INTRODUCTION TO NATURAL LANGUAGE PROCESSING IN PYTHON

Named Entity Recognition

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Founder, kjamistan

What is Named Entity Recognition?

- NLP task to identify important named entities in the text
  - People, places, organizations
  - Dates, states, works of art
  - ... and other categories!
- Can be used alongside topic identification
  - ... or on its own!
- Who? What? When? Where?

Example of NER

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

(Source: Europeana Newspapers (http://www.europeana-newspapers.eu))

nltk and the Stanford CoreNLP Library

- The Stanford CoreNLP library:
  - Integrated into Python via `nltk`
  - Java based
  - Support for NER as well as coreference and dependency trees

Using nltk for Named Entity Recognition

```
In [1]: import nltk

In [2]: sentence = '''In New York, I like to ride the Metro to visit MOMA
                      and some restaurants rated well by Ruth Reichl.'''

In [3]: tokenized_sent = nltk.word_tokenize(sentence)

In [4]: tagged_sent = nltk.pos_tag(tokenized_sent)

In [5]: tagged_sent[:3]
Out[5]: [('In', 'IN'), ('New', 'NNP'), ('York', 'NNP')]
```

nltk's ne_chunk()

```
In [6]: print(nltk.ne_chunk(tagged_sent))
(S
  In/IN
  (GPE New/NNP York/NNP)
  ,/,
  I/PRP
  like/VBP
  to/TO
  ride/VB
  the/DT
  (ORGANIZATION Metro/NNP)
  to/TO
  visit/VB
  (ORGANIZATION MOMA/NNP)
  and/CC
  some/DT
  restaurants/NNS
  rated/VBN
  well/RB
  by/IN
  (PERSON Ruth/NNP Reichl/NNP)
  ./.)
```

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Let's practice!

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Introduction to SpaCy

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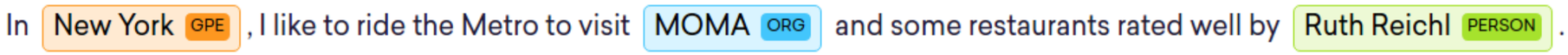
What is SpaCy?

- NLP library similar to `gensim`, with different implementations
- Focus on creating NLP pipelines to generate models and corpora
- Open-source, with extra libraries and tools
    - Displacy

Displacy entity recognition visualizer



(source: https://demos.explosion.ai/displacy-ent/)

SpaCy NER

```
In [1]: import spacy

In [2]: nlp = spacy.load('en')

In [3]: nlp.entity
Out[3]: <spacy.pipeline.EntityRecognizer at 0x7f76b75e68b8>

In [4]: doc = nlp("""Berlin is the capital of Germany;
                  and the residence of Chancellor Angela Merkel.""")

In [5]: doc.ents
Out[5]: (Berlin, Germany, Angela Merkel)

In [6]: print(doc.ents[0], doc.ents[0].label_)
Berlin GPE
```

Why use SpaCy for NER?

- Easy pipeline creation
- Different entity types compared to `nltk`
- Informal language corpora
  - Easily find entities in Tweets and chat messages
- Quickly growing!

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Let's practice!

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Multilingual NER with polyglot

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What is polyglot?

- NLP library which uses word vectors
- Why `polyglot`?
  - Vectors for many different languages
  - More than 130!

which	ويكه
India	يندیا
beat	بيت
Bermuda	بيرمودا
in	ين
Port	بورت
of	وف
Spain	سبا ين
in	ين
2007	
,	
which	ويكه
was	واس
equalled	يكاللليد
five	فيفي
days	دايس
ago	اغو
by	بي
South	سووث
Africa	افريكا
in	ين
their	ثير
victory	فيكتوري
over	وفير
West	ويست
Indies	يندييس
in	ين
Sydney	سيدني
.	

Spanish NER with polyglot

```
In [1]: from polyglot.text import Text

In [2]: text = """El presidente de la Generalitat de Cataluña,
                  Carles Puigdemont, ha afirmado hoy a la alcaldesa
                  de Madrid, Manuela Carmena, que en su etapa de
                  alcalde de Girona (de julio de 2011 a enero de 2016)
                  hizo una gran promoción de Madrid."""

In [3]: ptext = Text(text)

In [4]: ptext.entities
Out[4]:
[I-ORG(['Generalitat', 'de']),
 I-LOC(['Generalitat', 'de', 'Cataluña']),
 I-PER(['Carles', 'Puigdemont']),
 I-LOC(['Madrid']),
 I-PER(['Manuela', 'Carmena']),
 I-LOC(['Girona']),
 I-LOC(['Madrid'])]
```

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Let's practice!