**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 0.00 0.00 0.00 2

9 0.00 0.00 0.00 37

10 0.60 0.13 0.21 23

11 0.00 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

ARG0 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 1688

macro avg 0.28 0.23 0.23 1688

weighted avg 0.55 0.61 0.56 1688

**Dependency-Head**

Confusion Matrix:

[[1836 826]

[ 18 1684]]

**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 4364

macro avg 0.83 0.84 0.81 4364

weighted avg 0.87 0.81 0.81 4364

Classification Report:

precision recall f1-score support

0 0.00 0.00 0.00 1

1 0.53 0.47 0.50 316

2 0.51 0.48 0.49 594

3 0.00 0.00 0.00 44

4 0.67 0.02 0.04 103

5 0.00 0.00 0.00 21

6 0.00 0.00 0.00 21

7 0.00 0.00 0.00 18

9 0.50 0.03 0.05 35

10 0.33 0.09 0.14 22

11 0.00 0.00 0.00 5

12 0.00 0.00 0.00 24

13 0.50 0.07 0.12 29

14 0.50 0.19 0.27 212

15 0.25 0.05 0.09 113

16 0.00 0.00 0.00 12

17 0.00 0.00 0.00 2

18 0.00 0.00 0.00 1

19 0.00 0.00 0.00 46

20 0.00 0.00 0.00 2

21 0.47 0.28 0.35 98

22 0.71 0.90 0.79 2645

accuracy 0.66 4364

macro avg 0.23 0.12 0.13 4364

weighted avg 0.60 0.66 0.61 4364

**Dependency:**

Confusion Matrix:

[[2141 546]

[ 725 952]]

**Classification Report:**

precision recall f1-score support

0 0.75 0.80 0.77 2687

1 0.64 0.57 0.60 1677

accuracy 0.71 4364

macro avg 0.69 0.68 0.69 4364

weighted avg 0.70 0.71 0.71 4364

Classification Report:

precision recall f1-score support

1 0.55 0.45 0.49 314

2 0.57 0.43 0.49 583

3 1.00 0.02 0.04 45

4 0.60 0.03 0.06 99

5 0.00 0.00 0.00 14

6 0.00 0.00 0.00 19

7 0.00 0.00 0.00 18

8 0.00 0.00 0.00 1

9 0.00 0.00 0.00 45

10 0.67 0.07 0.12 30

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

15 0.43 0.03 0.05 104

16 0.00 0.00 0.00 19

17 0.00 0.00 0.00 1

18 0.00 0.00 0.00 3

19 0.00 0.00 0.00 46

20 0.00 0.00 0.00 1

21 0.43 0.22 0.29 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 Report:

precision recall f1-score support

1 0.45 0.16 0.24 312

2 0.58 0.30 0.40 587

3 0.00 0.00 0.00 57

4 0.38 0.08 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

10 0.33 0.03 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

19 0.00 0.00 0.00 37

20 0.00 0.00 0.00 1

21 0.53 0.18 0.26 108

22 0.65 0.94 0.77 2674

accuracy 0.63 4364

macro avg 0.14 0.08 0.09 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 0.70 0.83 0.76 2699

1 0.60 0.42 0.49 1665

accuracy 0.67 4364

macro avg 0.65 0.62 0.63 4364

weighted avg 0.66 0.67 0.66 4364

Classification Report:

precision recall f1-score support

1 0.45 0.15 0.23 298

2 0.56 0.28 0.38 583

3 0.00 0.00 0.00 52

4 0.57 0.03 0.06 117

5 0.00 0.00 0.00 17

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 0.00 0.00 46

10 0.50 0.07 0.12 30

11 0.00 0.00 0.00 10

12 0.00 0.00 0.00 29

13 1.00 0.04 0.08 25

14 0.09 0.01 0.01 199

15 0.67 0.02 0.04 102

16 0.00 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 35

21 0.50 0.25 0.33 105

22 0.64 0.94 0.76 2668

accuracy 0.63 4364

macro avg 0.24 0.09 0.10 4364

weighted avg 0.56 0.63 0.54 4364

**Postposition**

Confusion Matrix:

[[2157 495]

[ 975 737]]

Classification Report:

precision recall f1-score support

0 0.69 0.81 0.75 2652

1 0.60 0.43 0.50 1712

accuracy 0.66 4364

macro avg 0.64 0.62 0.62 4364

weighted avg 0.65 0.66 0.65 4364

Classification Report:

precision recall f1-score support

1 0.00 0.00 0.00 315

2 0.70 0.24 0.36 565

3 0.00 0.00 0.00 63

4 0.00 0.00 0.00 112

5 0.00 0.00 0.00 14

6 0.00 0.00 0.00 19

7 0.00 0.00 0.00 12

8 0.00 0.00 0.00 1

9 0.00 0.00 0.00 45

10 0.00 0.00 0.00 27

11 0.00 0.00 0.00 3

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 0.00 98

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 0.63 0.98 0.76 2662

accuracy 0.63 4364

macro avg 0.06 0.06 0.05 4364

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

1 0.38 0.14 0.20 1653

accuracy 0.59 4364

macro avg 0.50 0.50 0.46 4364

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

12 0.00 0.00 0.00 28

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 0.00 0.00 0.00 1

21 0.00 0.00 0.00 104

22 0.62 1.00 0.76 2695

accuracy 0.62 4364

macro avg 0.03 0.05 0.04 4364

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

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

ARG0 0.11 0.01 0.02 303

ARG1 0.47 0.94 0.63 599

ARG2 0.00 0.00 0.00 59

ARG2-ATR 0.00 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

ARGM-ADV 0.00 0.00 0.00 42

ARGM-CAU 0.00 0.00 0.00 24

ARGM-DIR 0.00 0.00 0.00 5

ARGM-DIS 0.00 0.00 0.00 31

ARGM-EXT 0.00 0.00 0.00 31

ARGM-LOC 0.33 0.56 0.41 200

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 0.61 0.25 33

ARGM-PRX 0.00 0.00 0.00 2

ARGM-TMP 0.00 0.00 0.00 95

accuracy 0.41 1688

macro avg 0.05 0.10 0.06 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 0.99 0.68 0.81 2636

1 0.67 0.99 0.80 1728

accuracy 0.80 4364

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 0.00 23

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

19 0.00 0.00 0.00 39

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:

precision recall f1-score support

0 0.66 0.72 0.69 2682

1 0.48 0.41 0.44 1682

accuracy 0.60 4364

macro avg 0.57 0.57 0.57 4364

weighted avg 0.59 0.60 0.60 4364

Classification Report:

precision recall f1-score support

0 0.00 0.00 0.00 1

1 0.00 0.00 0.00 308

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 0.00 19

14 0.00 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

accuracy 0.62 4364

macro avg 0.03 0.04 0.03 4364

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

accuracy 0.59 4364

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

1 0.00 0.00 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 0.00 0.00 22

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 0.00 21

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 0.00 0.00 0.00 2

21 0.00 0.00 0.00 92

22 0.61 1.00 0.76 2681

accuracy 0.61 4364

macro avg 0.03 0.05 0.04 4364

weighted avg 0.38 0.61 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

1 0.00 0.00 0.00 1662

accuracy 0.62 4364

macro avg 0.31 0.50 0.38 4364

weighted avg 0.38 0.62 0.47 4364

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

11 0.00 0.00 0.00 3

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

16 0.00 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

22 0.62 1.00 0.76 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

macro avg 0.31 0.50 0.38 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

1 0.00 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 0.00 109

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

12 0.00 0.00 0.00 27

13 0.00 0.00 0.00 29

14 0.00 0.00 0.00 216

15 0.00 0.00 0.00 100

16 0.00 0.00 0.00 8

18 0.00 0.00 0.00 3

19 0.00 0.00 0.00 38

21 0.00 0.00 0.00 103

22 0.61 1.00 0.76 2676

accuracy 0.61 4364

macro avg 0.03 0.05 0.04 4364

weighted avg 0.38 0.61 0.47 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

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 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 0.29 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 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 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 0.61 1.00 0.75 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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted 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

1 0.67 0.99 0.80 1720

accuracy 0.80 4364

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 0.00 305

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Dependency**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Head\_both dependency**

Confusion Matrix:

[[2169 475]

[ 255 1465]]

Classification Report:

precision recall f1-score support

0 0.89 0.82 0.86 2644

1 0.76 0.85 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 0.56 0.67 0.61 305

2 0.58 0.70 0.64 618

3 0.00 0.00 0.00 51

4 0.24 0.04 0.07 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 0.40 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 0.00 2

21 0.47 0.21 0.29 91

22 0.76 0.91 0.83 2644

accuracy 0.70 4364

macro avg 0.19 0.12 0.12 4364

weighted avg 0.63 0.70 0.65 4364

**Head-POS**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

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

accuracy 0.66 4364

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

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

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 0.63 0.96 0.76 2644

accuracy 0.63 4364

macro avg 0.15 0.07 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

accuracy 0.66 4364

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

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 0.63 0.96 0.76 2644

accuracy 0.63 4364

macro avg 0.15 0.07 0.08 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

accuracy 0.81 4364

macro avg 0.81 0.82 0.81 4364

weighted avg 0.83 0.81 0.81 4364

Classification Report:

precision recall f1-score support

1 0.54 0.38 0.45 305

2 0.54 0.39 0.45 618

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 0.00 0.00 3

19 0.00 0.00 0.00 39

20 0.00 0.00 0.00 2

21 0.45 0.21 0.29 91

22 0.67 0.92 0.78 2644

accuracy 0.65 4364

macro avg 0.16 0.09 0.10 4364

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

accuracy 0.73 4364

macro avg 0.72 0.71 0.71 4364

weighted avg 0.73 0.73 0.73 4364

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 0.00 8

8 0.00 0.00 0.00 2

9 0.00 0.00 0.00 38

10 1.00 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 0.00 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 0.46 0.18 0.25 91

22 0.66 0.95 0.78 2644

accuracy 0.65 4364

macro avg 0.18 0.09 0.09 4364

weighted avg 0.56 0.65 0.57 4364

**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

accuracy 0.66 4364

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

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

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 0.40 0.18 0.24 91

22 0.63 0.96 0.76 2644

accuracy 0.63 4364

macro avg 0.15 0.07 0.08 4364

weighted avg 0.53 0.63 0.53 4364

**postposition**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

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

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 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 0.29 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 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 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 0.61 1.00 0.75 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

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

accuracy 0.61 4364

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 Report:

precision recall f1-score support

0 0.99 0.68 0.81 2644

1 0.67 0.99 0.80 1720

accuracy 0.80 4364

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 0.00 305

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Dependency**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 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 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 0.22 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 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 0.08 0.07 4364

weighted avg 0.54 0.68 0.59 4364

**Head\_POS**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Head**

Confusion Matrix:

[[2644 0]

[1720 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

macro avg 0.30 0.50 0.38 4364

weighted avg 0.37 0.61 0.46 4364

Confusion Matrix:

[[2644 0]

[1720 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

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

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

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]

[1720 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

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 0.56 0.71 0.62 320

2 0.55 0.79 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

8 0.00 0.00 0.00 2

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

13 0.33 0.08 0.13 25

14 0.46 0.42 0.44 195

15 0.72 0.44 0.54 110

16 0.00 0.00 0.00 15

17 0.00 0.00 0.00 1

18 0.00 0.00 0.00 2

19 0.00 0.00 0.00 46

20 0.00 0.00 0.00 1

21 0.70 0.71 0.70 97

22 0.61 0.37 0.55 2644

accuracy 0.56 4364

macro avg 0.32 0.21 0.23 4364

weighted avg 0.51 0.56 0.52 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

1 0.67 0.99 0.80 1720

accuracy 0.80 4364

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 0.00 305

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Head\_with\_dependency**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

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]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364

**Postposition**

Confusion Matrix:

[[2644 0]

[1720 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

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

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

accuracy 0.61 4364

macro avg 0.03 0.05 0.03 4364

weighted avg 0.37 0.61 0.46 4364