Relatório - Daniel da Silva Costa

Notas:

* **Faltou gerar os resultados de modelos com e sem embeddings!**
* Rever a descrição da tarefa no Classroom.
* Rever as minhas anotações no caderno.
* Fazer inference para os modelos treinados (spaCy não vai precisar né?).
  + No tagger GRU da professora tem um exemplo para usar nos dados de teste.
* Rever as métricas que a professora utilizou pra ver se tem alguma melhor que acurácia e f-1.
* Rever os notebooks para retirar textos e comentários desnecessários.
  + Corrigir os nomes CoNLLDataset.
* Acertar os labels das tags nos resultados do Bertimbau: está com os *ids*.
* No resultado do spaCy, vale a pena comparar com o indicado no site do próprio spaCy.
* Treinar o GRU e o LSTM é bem mais demorado que o fine-tuning no BERTimbau.
  + Indicar números de tempos.
    - Rodar com 1 epoch só e comparar.
* Colocar no relatório o link do GitHub.
  + Lembrar de colocar o repositório como público.
* Consigo treinar o GRU e o LSTM com 500 epochs?

# Resultados

## GRU

### Epochs: 1

precision recall f1-score support

<pad> 0.00 0.00 0.00 33153

ADJ 0.42 0.05 0.08 1157

ADP 0.90 0.93 0.92 3549

ADV 0.73 0.49 0.59 844

AUX 0.26 0.65 0.37 581

CCONJ 0.98 0.92 0.95 542

DET 0.88 0.92 0.90 3702

INTJ 0.00 0.00 0.00 3

NOUN 0.58 0.82 0.68 4415

NUM 0.77 0.18 0.29 461

PRON 0.82 0.61 0.70 835

PROPN 0.44 0.30 0.36 2143

PUNCT 0.98 0.99 0.98 3267

SCONJ 0.00 0.29 0.01 542

SYM 1.00 0.92 0.96 36

VERB 0.52 0.54 0.53 2166

X 0.00 0.00 0.00 19

\_ 0.97 0.93 0.95 1753

accuracy 0.32 59168

macro avg 0.57 0.53 0.51 59168

weighted avg 0.32 0.32 0.31 59168

F1: 0.31

**Accuracy: 0.32**

### Epochs: 50

precision recall f1-score support

<pad> 0.00 0.00 0.00 33153

ADJ 0.79 0.56 0.65 1157

ADP 0.96 0.97 0.96 3549

ADV 0.92 0.86 0.89 844

AUX 0.92 0.95 0.94 581

CCONJ 0.99 0.99 0.99 542

DET 0.95 0.98 0.97 3702

INTJ 0.00 0.00 0.00 3

NOUN 0.80 0.90 0.85 4415

NUM 0.93 0.74 0.82 461

PRON 0.93 0.86 0.89 835

PROPN 0.04 0.59 0.07 2143

PUNCT 1.00 1.00 1.00 3267

SCONJ 0.77 0.69 0.73 542

SYM 1.00 1.00 1.00 36

VERB 0.69 0.85 0.77 2166

X 0.00 0.00 0.00 19

\_ 1.00 0.97 0.98 1753

accuracy 0.39 59168

macro avg 0.70 0.72 0.69 59168

weighted avg 0.36 0.39 0.37 59168

F1: 0.37

**Accuracy: 0.39**

## LSTM

### Epochs: 1

precision recall f1-score support

<pad> 0.00 0.00 0.00 33153

ADJ 0.45 0.03 0.05 1157

ADP 0.91 0.93 0.92 3549

ADV 0.79 0.40 0.53 844

AUX 0.80 0.54 0.64 581

CCONJ 0.98 0.90 0.94 542

DET 0.79 0.92 0.85 3702

INTJ 0.00 0.00 0.00 3

NOUN 0.09 0.81 0.16 4415

NUM 0.97 0.07 0.13 461

PRON 0.77 0.55 0.64 835

PROPN 0.39 0.26 0.31 2143

PUNCT 0.99 0.99 0.99 3267

SCONJ 0.71 0.23 0.34 542

SYM 1.00 0.31 0.47 36

VERB 0.46 0.65 0.54 2166

X 0.00 0.00 0.00 19

\_ 0.96 0.92 0.94 1753

accuracy 0.32 59168

macro avg 0.61 0.47 0.47 59168

weighted avg 0.29 0.32 0.27 59168

F1: 0.27

Accuracy: 0.32

### Epochs: 50

precision recall f1-score support

<pad> 0.00 0.00 0.00 33153

ADJ 0.80 0.60 0.69 1157

ADP 0.96 0.97 0.96 3549

ADV 0.90 0.87 0.89 844

AUX 0.94 0.87 0.90 581

CCONJ 0.99 0.99 0.99 542

DET 0.96 0.97 0.97 3702

INTJ 0.00 0.00 0.00 3

NOUN 0.77 0.91 0.84 4415

NUM 0.93 0.76 0.84 461

PRON 0.70 0.86 0.77 835

PROPN 0.03 0.50 0.06 2143

PUNCT 1.00 1.00 1.00 3267

SCONJ 0.72 0.68 0.70 542

SYM 1.00 1.00 1.00 36

VERB 0.72 0.84 0.77 2166

X 0.20 0.05 0.08 19

\_ 0.98 0.96 0.97 1753

accuracy 0.39 59168

macro avg 0.70 0.71 0.69 59168

weighted avg 0.36 0.39 0.36 59168

F1: 0.36

**Accuracy: 0.39**

## BERTimbau

### Epochs: 1 (Fine-Tuning) (Resultado da última época treinada)

precision recall f1-score support

1 0.92 0.97 0.94 4637

2 0.00 0.00 0.00 11

3 1.00 1.00 1.00 2671

4 0.89 0.89 0.89 1352

5 0.91 0.91 0.91 348

6 0.95 0.93 0.94 760

7 0.90 0.94 0.92 838

8 0.98 0.99 0.98 3082

9 0.95 0.97 0.96 2700

10 0.00 0.00 0.00 4

11 0.92 0.96 0.94 503

12 0.00 0.00 0.00 46

13 0.90 0.88 0.89 515

14 0.99 0.99 0.99 470

15 0.96 0.87 0.91 3122

16 0.99 0.98 0.98 2889

accuracy 0.95 23948

macro avg 0.77 0.77 0.77 23948

weighted avg 0.95 0.95 0.95 23948

F1: 0.95

**Accuracy: 0.95**

### Epochs: 5 (Fine-Tuning) (Resultado da última época treinada)

precision recall f1-score support

0 0.97 0.98 0.98 2700

1 0.95 0.97 0.96 4637

2 0.99 1.00 0.99 470

3 0.96 0.93 0.94 3122

4 1.00 1.00 1.00 11

5 0.63 0.59 0.61 46

6 0.99 0.99 0.99 3082

7 0.99 0.99 0.99 2889

8 0.98 0.93 0.96 348

9 1.00 1.00 1.00 2671

10 0.97 0.97 0.97 503

11 0.00 0.00 0.00 4

13 0.95 0.94 0.94 515

14 0.92 0.92 0.92 1352

15 0.95 0.95 0.95 838

16 0.96 0.99 0.98 760

17 0.00 0.00 0.00 0

accuracy 0.97 23948

macro avg 0.84 0.83 0.83 23948

weighted avg 0.97 0.97 0.97 23948

F1: 0.97

**Accuracy: 0.97**

### Epochs: 10 (Fine-Tuning) (Resultado da última época treinada)

precision recall f1-score support

0 0.96 0.96 0.96 4637

1 0.93 0.91 0.92 1352

2 1.00 1.00 1.00 2671

3 1.00 0.99 0.99 470

5 1.00 1.00 1.00 11

6 0.97 0.94 0.95 515

7 0.97 0.99 0.98 760

8 0.99 0.99 0.99 3082

9 1.00 0.33 0.49 46

10 0.94 0.95 0.95 3122

11 0.96 0.95 0.96 838

12 0.98 0.94 0.96 348

13 0.00 0.00 0.00 4

14 0.99 0.99 0.99 2889

15 0.97 0.99 0.98 2700

16 0.97 0.98 0.97 503

17 0.00 0.00 0.00 0

accuracy 0.97 23948

macro avg 0.86 0.82 0.83 23948

weighted avg 0.97 0.97 0.97 23948

F1: 0.97

**Accuracy: 0.97**

## spaCy

### Train Dataset

precision recall f1-score support

ADJ 0.98 0.97 0.97 8638

ADP 0.98 0.98 0.98 25482

ADV 0.96 0.97 0.97 6345

AUX 0.97 0.98 0.98 3713

CCONJ 0.98 0.98 0.98 4029

DET 0.98 0.99 0.98 26307

INTJ 0.68 0.56 0.61 27

NOUN 0.98 0.97 0.98 31136

NUM 0.97 0.97 0.97 3580

PART 1.00 0.33 0.50 3

PRON 0.96 0.88 0.92 5525

PROPN 0.94 0.98 0.96 14249

PUNCT 0.99 0.99 0.99 22586

SCONJ 0.85 0.92 0.89 4056

SYM 1.00 1.00 1.00 321

VERB 0.99 0.98 0.98 15678

X 0.91 0.90 0.91 101

accuracy 0.97 171776

macro avg 0.95 0.90 0.91 171776

weighted avg 0.97 0.97 0.97 171776

F1: 0.97

**Accuracy: 0.97**

### Dev Dataset

precision recall f1-score support

ADJ 0.95 0.93 0.94 1345

ADP 0.98 0.98 0.98 4185

ADV 0.96 0.96 0.96 1005

AUX 0.97 0.99 0.98 651

CCONJ 0.98 0.98 0.98 650

DET 0.98 0.98 0.98 4354

INTJ 1.00 0.67 0.80 3

NOUN 0.97 0.96 0.97 5193

NUM 0.98 0.96 0.97 569

PRON 0.96 0.90 0.93 972

PROPN 0.92 0.96 0.94 2439

PUNCT 0.99 0.99 0.99 3844

SCONJ 0.84 0.91 0.87 638

SYM 0.97 0.97 0.97 36

VERB 0.98 0.98 0.98 2535

X 0.85 0.61 0.71 28

accuracy 0.97 28447

macro avg 0.96 0.92 0.93 28447

weighted avg 0.97 0.97 0.97 28447

F1: 0.97

**Accuracy: 0.97**

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