

Background



From Gray's Anatomy of the Human Body (1918)



ApiNATOMY model (de Bono et al., 2012)

Motivation & Goal

- Many papers contain information on individual nerves and their pathways
- No systematic approach has been taken to aggregate this information
- Goal: Relation extraction system that pulls sentences with neuronal connectivity information within the autonomic nervous system

Detecting Anatomical and Functional Connectivity Relations in Biomedical Literature via Language Representation Models Ibrahim Burak Ozyurt, Joseph Menke, Anita Bandrowski, Maryann E. Martone



Corpus







5 relation types

100 sentences per iteration

Models 4 ELECTRA-based variants:

 12.3 billion words 21.2 million PubMed abstracts

Model	Params	А
Bio-ELECTRA Mid	50M	hidde
Bio-ELECTRA Base	110M	hidde
Bio-ELECTRA Mid-tall	88M	hidden:512
Bio-ELECTRA Mid Combined	50M	hidde



Performance Mean (Standard Deviation)

	Parameters	Precision	Recall	F_1
N		71.05 (4.36)	54.23 (4.20)	61.36 (3.01)
	110M	69.35 (4.23)	70.85 (5.43)	70.03 (4.39)
	110M	67.82 (4.71)	72.34 (2.18)	69.89 (2.40)
IMPAC	11M	54.41 (2.11)	70.32 (3.38)	61.26 (1.33)
d	50M	69.16 (3.53)	73.83 (2.24)	71.36 (2.16)
se \rightarrow best	110M	69.93 (2.91)	74.26 (3.55)	71.99 (2.76)
d Combined	50M	67.66 (2.38)	74.36 (5.80)	70.70 (2.78)
d-tall	88M	63.89 (4.51)	65.96 (3.81)	64.78 (2.98)

Active Learning

250 random sentences

VS.

250 strategic sentences

Precision 70.29 (1.69) 75.88 (2.70)

Recall 74.04 (3.27)

 F_1 72.06 (1.68) 75.11 (2.39) 75.47 (2.30)

Hyperparameter Optimization

Total corpus = 1308 sentences

Training:Testing 80% to 20%

S:	learning	rate &	number o	of epochs

	Precision	Recall	F_1
A Base (default)	76.97 (2.72)	74.68 (2.32)	75.77 (1.99)
A Base (opt)	77.32 (2.39)	77.98 (1.65)	77.62 (1.33)
			12

Conclusions • A three class Bio-ELECTRA classifier (functional, anatomical, neither):

	Precision	Recall	F_1
onnectivity	68.93 (2.94)	77.12 (1.37)	72.77 (1.99)
nnectivity	82.79 (2.39)	68.00 (2.80)	74.61 (2.35)

• Future work: implement a web-based tool for connectivity knowledge base construction with continuous learning ability and utilize data with ApiNATOMY