Natural Language Processing Introduction

August 2019

Who am I?

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Master in Computer Science (UADY)
Research Engineer at SoldAI
Experience as webmaster, chief technology officer and research engineer at SoldAI
Interest in conversational systems, automatic reasoning and biologically inspired algorithms

What NLP is all about?

Natural Language Processing

"Natural Language Processing (NLP) is the interdisciplinary field of study between artificial intelligence, linguistics and computer science whose goal is to make computers perform useful tasks that involve human language"

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- Make useful processing of text and speech (ortigraphic corrector)

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- Human language as universal communication paradigm (Siri, Google Assistant, Cortana, Messenger, Alexa).
- Tool to obtain knowledge of a bunch of unestructured data.

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  - Humor and sarcasm
  - Writing and grammatical errors

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The perfect understanding of the human language is an AI-complete problem.

Turing Test

"A computer can be considered intelligent if it's able to hold a conversation with a human beign without realizing to be talking with a machine"

— Alan Turing

Ambiguity

- I saw the mountains flying to New York
- After the death, the miners refuse to work
- In Mexico a woman gives birth every 15 minutes
- The officer shot the man with the knife

Lost in translation

"The spirit is willing, but the flesh is weak"
Translates to:

Lost in translation

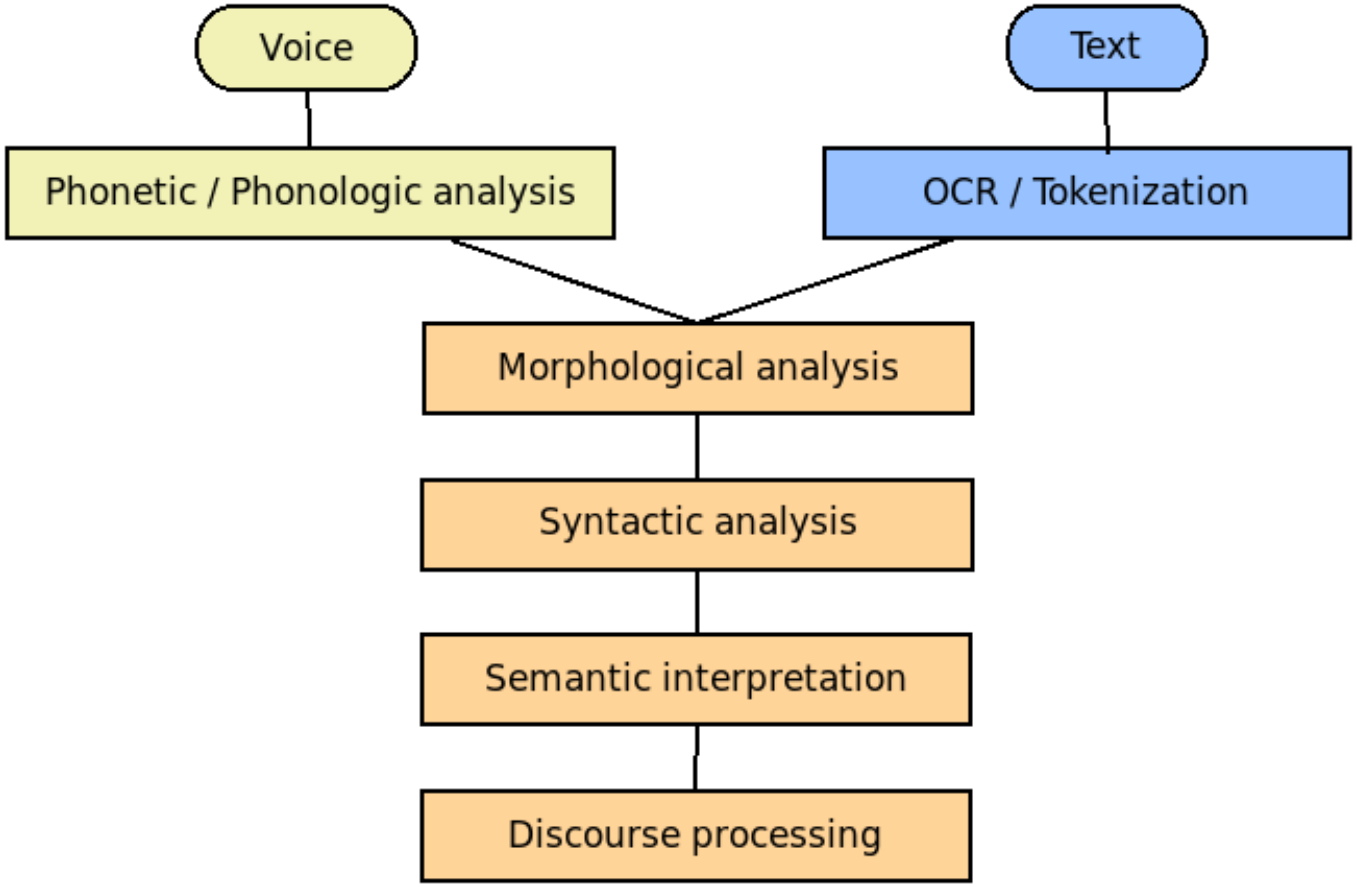
"The spirit is willing, but the flesh is weak"
Translates to:

"The vodka is agreeable, but the meat is rotten"

Combinatorial space for words

- A highschool student knows around 60,000 words
- Almost each sentence produced by a person is a combination generated for the first time in it's life.

NLP Levels


Voice
Text
Phonetic / Phonologic analysis
OCR / Tokenization
Morphological analysis
Syntactic analysis
Semantic interpretation
Discourse processing

Pre-processing

- Cleaning
  - Deletion of empty meaning words (stopwords)
  - Capitalization
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- Normalization
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- Others
  - Tokenizing / Segmentation
  - Counting and grouping

Main approaches

- Rule based methods
  - Regular expressions
  - Free context Grammars
  - First order logic

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  - Maximum likelihood
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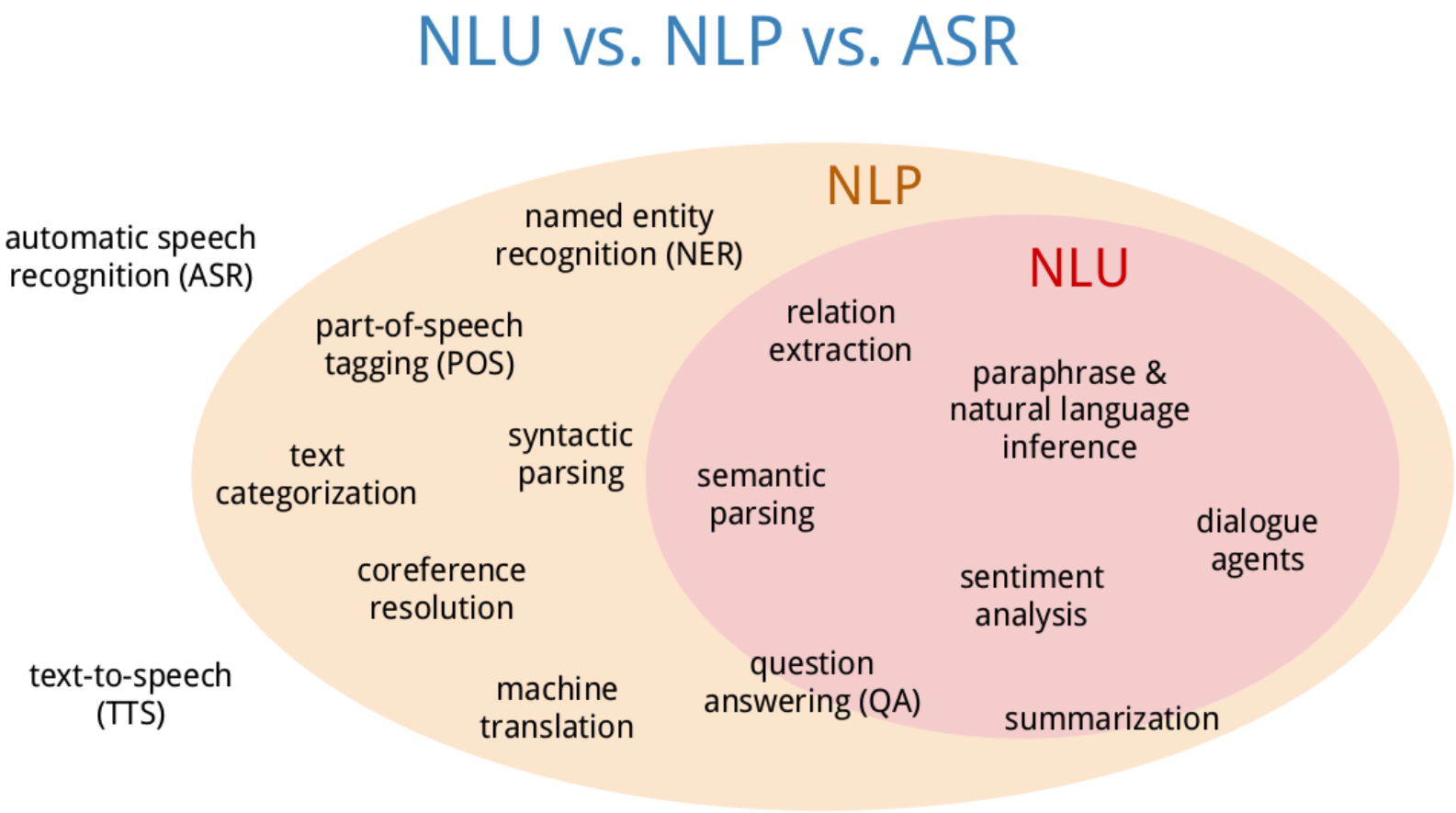
- Deep learning
  - Representation Learning
  - Embeddings
  - Convolutional, Recursive, Long Short Term Memory and Recurrent Neural Networks

Task terminology



Some interesting applications

- Sentiment Analysis
- Ortographic correction
- Search engines
- Information extraction
- Document classification
- Automatic translation
- Dialog systems and digital assistans
- Automatic quesiton answering
- Natural language database interfaces
- Automatic summary

Resources

- Libraries
  - NLTK (Natural Language Toolkit)
  - Stanford CoreNLP
  - Apache OpenNLP
  - Spacy
- Corpus and databases
  - WordNet
  - Penn TreeBank

Let's code

Execute in your machine

git clone https://github.com/MaxSob/nlp-introduction

References

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