Natural Language Research Group

Presentation

Session requirements

Framework

Additional information

Introduction to Human Language Technologies
1. Framework

Natural Language Research Group

UNIVERSITAT POLITÈCNICA DE CATALUNYA
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Course 2018/19

Outline

1. Presentation
   - Objectives
   - Evaluation
   - Project
   - Software Installation
2. Session requirements
3. Framework
   - NLTK
   - Corpus Readers
   - Stopwords reader
   - Class Text
4. Additional information
   - Plain Text
   - Web resources

Goal of IHLT lab sessions

- Learn to use basic NLP functions for managing text content
- Solve simple programming exercises

  Programming platform: Jupyter (python)
  [works saved as notebooks - *.ipynb -]
  NLP package for Python: `nltk`

  Similar open-source NLP suites out of this framework:
  Stanford CoreNLP, Freeling, Apache OpenNLP, IXA Pipes

Evaluation of IHLT lab

- groups of 2 people, although individual works will be accepted
- A mandatory project (Semantic Textual Similarity)
- A set of mandatory exercises solved in lab sessions
- A set of optional exercises and projects
- Grade = 0.4 * Project + 0.2 * Exercises
  (this represents the 60% of the final IHLT grade)
- Jupyter notebooks of exercises & projects should be uploaded to `raco.fib.upc.edu`

Topic of the project

How similar two sentences are between them? compare different approaches

Relevance of the topic:
IR, QA, summarization, automatic translation, plagiarism detection, ...

A pair of texts is a paraphrase when both texts describe the same meaning with different words

Example from trial of project data set:

- `The bird is bathing in the sink.`
- `Birdie is washing itself in the water basin.`

Project description

Natural Language Research Group

Presentation
Project
Session requirements
Framework
Additional information

Deadline: 13/12/2018 (oral presentation)

- Implement some approaches to detect paraphrase using sentence similarity metrics.
  - Explore some lexical dimensions.
  - Explore the syntactic dimension alone.
  - Explore the combination of both previous.
- Compare and comment the results achieved by these approaches among them and among the official results.
- Use data set and description of task *Semantic Textual Similarity* in *SemEval 2012*
  `https://www.cs.york.ac.uk/semeval-2012/task6/index.html`
- Jupyter notebook: sts-[Student1]-[Student2].ipynb
- slides: sts-[Student1]-[Student2].pdf
- send files to `raco` in *'IHLT STS Project'* before the oral presentation

Framework installation (Linux)

Framework (python3, jupyter, nltk, numpy, scipy):

> `sudo apt-get install python3`

> `pip3 install -U pip`

> `pip3 install jupyter`

> `sudo pip3 install -U numpy`

> `sudo pip3 install -U nltk`

> `sudo pip3 install -U scipy`

> `jupyter notebook` (select New/Python3)

Stop server with Ctrl-C

Framework installation (Windows)

Framework (python3, jupyter, nltk, numpy, scipy):

- Download python3 from `http://www.python.org`
- Install it checking the option `Add python to the path`
- Start the shell (`cmd`)

```
> pip install jupyter
> pip install -U numpy
> pip install -U nltk
> pip install -U scipy
> jupyter notebook (select New/Python3)
  Stop server with Ctrl-C
```

Execution test

Validate the installation process

- Open a new python3 jupyter notebook
- Change the name of the session to S1-[Student1]-[Student2]
- Import without errors `nltk` library
- Save the session and exit jupyter server.

Outline

1 Presentation
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- Project
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2 Session requirements

3 Framework
- NLTK
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4 Additional information
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Session requirements

Gutenberg corpus:

- Both Linux & Windows (via python shell)

```
> import nltk
> nltk.download('gutenberg')
> nltk.download('stopwords')
```

Attached resources:

- `pg35688.txt`
- `projectSTS.zip`

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2 Session requirements

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- Corpus Readers
- Stopwords reader
- Class Text

4 Additional information
- Plain Text
- Web resources

NLTK Resources

Python library:

- List of resources: `http://www.nltk.org/nltk_data/`
- Download non-default resources from nltk

```
import nltk
nltk.download()
```

- **Corpora and lexical resources**: Brown corpus (PoS annotations), sentence_polarity corpus... Lexical resources such as WordNet, SentiWordNet and specialized word lists.
- **Toy grammars**: grammars for English, Spanish, ...
- **Models**: Named Entity recognizer, taggers for English and Russian, ...

Corpus reader

- `http://www.nltk.org/howto/corpus.html`
- corpus reader objects & classes
  - `> from nltk.corpus import *resource* [as *variable_name*]`
- Gutenberg corpora
  - `> nltk.download('gutenberg')`
  - `> nltk.corpus.gutenberg.fileids()`
  - `> txt = nltk.corpus.gutenberg.words ('austen-persuasion.txt')`

Corpus reader

Example using the Gutenberg corpus (I):

```
In [1]: import nltk
        # list of files
        nltk.corpus.gutenberg.fileids()

Out[1]: ['austen-emma.txt',
         'austen-persuasion.txt',
         'austen-sense.txt',
         ...]

In [2]: # load a file
        cp = nltk.corpus.gutenberg.words('blake-poems.txt')
        len(cp) # length

Out[2]: 8354

In [3]: cp[100:108] # subset

Out[3]: ['the', 'same', 'again', ',', 'While', 'he', 'wept', 'with']
```

Corpus reader

Example using the Gutenberg corpus (II):

```
In [4]: len(set(cp)) # set

Out[4]: 1820

In [5]: # list of words with more than 2 chars
        lst = [w for w in cp if len(w)>2]
        lst[:30]

Out[5]: ['Poems',
         'William',
         'Blake',
         '1789',
         ...]

In [6]: # tuples with words lowered and length
        tup = [(w.lower(), len(w)) for w in lst]
        sorted(tup)[:5]

Out[6]: [('!"--', 4), ('\',"', 3), (',--', 3), ('1780', 4), ('1789', 4)]
```

Corpus reader

Example using the Gutenberg corpus (III):

```
In [7]: # frequencies of words
        freqs = {w:lst.count(w) for w in set(lst)}
        kmax = max(freqs, key=lambda k: freqs[k])
        kmax, freqs[kmax]

Out[7]: ('the', 351)
```

Stopwords reader

Provide the list of stop words of a specific language. Words that do not have individual meaning (pronouns, determiners, auxiliary verbs, ...)

Natural Language Research Group

Presentation

Session requirements

Framework

Stopwords reader

Additional information

```
In [1]: from nltk.corpus import stopwords

        sw=set(stopwords.words('english'))
        len(sw)

Out[1]: 179

In [2]: 'the' in sw

Out[2]: True

In [3]: sw

Out[3]: {'a', 'about', 'above', 'after', 'again', ...}
```

Mandatory exercise

Natural Language Research Group

Presentation

Session requirements

Framework

Stopwords reader

Additional information

1. Develop a `jupyter notebook` that show the 25 non-stopwords with more number of occurrences in the file `'blake-poems.txt'` of `Gutenberg` corpus.

Upload the jupyter file of the exercise to the `Raco`.

Class Text

Natural Language Research Group

Presentation

Session requirements

Framework

Class Text

Additional information

Consulting occurrences of words:

```
In [1]: from nltk.corpus import gutenberg
        from nltk.text import Text
        crp = Text(gutenberg.words('blake-poems.txt'))

In [2]: # counting words
        crp.count('love')

Out[2]: 15

In [3]: crp.count('Love')

Out[3]: 13

In [4]: # consulting context in a corpus
        crp.concordance('love')

Displaying 25 of 29 matches:
at we may learn to bear the beams of love And these black bodies and this sunb
ing , ' Come out from the grove , my love and care And round my golden tent li
, And be like him , and he will then love me . THE BLOSSOM Merry , merry sparr
 IMAGE To Mercy , Pity , Peace , and Love , All pray in their distress , And t
...
```

Class Text

Consulting contexts:

```
In [5]: # words in the same context
        crp.similar('love')

went youth desires compelled say nuts pointed none by thrush earth
turned ease all see there sight innocence him pitying
```

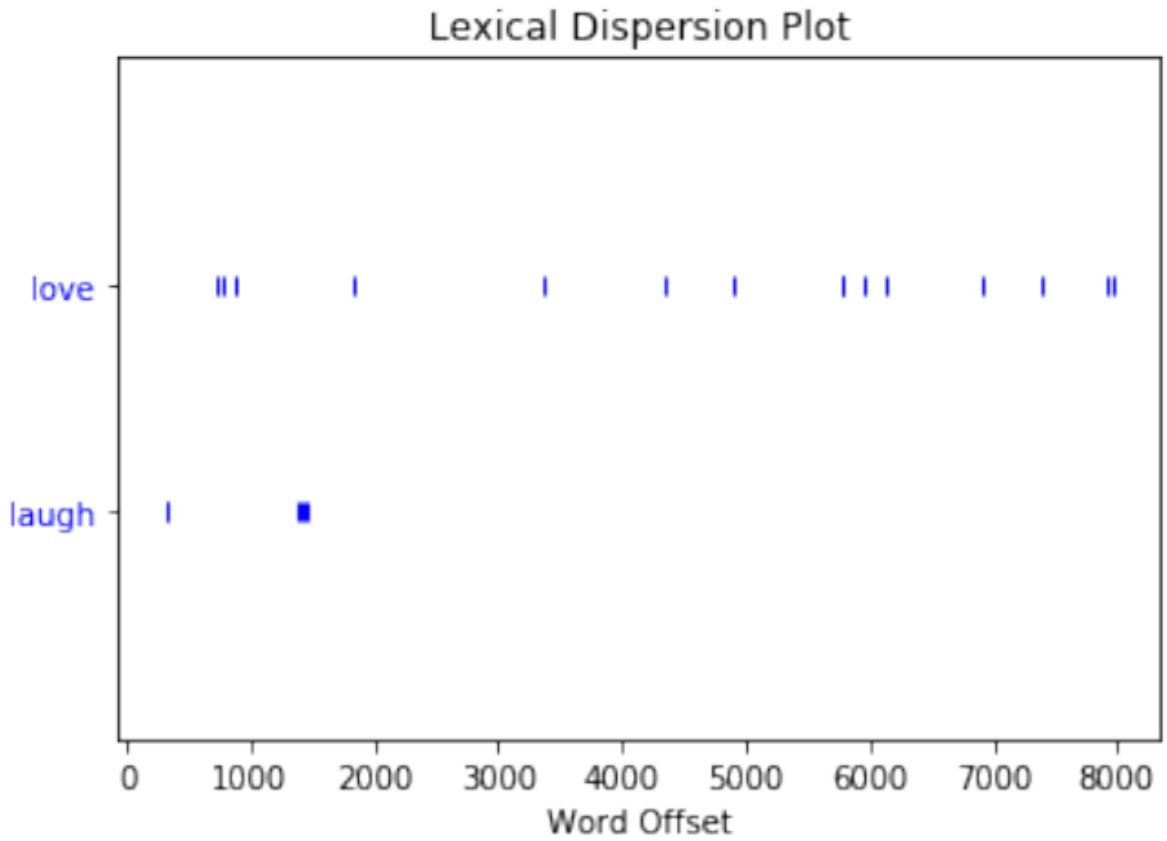
```
In [6]: # words in both context
        crp.common_contexts(['love', 'laugh'])

No common contexts were found
```

Class Text

Dispersion plot:

```
In [8]: # dispersion plot
        crp.dispersion_plot(['love','laugh'])
```



Optional exercise

1. Remake the same steps in the example above but with the file `'austen-sense.txt'` of `Gutenberg` corpus.
2. Compare the results with those in the example.
3. Be sure that the image of the dispersion plot appears in the notebook.

Upload files of the exercise to the `Raco`.

Outline

1 Presentation
- Objectives
- Evaluation
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3 Framework
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Plain Text Example

Loading corpus from a text file:

```
In [1]: import nltk

        crp = nltk.corpus.PlaintextCorpusReader('../data', '.*\.txt').words()
        len(crp)

Out[1]: 23714

In [2]: crp[:10]

Out[2]: ['The',
         'Project',
         'Gutenberg',
         'EBook',
         'of',
         'Alice',
         'in',
         'Wonderland',
         ',',
         'by']
```

Web Example

Fetching web data as string:

```
In [1]: import urllib.request

        url = 'http://www.gutenberg.org/cache/epub/35688/pg35688.txt'

        with urllib.request.urlopen(url) as response:
           dt = response.read().decode('utf8')

        dt[1:55]

Out[1]: 'The Project Gutenberg EBook of Alice in Wonderland, by'
```