

# Extraction of Drug-Drug Interactions from Biomedical Texts

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# Outline

- 1 Software
- 2 Method
- 3 Learners
- 4 Experiments
  - Word Vectors
  - Learning curves
- 5 Results
- 6 Conclusions

# Software

- Base language: Python
- XML parser: ElementTree
- Pandas
- Numpy
- Gensim: Word2Vec
- NLTK
  - a. Word tokenizer
  - b. Part-of-Speech tagger
  - c. English stemmer
- Scikit Learn
  - a. Data preprocessing
  - b. Pipelines
  - c. SVM
- Keras: ANN

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# Method

- Task9.1
- Task9.2

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# Learners

- Training/Validation split: (90%, 10%)  $\sim$  (133k, 14k) words
- Metrics:

## 1. Feed-forward Neural Network

- Architecture: [vector\_size, 512, 256, 128, 3]
- Activations: ReLU, Softmax
- Dropout fraction: 0.5
- Objective: Categorical cross-entropy
- Solver: Adam
- Number of parameters: XXXX

## 2. Support Vector Machine

- Kernel: radial basis function
- $C = 1$
- $\gamma = \text{auto}$
- $\alpha = 0.001$

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# Word Vectors

Vector size	Micro F1	Macro F1
10	0.9481	0.5041
<b>20</b>	<b>0.9517</b>	<b>0.5435</b>
50	0.9495	0.5215
100	0.9499	0.5232
200	0.9479	0.4855

Table: F1-score for different word-vector sizes.

- Vector size
- Vector type
- Preprocessing

Type	Micro f1	Macro f1
original	0.9499	0.5098
<b>stem</b>	<b>0.9599</b>	<b>0.6144</b>
original + PoS	0.9481	0.5105
stem + PoS	0.9517	0.5435

Table: F1-score for different word-vector types.

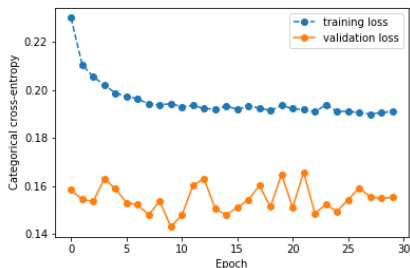
# Word Vectors

- Vector size
- Vector type
- Preprocessing

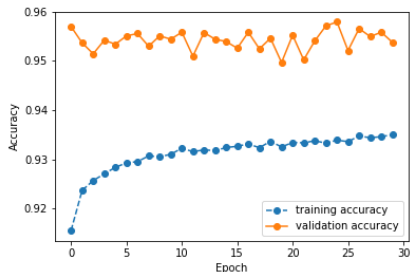
Preprocessing	Micro f1	Macro f1
No	0.9599	0.6144
Minmax(0,1)	0.9515	0.5207
Standardize	0.9581	0.5897

**Table:** F1-score for different preprocessing.

# Loss/Accuracy



(a) loss



(b) accuracy

Figure: Learning curves

# Micro F1/Precision/Recall score

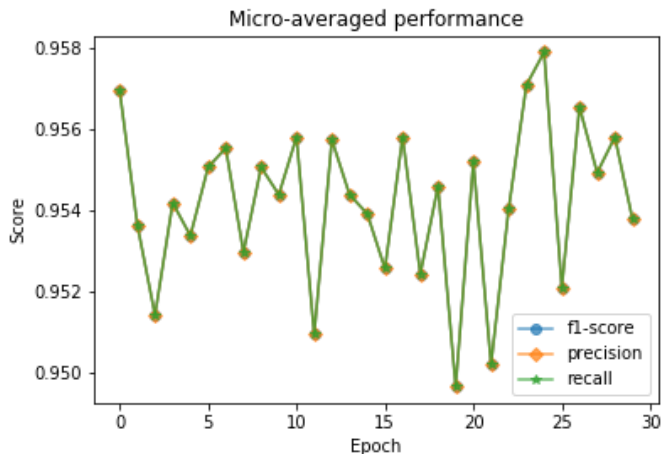
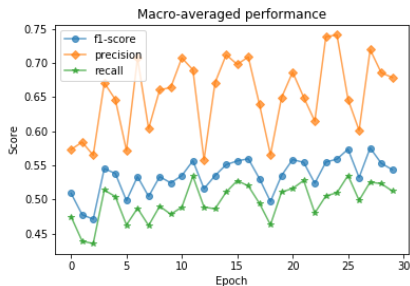
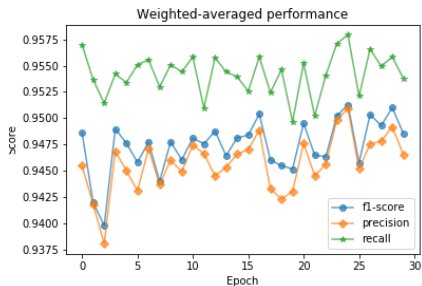


Figure: Micro scores.

# Macro/Weighted F1/Precision/Recall score



(a) loss



(b) accuracy

Figure: Macro and Weighted scores.

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# Results

	Exact			Partial		
	Precision	Recall	F1	Precision	Recall	F1
DrugBank	0.61	0.43	0.5	0.61	0.5	0.55
MedLine	0.51	0.29	0.37	0.51	0.35	0.41
Both	0.56	0.35	0.43	0.56	0.41	0.48

**Table:** Results on gold test dataset.

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# Conclusions

- Word vector size (too small, too big)
- stemming and PoS improved performance used individually, but not in conjunction
- Poor results (especially the recall)