Starten met NLP
in het Nederlands

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Smals Research

30/03/2021

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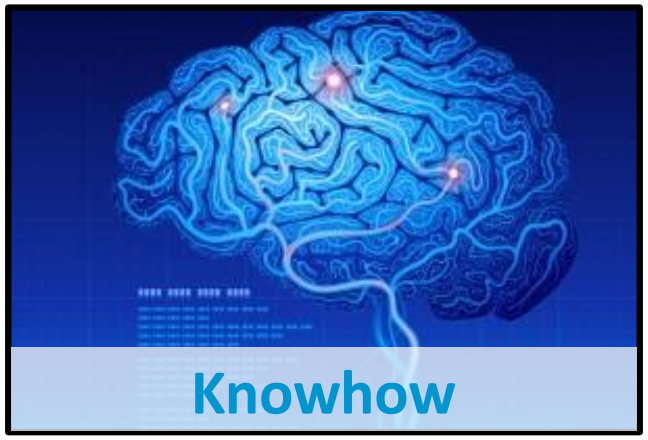
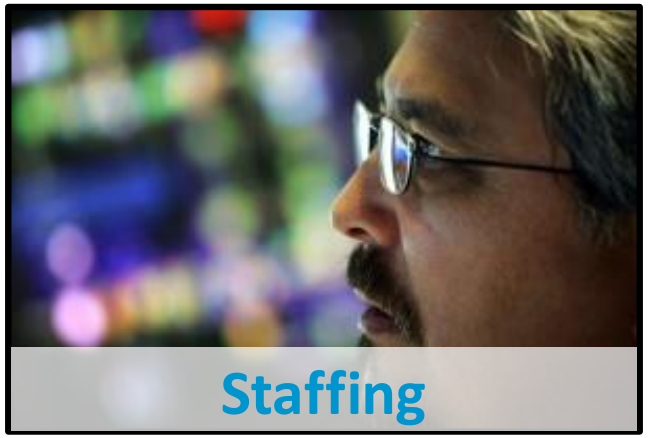
SUPPORT FOR E-GOVERNMENT





g-cloud

top EMPLOYER BELGIË BELGIQUE
CERTIFIED EXCELLENCE IN EMPLOYEE CONDITIONS

WWW.SMALS.BE

Smals Research 2021

Innovation with new technologies

Consultancy & expertise

Internal & external knowledge transfer

Support for going live

HA Software Architectures

Anomalies & Transaction Management

Conversational Platform

On-premise Cloud

GIS for Analytics

Natural Language Generation

Knowledge Graphs

2021

Knowledge Retention

Next Best Action

AI Deployment

European Blockchain Infrastructure

Privacy Enhancing Technologies

Passwordless Authentication

"Proof of Life"

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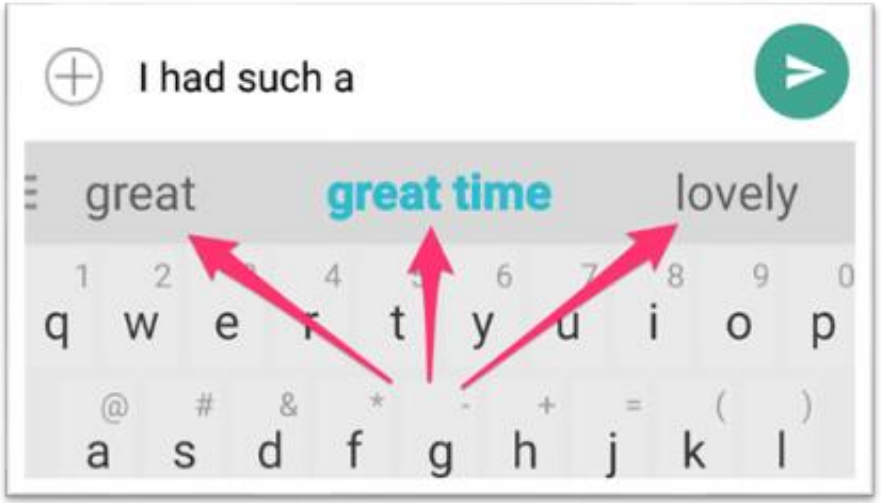
NLP: de computationele technieken waarmee we geschreven / gesproken tekst kunnen ontleden, analyseren en interpreteren.



Statistisch lettercombinaties associëren ≠ taal begrijpen!

NLP: subtaken

- Automatic speech recognition
- CCG
- Common sense
- Constituency parsing
- Coreference resolution
- Dependency parsing
- Dialogue
- Domain adaptation
- Entity linking
- Grammatical error correction
- Information extraction
- Language modeling
- Lexical normalization
- Machine translation
- Missing elements
- Multi-task learning
- Multi-modal
- Named entity recognition
- Natural language inference
- Part-of-speech tagging
- Question answering
- Relation prediction
- Relationship extraction
- Semantic textual similarity
- Semantic parsing
- Semantic role labeling
- Sentiment analysis
- Shallow syntax
- Simplification
- Intent Detection and Slot Filling
- Stance detection
- Summarization
- Taxonomy learning
- Temporal processing
- Text classification
- Word sense disambiguation

Current state-of-the-art: https://nlpprogress.com/

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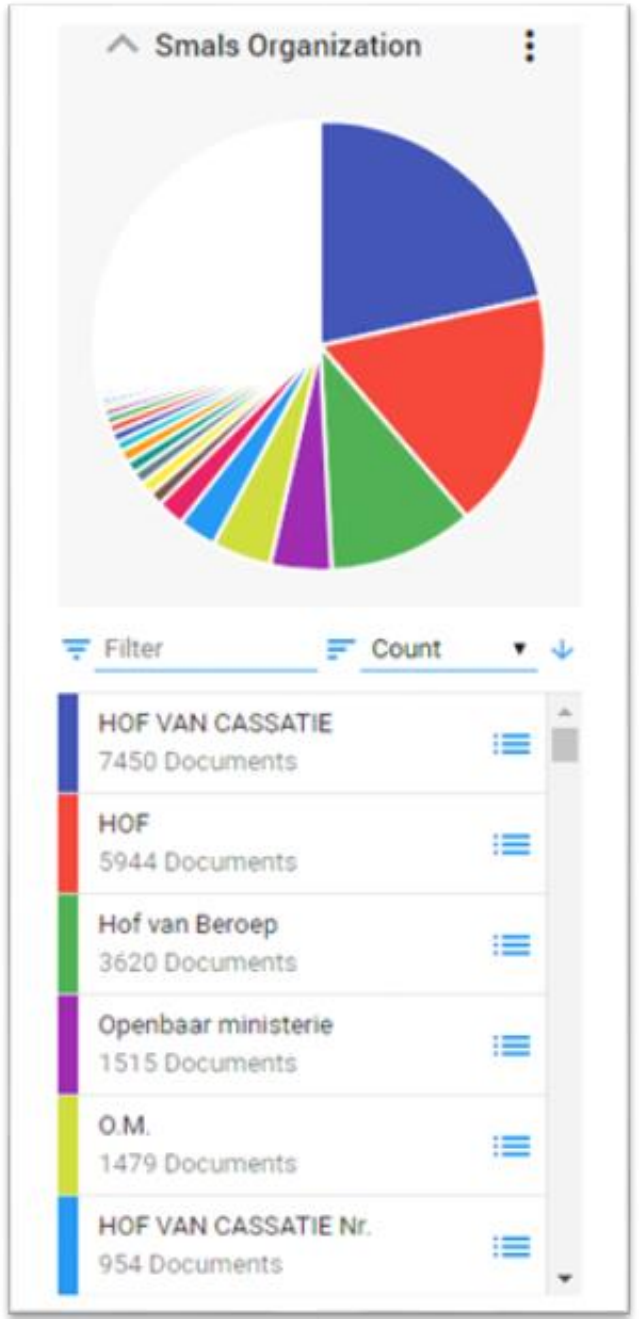
Named Entity Recognition

In 1917, Einstein applied the general theory of relativity to model the large-scale structure of the universe. He was visiting the United States when Adolf Hitler came to power in 1933 and did not go back to Germany, where he had been a professor at the Berlin Academy of Sciences. He settled in the U.S., becoming an American citizen in 1940. On the eve of World War II, he endorsed a letter to President Franklin D. Roosevelt alerting him to the potential development of "extremely powerful bombs of a new type" and recommending that the U.S. begin similar research. This eventually led to what would become the Manhattan Project. Einstein supported defending the Allied forces, but largely denounced using the new discovery of nuclear fission as a weapon. Later, with the British philosopher Bertrand Russell, Einstein signed the Russell-Einstein Manifesto, which highlighted the danger of nuclear weapons. Einstein was affiliated with the Institute for Advanced Study in Princeton, New Jersey, until his death in 1955.

Tag colours:

LOCATION TIME PERSON ORGANIZATION MONEY PERCENT DATE

(voorbeeld © Europeana)



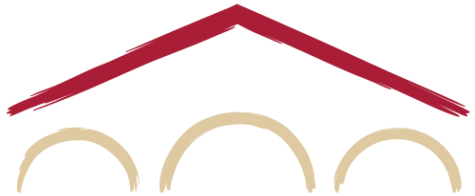
INTERVIEW

‘Alle Sky ECC-berichten lezen, zou ons 685 jaar kosten’

Het gerecht zou met de huidige middelen 685 jaar nodig hebben om alle berichten te lezen die onderschept zijn bij de kraak van de misdaadtelefoons van Sky ECC. Federaal procureur Frédéric Van Leeuw

(De Tijd, 12/02/2021)

Enkele NLP libraries



CoreNLP

AllenNLP

Stanza

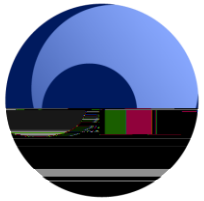
flair

NLTK

Natural Language Toolkit

Reference Guide

spaCy



GENSIM

topic modelling for humans

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Een eerste blik

- Apple ORG buys a French NORP company for $1 billion MONEY .
- Apple PERSON koopt een Frans NORP bedrijf voor $ 1 CARDINAL miljard.

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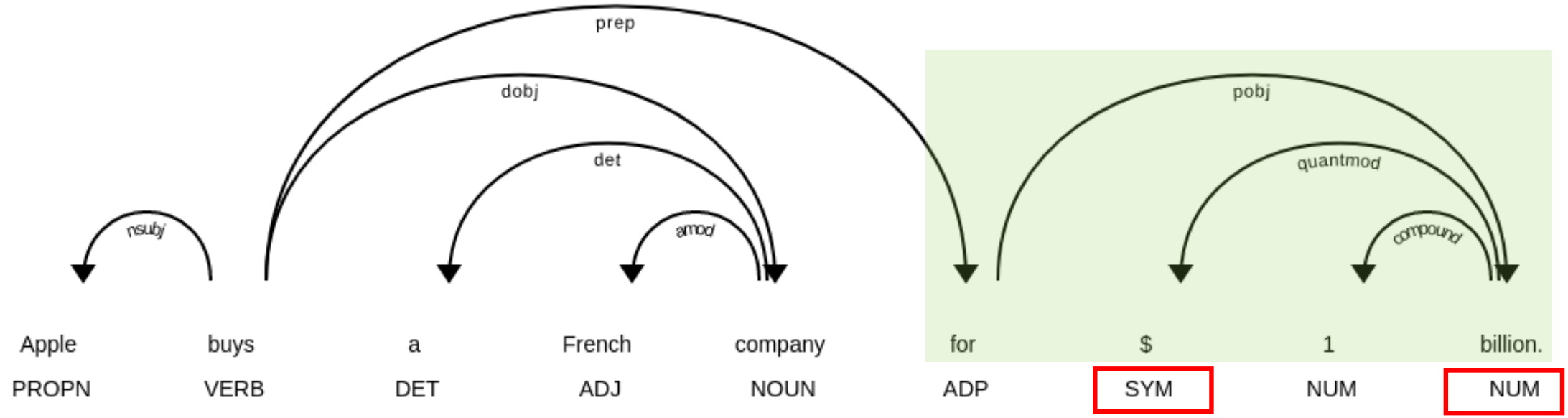
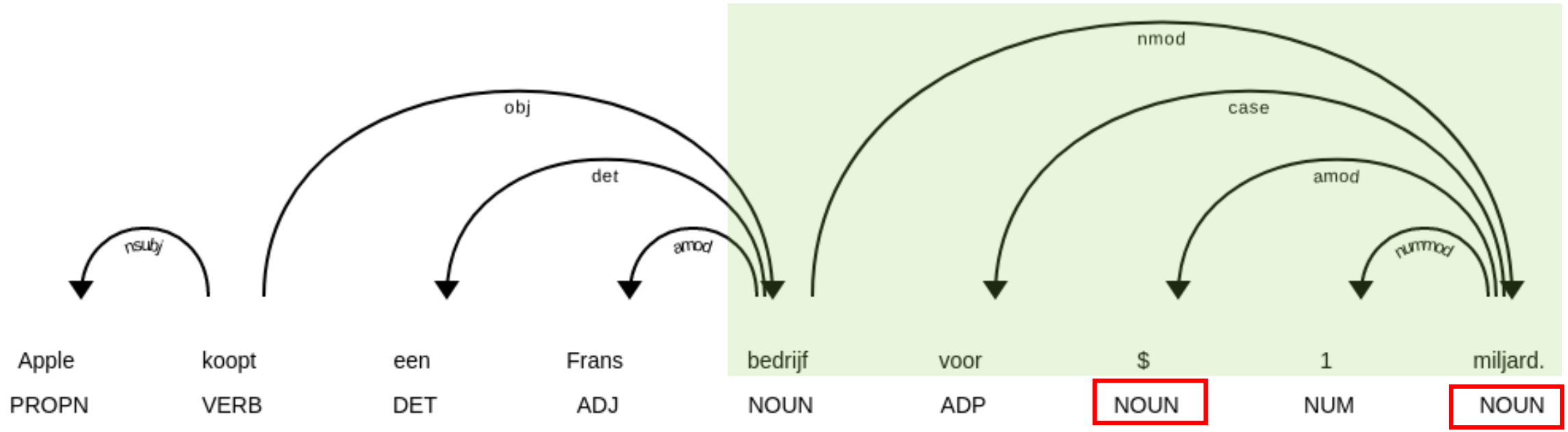
In de achtergrond

- EN:



- NL:



Verschillende talen, verschillende analyses

English

TAGGER

$, '' , , , -LRB- , -RRB- , . , : , ADD , AFX , CC , CD , DT , EX , FW , HYPH , IN , JJ , JJR , JJS , LS , MD , NFP , NN , NNP , NNPS , NNS , PDT , POS , PRP , PRP$, RB , RBR , RBS , RP , SYM , TO , UH , VB , VBD , VBG , VBN , VBP , VBZ , WDT , WP , WP$, WRB , XX , ``

49 woordsoort-labels

"a.m.",
"Adm.",
"Bros.",
"co.",
"Co.",
"Corp.",
"D.C.",

Een 100-tal afkortingen
(“tokenizer exceptions”)

Nederlands

N|soort|ev|basis|zijd|stan__Gender=Com|Number=Sing ,
N|soort|ev|dim|onz|stan__Gender=Neut|Number=Sing ,
N|soort|mv|basis__Number=Plur , N|soort|mv|dim__Number=Plur ,
SPEC|afgebr , SPEC|afk__Abbr=Yes , SPEC|deeleigen , SPEC|enof ,
SPEC|meta , SPEC|symb , SPEC|vreemd__Foreign=Yes , TSW ,
TW|hoofd|nom|mv-n|basis , TW|hoofd|nom|mv-n|dim ,
TW|hoofd|nom|zonder-n|basis , TW|hoofd|nom|zonder-n|dim ,
TW|hoofd|prenom|stan , TW|hoofd|vrij , TW|rang|nom|mv-n ,

… → 233 woordsoort-labels

"b.v.",
"b.ver.coll.gem.gem.comm.",
"b.verg.r.b.",
"b.versl.",
"b.wl.ev."

… → 1500+ afkortingen

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Verschillen in trainingsdata

English

OntoNotes 5.0

- 300000 zinnen
- 2.9mln woorden
- Nieuws, wiki, fora, conversaties, bijbel, …

Nederlands

UD LassySmall + Alpino (*)

- 20966 zinnen
- 306764 woorden
- wiki + nieuws uit begin jaren ’00

(ref: Bijbelvertaling = ± 900000 woorden)

(* uitgez. word vectors: CommonCrawl+Wiki)

Model	Labeled dependencies	Part-Of-Speech (detailed)	NER F-score
Nl_core_news_sm (CNN)	81%	94%	72%
Nl_core_news_lg (CNN)	84%	95%	77%
En_core_web_sm (CNN)	90%	97%	84%
En_core_web_lg (CNN)	90%	97%	86%
En_core_web_trf (roBERTa)	94%	98%	90%

Situatie 25/03/2021

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De analyse verbeteren (1)

- Zelf gedefinieerde componenten invoegen

De analyse verbeteren (2): een component bijtrainen

- Kloon een van de voorbeeldprojecten (https://spacy.io/usage/projects)
-
- Pas de “makefile” *project.yml* aan
- Voeg eigen trainingsdata en preprocessing scripts toe:

```
["OnePlus 9 Pro met nieuwe Sony-sensor verschijnt eind maart voor 899 euro.",
        {"entities":[[0,7,"ORG"],[25,29,"ORG"],[64,72,"MONEY"]]}],
["Gerucht: Discord voert gesprekken met Microsoft over mogelijke overname.",
        {"entities":[[9,16,"ORG"],[38,47,"ORG"]]}],
...
```

-

- Risico: catastrophic forgetting → trainingsdata finetunen

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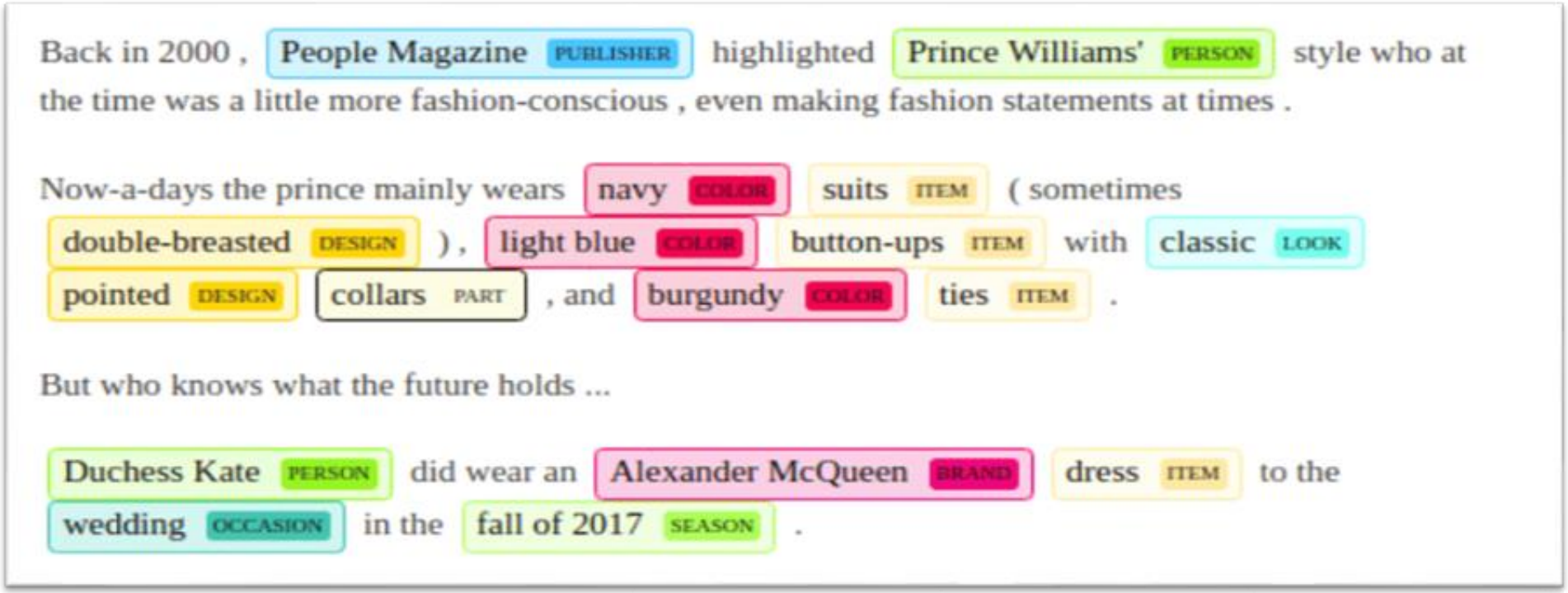
De analyse verbeteren (3) : een eigen NER trainen

- Vertrek ook hier van een bestaand project
  -
- Leg een eigen, volledige dataset aan
- Behoudt alleen labels die je nodig hebt



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Toepassing: juridische tekst

- Dataset: gepubliceerde arresten

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Een volgende stap: Entity Linking

- Bvb. herformatteer herkende entiteiten als URLs

  proof-of-concept uitgewerkt door TheMatchbox op NLP4Gov Hackathon, Informatie Vlaanderen, 2018:

- Met behulp van Knowledge Bases
  - Zie Sofie Van Landeghem, “Training a custom Entity Linking model with spaCy”, YouTube

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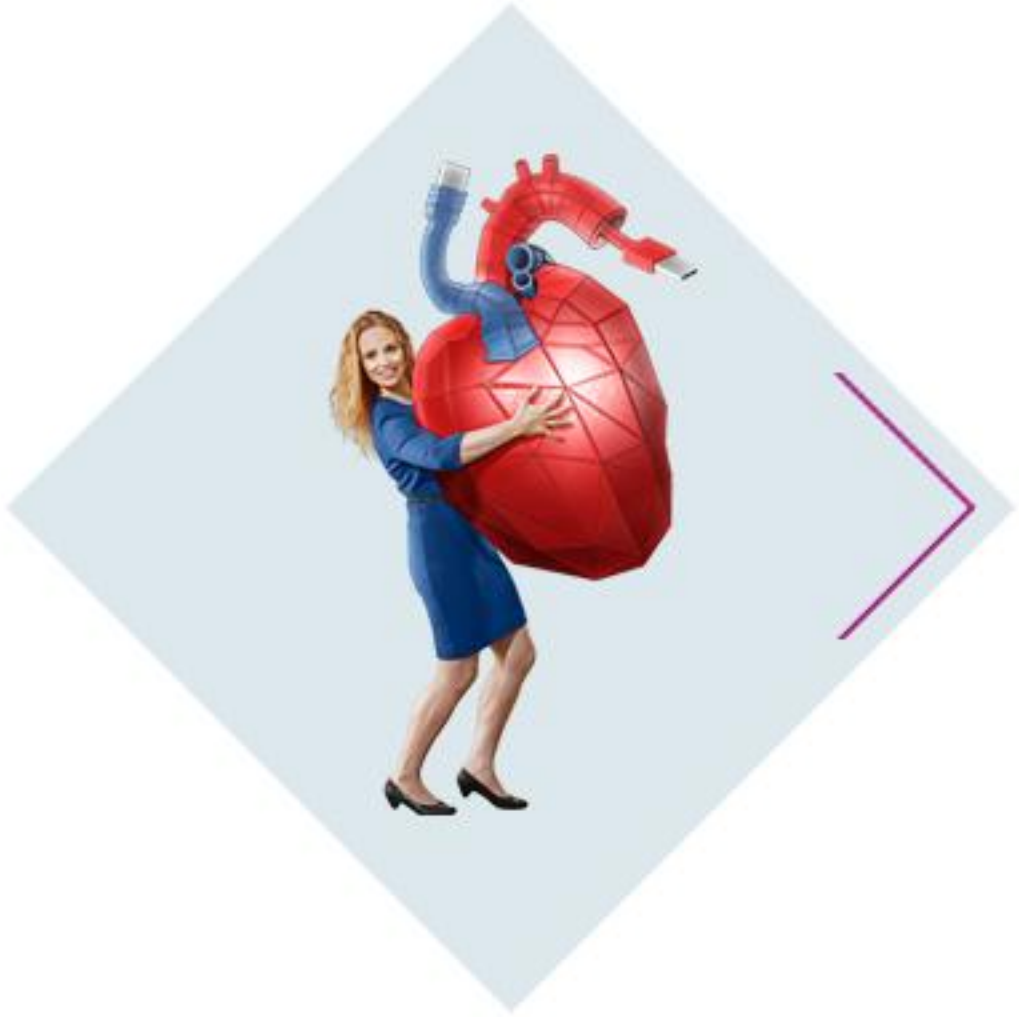
Conclusies

- Resterende problemen
  - Structureel gebrek aan grote Nederlandstalige geannoteerde datasets
  - Nederlandse taalmodellen lopen achter op Engelstalige
- Het goede nieuws
  - Zelf een taalmodel tweaken



Met dank aan

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TheMatchbox
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…

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