head-POS

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
                                2644
     0
          0.61
                  1.00
                         0.75
          0.00
      1
                  0.00
                         0.00
                                1720
  accuracy
                        0.61
                                4364
 macro avg
               0.30
                      0.50
                             0.38
                                     4364
weighted avg
                0.37
                       0.61
                              0.46
                                      4364
```

```
Classification Report:
    precision recall f1-score support

1 0.00 0.00 0.00 305
2 0.00 0.00 618
```

```
3
           0.00
                  0.00
                          0.00
                                  51
      4
           0.00
                  0.00
                          0.00
                                  93
      5
           0.00
                  0.00
                          0.00
                                  14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
          0.00
                  0.00
                          0.00
                                   8
      8
           0.00
                  0.00
                          0.00
                                   2
      9
           0.00
                  0.00
                          0.00
                                  38
     10
           0.00
                   0.00
                          0.00
                                   24
                                   5
     11
           0.00
                   0.00
                          0.00
     12
           0.00
                   0.00
                          0.00
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
                                   39
     19
           0.00
                   0.00
                          0.00
     20
                          0.00
                                   2
           0.00
                   0.00
                                   91
     21
           0.00
                   0.00
                          0.00
     22
           0.61
                   1.00
                          0.75
                                  2644
                         0.61
                                4364
  accuracy
                       0.05
                              0.03
                                      4364
 macro avg
               0.03
weighted avg
                0.37
                        0.61
                               0.46
                                       4364
```

Head

Confusion Matrix:

[[2273 371]

[1102 618]]

```
Classification Report:
       precision recall f1-score support
     0
           0.67
                  0.86
                         0.76
                                 2644
      1
          0.62
                  0.36
                         0.46
                                 1720
                         0.66
                                4364
  accuracy
 macro avg
               0.65
                      0.61
                              0.61
                                     4364
weighted avg
                0.65
                       0.66
                               0.64
                                      4364
Classification Report:
       precision recall f1-score support
      1
          0.48
                  0.15
                         0.23
                                 305
      2
          0.67
                  0.22
                         0.33
                                 618
      3
          0.00
                  0.00
                         0.00
                                  51
      4
          0.29
                  0.02
                         0.04
                                  93
      5
          0.00
                  0.00
                         0.00
                                  14
           0.00
      6
                  0.00
                         0.00
                                  6
      7
           0.00
                  0.00
                                  8
                         0.00
```

```
8
          0.00
                  0.00
                         0.00
                                  2
     9
          0.00
                  0.00
                         0.00
                                  38
     10
           0.50
                  0.04
                          0.08
                                  24
                  0.00
                          0.00
                                   5
     11
           0.00
     12
           0.25
                  0.03
                          0.05
                                  34
                  0.00
                          0.00
     13
           0.00
                                  31
     14
           0.00
                  0.00
                          0.00
                                  214
     15
           0.00
                  0.00
                          0.00
                                  129
     16
           0.00
                  0.00
                          0.00
                                  12
     17
                  0.00
                          0.00
           0.00
                                   1
     18
           0.00
                  0.00
                          0.00
                                   3
     19
           0.00
                  0.00
                          0.00
                                  39
     20
           0.00
                  0.00
                          0.00
                                   2
     21
           0.41
                  0.18
                          0.25
                                  91
     22
                          0.76
           0.63
                  0.96
                                 2644
                         0.63
                                4364
  accuracy
                      0.07
 macro avg
               0.15
                              0.08
                                     4364
weighted avg
                0.53
                       0.63
                               0.53
                                      4364
```

Head_with_chunk

Confusion Matrix:

[[2264 380]

[1099 621]]

```
Classification Report:
       precision recall f1-score support
     0
          0.67
                  0.86
                         0.75
                                 2644
      1
          0.62
                  0.36
                         0.46
                                 1720
                        0.66
                                4364
  accuracy
 macro avg
               0.65
                      0.61
                              0.61
                                     4364
weighted avg
                0.65
                       0.66
                               0.64
                                      4364
```

```
Classification Report:
       precision recall f1-score support
      1
           0.50
                  0.15
                          0.23
                                  305
      2
           0.67
                  0.22
                          0.33
                                  618
      3
           0.00
                  0.00
                          0.00
                                   51
      4
           0.29
                  0.02
                          0.04
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
           0.00
                  0.00
                          0.00
                                   2
      9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.50
                   0.04
                           0.08
                                   24
```

```
11
           0.00
                   0.00
                          0.00
                                   5
     12
           0.25
                   0.03
                          0.05
                                   34
     13
                   0.00
                          0.00
           0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
                   0.00
                          0.00
     16
           0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
                                   39
           0.00
                   0.00
                          0.00
                                   2
     20
           0.00
                   0.00
                          0.00
     21
           0.41
                   0.18
                          0.25
                                   91
                                  2644
     22
           0.63
                   0.96
                          0.76
  accuracy
                         0.63
                                4364
               0.15
                      0.07
                              0.08
 macro avg
                                      4364
weighted avg
                0.53
                        0.63
                               0.53
                                       4364
```

head_with_dependency-head

Confusion Matrix:

[[2024 620]

[202 1518]]

```
Classification Report:
       precision
                  recall f1-score support
     0
          0.91
                  0.77
                         0.83
                                 2644
      1
          0.71
                  0.88
                         0.79
                                 1720
                         0.81
                                4364
  accuracy
 macro avg
               0.81
                      0.82
                              0.81
                                     4364
                       0.81
                               0.81
                                      4364
weighted avg
                0.83
```

```
Classification Report:
       precision recall f1-score support
      1
           0.54
                  0.38
                          0.45
                                  305
      2
           0.54
                  0.39
                                  618
                          0.45
      3
           0.00
                  0.00
                          0.00
                                   51
      4
           0.25
                  0.02
                          0.04
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
     8
           0.00
                  0.00
                          0.00
                                   2
     9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.50
                   0.04
                           0.08
                                   24
     11
           0.00
                   0.00
                           0.00
                                    5
     12
           0.33
                   0.03
                           0.05
                                   34
     13
           0.00
                   0.00
                           0.00
                                   31
     14
           0.27
                   0.01
                           0.03
                                   214
     15
           0.00
                   0.00
                           0.00
                                   129
```

```
16
           0.00
                  0.00
                          0.00
                                  12
     17
           0.00
                  0.00
                          0.00
                                   1
     18
                          0.00
                                   3
           0.00
                  0.00
     19
                  0.00
                          0.00
                                  39
           0.00
     20
                                   2
           0.00
                  0.00
                          0.00
     21
                          0.29
                                  91
           0.45
                  0.21
     22
           0.67
                  0.92
                          0.78
                                 2644
                         0.65
                                4364
  accuracy
                      0.09
                              0.10
                                     4364
 macro avg
               0.16
weighted avg
                0.56
                       0.65
                               0.58
                                      4364
```

head_with_dependency

Confusion Matrix:

[[2083 561]

[625 1095]]

```
Classification Report:
       precision recall f1-score support
      0
           0.77
                  0.79
                          0.78
                                 2644
      1
           0.66
                  0.64
                          0.65
                                 1720
                         0.73
                                 4364
  accuracy
 macro avg
               0.72
                       0.71
                              0.71
                                      4364
                0.73
                        0.73
                               0.73
                                       4364
weighted avg
Classification Report:
       precision recall f1-score support
      1
           0.60
                  0.32
                          0.42
                                  305
      2
           0.66
                  0.33
                          0.44
                                  618
      3
           0.00
                  0.00
                          0.00
                                  51
      4
           0.22
                  0.02
                          0.04
                                  93
      5
           0.00
                  0.00
                          0.00
                                  14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                          0.00
                                   8
                  0.00
                                   2
      8
           0.00
                  0.00
                          0.00
      9
           0.00
                  0.00
                          0.00
                                  38
     10
                   0.04
                                   24
           1.00
                          0.08
     11
           0.00
                   0.00
                          0.00
                                   5
                   0.03
                                   34
     12
           0.33
                          0.05
     13
           0.00
                   0.00
                          0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
                          0.00
                                   39
           0.00
                   0.00
     20
                   0.00
                          0.00
                                    2
           0.00
```

21 0.46 0.18 0.25 91 22 0.66 0.95 0.78 2644 0.65 4364 accuracy macro avg 0.18 0.09 0.09 4364 weighted avg 0.65 0.57 4364 0.56

head_with_head_POS

Confusion Matrix: [[2256 388] [1081 639]]

```
Classification Report:
       precision recall f1-score support
     0
          0.68
                  0.85
                         0.75
                                2644
      1
          0.62
                  0.37
                         0.47
                                1720
                        0.66
                                4364
  accuracy
               0.65
                      0.61
                             0.61
                                     4364
 macro avg
weighted avg
                0.65
                       0.66
                               0.64
                                      4364
```

```
Classification Report:
       precision recall f1-score support
                          0.23
      1
           0.48
                  0.15
                                  305
      2
           0.67
                  0.22
                          0.33
                                  618
      3
           0.00
                  0.00
                          0.00
                                  51
      4
           0.29
                  0.02
                          0.04
                                  93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
           0.00
                  0.00
                          0.00
                                   2
      9
           0.00
                  0.00
                          0.00
                                   38
                                   24
     10
           0.50
                   0.04
                          0.08
                   0.00
                                   5
     11
           0.00
                          0.00
     12
           0.25
                   0.03
                           0.05
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                   214
     15
           0.00
                   0.00
                           0.00
                                   129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                    1
     18
           0.00
                   0.00
                          0.00
                                    3
     19
           0.00
                   0.00
                           0.00
                                   39
                                    2
     20
           0.00
                   0.00
                           0.00
     21
           0.40
                   0.18
                           0.24
                                   91
     22
           0.63
                   0.96
                           0.76
                                  2644
```

0.63 4364 accuracy 0.15 0.07 80.0 4364 macro avg 0.53 weighted avg 0.53 0.63 4364

postposition

Confusion Matrix:

[[2644 0]

[1720 0]]

Classification Report:

precision recall f1-score support

0.75 0 0.61 1.00 2644 0.00 1 0.00 0.00 1720

accuracy 0.61 4364 0.50 0.38 4364 macro avg 0.30 0.37 0.61 0.46 4364 weighted avg

Classification Report:

0.00

precision recall f1-score support

1 0.00 0.00 0.00 305

2 0.00 0.00 0.00 618

3 0.00 0.00 0.00 51

4 0.00 0.00 93 0.00 5

0.00

14

0.00 6 0.00 0.00 0.00 6

7 0.00 0.00 0.00 8

8 0.00 0.00 0.00 2

9 0.00 0.00 0.00 38

10 0.00 0.00 0.00 24

11 0.00 0.00 0.00 5

12 0.00 34 0.00 0.00

0.00 31 13 0.00 0.00

14 0.00 0.00 0.00 214

15 0.00 0.00 0.00 129

16 0.00 0.00 0.00 12

17 0.00 0.00 0.00 1

18 0.00 0.00 0.00 3

19 0.00 0.00 0.00 39

20 0.00 0.00 0.00 2

21 0.00 0.00 0.00 91

22 0.61 1.00 0.75 2644

accuracy 0.61 4364

0.05 0.03 4364 macro avg 0.03 weighted avg 0.37 0.61 0.46 4364

Combination with Different Parameter For Identification and Classification Support Vector Classifier Using Word2Vec

Dependecy-head, Dependency

Confusion Matrix:

[[2108 536]

[209 1511]]

```
Classification Report:
       precision recall f1-score support
     0
          0.91
                  0.80
                         0.85
                                 2644
      1
          0.74
                  0.88
                         0.80
                                 1720
  accuracy
                        0.83
                                4364
 macro avg
               0.82
                      0.84
                             0.83
                                     4364
                       0.83
                               0.83
                                      4364
weighted avg
                0.84
```

```
Classification Report:
       precision recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  305
      2
           0.43
                  0.89
                          0.58
                                  618
      3
           0.00
                  0.00
                         0.00
                                  51
      4
          0.00
                  0.00
                         0.00
                                  93
      5
           0.00
                  0.00
                         0.00
                                  14
      6
                  0.00
          0.00
                          0.00
                                   6
                  0.00
      7
           0.00
                         0.00
                                   8
     8
           0.00
                  0.00
                          0.00
                                   2
     9
           0.00
                  0.00
                          0.00
                                  38
     10
           0.00
                  0.00
                          0.00
                                   24
                   0.00
                          0.00
                                   5
     11
           0.00
     12
           0.00
                   0.00
                          0.00
                                   34
                   0.00
     13
           0.00
                          0.00
                                   31
     14
           0.29
                   0.01
                          0.02
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
                          0.00
                                   39
           0.00
                   0.00
                                   2
     20
           0.00
                   0.00
                          0.00
     21
           0.00
                   0.00
                          0.00
                                   91
     22
           0.78
                   0.91
                          0.84
                                  2644
                         0.68
                                4364
  accuracy
 macro avg
               0.07
                      0.08
                              0.07
                                      4364
weighted avg
                0.55
                        0.68
                               0.59
                                       4364
```

Chunk

Confusion Matrix:

[[2644 0]

[1720 0]]

```
Classification Report:
       precision recall f1-score support
     0
                  1.00
           0.61
                         0.75
                                 2644
          0.00
      1
                  0.00
                         0.00
                                 1720
                                4364
  accuracy
                         0.61
 macro avg
               0.30
                      0.50
                              0.38
                                     4364
weighted avg
                0.37
                        0.61
                               0.46
                                      4364
```

```
Classification Report:
       precision recall f1-score support
           0.00
                  0.00
                          0.00
                                  305
      1
      2
           0.00
                  0.00
                          0.00
                                  618
      3
                  0.00
           0.00
                          0.00
                                   51
      4
           0.00
                  0.00
                          0.00
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
           0.00
                  0.00
                                   2
                          0.00
      9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.00
                   0.00
                           0.00
                                   24
                   0.00
                                    5
     11
           0.00
                           0.00
                   0.00
                                   34
     12
            0.00
                           0.00
     13
           0.00
                   0.00
                           0.00
                                   31
     14
                   0.00
                           0.00
           0.00
                                   214
     15
                   0.00
                                   129
            0.00
                           0.00
     16
            0.00
                   0.00
                           0.00
                                   12
                   0.00
                           0.00
     17
            0.00
                                    1
     18
            0.00
                   0.00
                           0.00
                                    3
     19
            0.00
                   0.00
                           0.00
                                   39
     20
            0.00
                   0.00
                           0.00
                                    2
     21
            0.00
                   0.00
                           0.00
                                   91
     22
            0.61
                   1.00
                           0.75
                                  2644
                         0.61
                                 4364
  accuracy
 macro avg
               0.03
                       0.05
                               0.03
                                      4364
weighted avg
                0.37
                        0.61
                                0.46
                                       4364
```

Dependecy-head

Confusion Matrix:

[[1804 840] [23 1697]]

Classification	on Report:			
pre	cision red	call f1-sco	ore su	pport
0	0.99 0.6	8 0.81	264	4
	0.67 0.9			
accuracy		0.80	4364	1
macro avg			0.80	4364
weighted a	vg 0.86	0.80	0.80	4364

Classif	icati	on Repo	ort:								
	pre	ecision	recall	f1-score	suppo	ort					
	1	0.00	0.00	0.00	305						
	2	0.00	0.00	0.00	618						
	3	0.00	0.00	0.00	51						
	4	0.00	0.00	0.00	93						
	5	0.00	0.00	0.00	14						
	6	0.00	0.00	0.00	6						
	7	0.00	0.00	0.00	8						
	8	0.00	0.00	0.00	2						
	9	0.00	0.00	0.00	38						
] 1	10	0.00	0.00	0.00	24						
1	11	0.00	0.00	0.00	5						
1	12	0.00	0.00	0.00	34						
1	13	0.00	0.00	0.00	31						
	14	0.00	0.00	0.00	214						
] 1	15	0.00	0.00	0.00	129						
	16	0.00	0.00	0.00	12						
	17	0.00	0.00	0.00	1						
	18	0.00	0.00	0.00	3						
	19	0.00	0.00	0.00	39						
	20	0.00	0.00	0.00	2						
	21	0.00	0.00	0.00	91						
2	22	0.61	1.00	0.75	2644						
	ıracy				1364						
macı		_		.05 0.0		364					
weigh	ted a	avg C).37	0.61 0.	46 4	4364					

Dependency

Confusion Matrix:

[[2644 0]

```
Classification Report: precision recall f1-score support
```

```
0
          0.61
                  1.00
                         0.75
                                2644
     1
          0.00
                  0.00
                         0.00
                                1720
                        0.61
                               4364
  accuracy
 macro avg
               0.30
                      0.50
                             0.38
                                    4364
                              0.46
                                      4364
weighted avg
                0.37
                       0.61
```

```
Classification Report:
                  recall f1-score support
       precision
          0.00
                  0.00
                         0.00
      1
                                  305
      2
           0.00
                  0.00
                         0.00
                                  618
      3
          0.00
                  0.00
                          0.00
                                  51
      4
           0.00
                  0.00
                         0.00
                                  93
      5
           0.00
                  0.00
                         0.00
                                  14
      6
          0.00
                  0.00
                         0.00
                                   6
      7
          0.00
                  0.00
                         0.00
                                   8
                                   2
      8
           0.00
                  0.00
                          0.00
      9
           0.00
                  0.00
                          0.00
                                  38
     10
           0.00
                   0.00
                          0.00
                                   24
     11
           0.00
                   0.00
                          0.00
                                   5
                   0.00
                                   34
     12
           0.00
                          0.00
     13
           0.00
                   0.00
                          0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
           0.00
                   0.00
                          0.00
                                   12
     16
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
           0.00
                   0.00
                          0.00
                                   39
     20
                   0.00
                          0.00
                                   2
           0.00
     21
           0.00
                   0.00
                          0.00
                                   91
     22
           0.61
                   1.00
                          0.75
                                  2644
                                4364
  accuracy
                         0.61
               0.03
                      0.05
                              0.03
                                      4364
 macro avg
                0.37
                               0.46
weighted avg
                        0.61
                                       4364
```

Head_both_dependency

Confusion Matrix:

[[2108 536] [209 1511]]

```
Classification Report:
       precision recall f1-score support
      0
           0.91
                  0.80
                          0.85
                                 2644
      1
           0.74
                  0.88
                          0.80
                                 1720
```

accuracy 0.83 4364 macro avg 0.82 0.84 0.83 4364 weighted avg 0.84 0.83 0.83 4364

```
Classification Report:
       precision recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  305
      2
           0.43
                  0.89
                          0.58
                                  618
      3
           0.00
                  0.00
                          0.00
                                  51
      4
           0.00
                  0.00
                          0.00
                                  93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
           0.00
                  0.00
                          0.00
                                   2
      9
           0.00
                  0.00
                          0.00
                                   38
     10
                   0.00
                                   24
           0.00
                          0.00
                   0.00
                           0.00
                                    5
     11
           0.00
     12
            0.00
                   0.00
                           0.00
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
     14
            0.22
                   0.01
                           0.02
                                   214
                   0.00
     15
            0.00
                           0.00
                                   129
     16
            0.00
                   0.00
                           0.00
                                   12
           0.00
     17
                   0.00
                           0.00
                                    1
     18
            0.00
                   0.00
                           0.00
                                    3
     19
                   0.00
                           0.00
                                   39
            0.00
     20
                   0.00
                           0.00
                                    2
            0.00
     21
            0.00
                   0.00
                           0.00
                                   91
     22
            0.78
                   0.91
                           0.84
                                  2644
                         0.68
                                 4364
  accuracy
 macro avg
               0.07
                       0.08
                              0.07
                                      4364
weighted avg
                0.54
                        0.68
                                0.59
                                       4364
```

Head POS

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
     0
          0.61
                  1.00
                         0.75
                                 2644
      1
          0.00
                  0.00
                         0.00
                                 1720
                         0.61
                                4364
  accuracy
               0.30
                      0.50
                              0.38
                                     4364
 macro avg
                0.37
                               0.46
weighted avg
                       0.61
                                      4364
```

```
Classification Report:
        precision
                  recall f1-score support
      1
           0.00
                  0.00
                          0.00
                                  305
      2
           0.00
                  0.00
                          0.00
                                  618
      3
           0.00
                  0.00
                          0.00
                                   51
      4
           0.00
                  0.00
                          0.00
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
                                   2
           0.00
                  0.00
                          0.00
      9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.00
                   0.00
                           0.00
                                   24
     11
           0.00
                   0.00
                           0.00
                                    5
     12
            0.00
                   0.00
                           0.00
                                   34
     13
            0.00
                   0.00
                           0.00
                                   31
     14
            0.00
                   0.00
                           0.00
                                   214
     15
            0.00
                   0.00
                           0.00
                                   129
     16
            0.00
                   0.00
                           0.00
                                   12
     17
            0.00
                   0.00
                           0.00
                                    1
     18
            0.00
                   0.00
                           0.00
                                    3
     19
            0.00
                   0.00
                           0.00
                                   39
     20
            0.00
                   0.00
                           0.00
                                    2
     21
            0.00
                   0.00
                           0.00
                                   91
     22
            0.61
                   1.00
                           0.75
                                   2644
                                 4364
                         0.61
  accuracy
                       0.05
                               0.03
 macro avg
               0.03
                                      4364
                                0.46
                                       4364
weighted avg
                 0.37
                        0.61
```

Head

Confusion Matrix:

[[2644 0]

[1720 0]]

```
Classification Report:
       precision recall f1-score support
                  1.00
     0
          0.61
                         0.75
                                 2644
      1
          0.00
                  0.00
                         0.00
                                 1720
                                4364
  accuracy
                         0.61
                      0.50
 macro avg
               0.30
                              0.38
                                     4364
                0.37
                       0.61
                               0.46
                                       4364
weighted avg
```

```
Confusion Matrix:
```

[[2644 0]

```
Classification Report:
       precision recall f1-score support
     0
          0.61
                  1.00
                         0.75
                                 2644
          0.00
                  0.00
                         0.00
                                 1720
      1
  accuracy
                        0.61
                                4364
 macro avg
               0.30
                      0.50
                              0.38
                                     4364
                       0.61
                               0.46
                                      4364
weighted avg
                0.37
```

```
Classification Report:
       precision recall f1-score support
      1
          0.00
                  0.00
                         0.00
                                  305
      2
          0.00
                  0.00
                         0.00
                                  618
      3
          0.00
                  0.00
                         0.00
                                  51
      4
          0.00
                  0.00
                         0.00
                                  93
      5
          0.00
                  0.00
                         0.00
                                  14
      6
          0.00
                  0.00
                         0.00
                                   6
      7
          0.00
                  0.00
                         0.00
                                   8
      8
          0.00
                  0.00
                         0.00
                                   2
     9
          0.00
                  0.00
                         0.00
                                  38
     10
                  0.00
           0.00
                          0.00
                                   24
     11
           0.00
                   0.00
                          0.00
                                   5
     12
           0.00
                  0.00
                          0.00
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
     14
           0.00
                   0.00
                          0.00
                                  214
     15
           0.00
                   0.00
                          0.00
                                  129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                  0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                   3
     19
           0.00
                  0.00
                          0.00
                                   39
                                   2
     20
           0.00
                   0.00
                          0.00
     21
           0.00
                   0.00
                          0.00
                                   91
     22
           0.61
                   1.00
                          0.75
                                  2644
  accuracy
                         0.61
                                4364
 macro avg
               0.03
                      0.05
                              0.03
                                     4364
weighted avg
                0.37
                        0.61
                               0.46
                                       4364
```

Head_with-Chunk

Confusion Matrix:

[[2644 0]

```
Classification Report:

precision recall f1-score support

0 0.61 1.00 0.75 2644
```

```
1
          0.00
                 0.00
                        0.00
                                1720
  accuracy
                        0.61
                               4364
                     0.50
                             0.38
 macro avg
              0.30
                                    4364
weighted avg
               0.37
                       0.61
                              0.46
                                     4364
```

```
Classification Report:
       precision recall f1-score support
                  0.71
      1
          0.56
                          0.62
                                  320
          0.55
                  0.79
      2
                          0.65
                                  589
      3
           0.00
                  0.00
                          0.00
                                  52
      4
          0.71
                  0.34
                          0.46
                                  104
      5
           0.00
                  0.00
                          0.00
                                  18
      6
           0.00
                  0.00
                          0.00
                                  17
      7
          0.00
                  0.00
                          0.00
                                   9
                                   2
     8
          0.00
                  0.00
                          0.00
     9
           0.45
                  0.13
                          0.20
                                   39
     10
           0.60
                   0.18
                          0.27
                                   17
     11
           1.00
                   0.20
                          0.33
                                   5
     12
           0.59
                   0.38
                          0.47
                                   26
                   0.08
                                   25
     13
           0.33
                          0.13
     14
           0.46
                   0.42
                          0.44
                                   195
           0.72
     15
                   0.44
                          0.54
                                   110
     16
           0.00
                   0.00
                          0.00
                                   15
     17
                   0.00
                          0.00
           0.00
                                   1
                   0.00
                          0.00
                                   2
     18
           0.00
     19
           0.00
                   0.00
                          0.00
                                   46
     20
                   0.00
                          0.00
           0.00
                                   1
     21
                                   97
           0.70
                   0.71
                          0.70
     22
          0.61
                   0.37
                          0.55
                                  2644
  accuracy
                         0.56
                                4364
                              0.23
                       0.21
                                      4364
 macro avg
               0.32
                               0.52
weighted avg
                0.51
                        0.56
                                       4364
```

Head_with_both_dependency

Confusion Matrix:

[[1804 840]

[23 1697]]

```
Classification Report:
       precision recall f1-score support
     0
          0.99
                  0.68
                         0.81
                                2644
          0.67
                  0.99
                         0.80
                                1720
                        0.80
                                4364
  accuracy
                      0.83
                             0.80
 macro avg
               0.83
                                    4364
```

weighted avg 0.86 0.80 0.80 4364

```
Classification Report:
       precision
                  recall f1-score support
           0.00
                  0.00
                          0.00
      1
                                  305
      2
           0.00
                  0.00
                          0.00
                                  618
      3
           0.00
                  0.00
                          0.00
                                   51
      4
           0.00
                  0.00
                          0.00
                                   93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
      8
                                   2
           0.00
                  0.00
                          0.00
      9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.00
                   0.00
                           0.00
                                   24
                                    5
                   0.00
     11
           0.00
                           0.00
     12
                   0.00
                           0.00
                                   34
            0.00
     13
            0.00
                   0.00
                           0.00
                                   31
     14
           0.00
                   0.00
                           0.00
                                   214
     15
            0.00
                   0.00
                           0.00
                                   129
                   0.00
     16
            0.00
                           0.00
                                   12
     17
           0.00
                   0.00
                           0.00
                                    1
     18
                   0.00
                           0.00
                                    3
           0.00
           0.00
     19
                   0.00
                           0.00
                                   39
                                    2
     20
                           0.00
            0.00
                   0.00
     21
                   0.00
                           0.00
                                   91
            0.00
     22
            0.61
                   1.00
                           0.75
                                  2644
                                 4364
  accuracy
                         0.61
               0.03
                       0.05
                               0.03
                                      4364
 macro avg
weighted avg
                0.37
                        0.61
                                0.46
                                       4364
```

Head with dependency

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
     0
          0.61
                  1.00
                         0.75
                                 2644
      1
          0.00
                  0.00
                         0.00
                                 1720
                         0.61
                                4364
  accuracy
 macro avg
               0.30
                      0.50
                              0.38
                                     4364
weighted avg
                0.37
                               0.46
                       0.61
                                      4364
```

```
Classification Report:
                  recall f1-score support
       precision
      1
           0.00
                  0.00
                          0.00
                                  305
      2
           0.00
                  0.00
                          0.00
                                  618
      3
           0.00
                  0.00
                          0.00
                                  51
      4
           0.00
                  0.00
                          0.00
                                  93
      5
           0.00
                  0.00
                          0.00
                                   14
      6
           0.00
                  0.00
                          0.00
                                   6
      7
           0.00
                  0.00
                          0.00
                                   8
                                   2
      8
           0.00
                  0.00
                          0.00
      9
           0.00
                  0.00
                          0.00
                                   38
     10
           0.00
                   0.00
                          0.00
                                   24
                   0.00
                          0.00
                                   5
     11
           0.00
     12
           0.00
                   0.00
                          0.00
                                   34
     13
           0.00
                   0.00
                          0.00
                                   31
                   0.00
     14
           0.00
                          0.00
                                   214
     15
           0.00
                   0.00
                          0.00
                                   129
     16
           0.00
                   0.00
                          0.00
                                   12
     17
           0.00
                   0.00
                          0.00
                                   1
     18
           0.00
                   0.00
                          0.00
                                    3
     19
           0.00
                   0.00
                          0.00
                                   39
     20
                   0.00
                                    2
           0.00
                          0.00
     21
                   0.00
                          0.00
                                   91
           0.00
     22
           0.61
                   1.00
                          0.75
                                  2644
  accuracy
                         0.61
                                 4364
 macro avg
               0.03
                       0.05
                              0.03
                                      4364
weighted avg
                0.37
                        0.61
                               0.46
                                       4364
```

Head_with_head_POS

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
          0.61
                  1.00
                         0.75
                                2644
     0
      1
          0.00
                  0.00
                         0.00
                                1720
                        0.61
                                4364
  accuracy
 macro avg
               0.30
                      0.50
                            0.38
                                     4364
```

weighted avg 0.37 0.61 0.46 4364

Classificat	ion Repo	ort:		
pr	ecision	recall	f1-score	e support
1	0.00	0.00	0.00	305
2	0.00	0.00	0.00	618
3	0.00	0.00	0.00	51
4	0.00	0.00	0.00	93
5	0.00	0.00	0.00	14
6	0.00	0.00	0.00	6
7	0.00	0.00	0.00	8
8	0.00	0.00	0.00	2
9	0.00	0.00	0.00	38
10	0.00	0.00	0.00	24
11	0.00	0.00	0.00	5
12	0.00	0.00	0.00	34
13	0.00	0.00	0.00	31
14	0.00	0.00	0.00	214
15	0.00	0.00	0.00	129
16	0.00	0.00	0.00	12
17	0.00	0.00	0.00	1
18	0.00	0.00	0.00	3
19	0.00	0.00	0.00	39
20	0.00	0.00	0.00	2
21	0.00	0.00	0.00	91
22	0.61	1.00	0.75	2644
accurac	V		0.61	4364
macro a	•	03 0.	0.01	
weighted	_			0.46 4364 0.46 4364
weignteu	avg (,.57	J.U1 U.	,, _{то} тоот

Postposition

Confusion Matrix:

[[2644 0]

```
Classification Report:
       precision recall f1-score support
                        0.75
     0
          0.61
                 1.00
                                2644
     1
          0.00
                 0.00
                        0.00
                               1720
  accuracy
                        0.61
                               4364
 macro avg
              0.30
                     0.50
                            0.38
                                   4364
weighted avg
               0.37
                       0.61
                              0.46
                                     4364
```

```
Classification Report:

precision recall f1-score support
```

```
1
         0.00
                0.00
                        0.00
                                305
    2
         0.00
                0.00
                        0.00
                                618
    3
         0.00
                0.00
                        0.00
                                51
         0.00
                0.00
                                93
    4
                        0.00
    5
         0.00
                0.00
                        0.00
                                14
    6
         0.00
                0.00
                        0.00
                                 6
    7
         0.00
                0.00
                        0.00
                                 8
    8
         0.00
                0.00
                        0.00
                                 2
    9
         0.00
                0.00
                        0.00
                                38
   10
         0.00
                 0.00
                        0.00
                                 24
   11
         0.00
                 0.00
                        0.00
                                 5
   12
                 0.00
                        0.00
                                 34
         0.00
                 0.00
   13
          0.00
                        0.00
                                 31
   14
         0.00
                 0.00
                        0.00
                                214
   15
                        0.00
                                129
         0.00
                 0.00
   16
         0.00
                 0.00
                        0.00
                                 12
   17
         0.00
                 0.00
                        0.00
                                 1
                                  3
   18
         0.00
                 0.00
                        0.00
   19
         0.00
                 0.00
                        0.00
                                 39
   20
         0.00
                 0.00
                        0.00
                                 2
   21
         0.00
                 0.00
                        0.00
                                 91
   22
         0.61
                 1.00
                        0.75
                                2644
                       0.61
                              4364
accuracy
             0.03
                     0.05
                            0.03
                                    4364
macro avg
```

weighted avg

0.37

0.61

0.46

4364