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92586 Computational Linguistics

Lesson 0. Introduction

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Materials

Materials

Core bibliography

- ① Kenneth W. Church's **Unix for poets**
- ② Lane et al. (2019)'s **Natural Language Processing in Action**
- ③ Numerous **Wikipedia articles** on relevant topics.
- ④ Working notes (under development)

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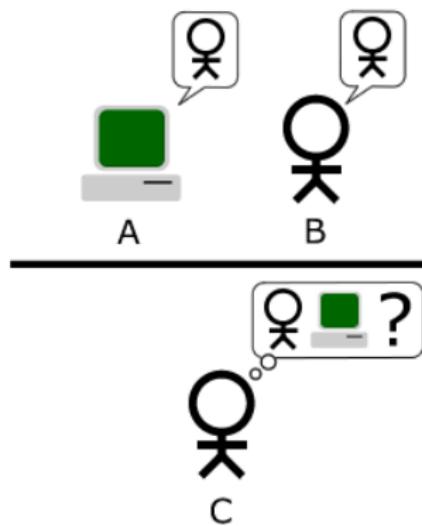
Tools

- ① Python 3
- ② Jupyter through Google's colab or PyCharm
- ③ Git & Latex

Introduction

Introduction

Natural Language as a Measure of Intelligence



Turing (1950). "Computing machinery and intelligence". Mind. 59 (236)

Introduction

CL vs NLP

Computational linguistics¹

- **Interdisciplinary field concerned with the statistical or rule-based modeling of natural language from a computational perspective**

¹https://en.wikipedia.org/wiki/Computational_linguistics

²https://en.wikipedia.org/wiki/Natural_language_processing

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CL vs NLP

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- Subfield of **linguistics, computer science, information engineering, and artificial intelligence** concerned with the interactions between computers and human (natural) languages

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- Subfield of **linguistics, computer science, information engineering**, and **artificial intelligence** concerned with the interactions between computers and human (natural) languages
- How to program computers to process and **analyze large amounts of natural language data**

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Introduction

CL vs NLP

Natural Language Processing (Lane et al., 2019, p. 4)

- Area of research in computer science and artificial intelligence concerned with **processing natural languages**
- This processing generally involves **translating natural language into data** (numbers) that a computer can use to learn about the world.

Introduction

Who are welcome in NLP

Back to the Wikipedia article³

Traditionally [...] performed by **computer scientists** specialized in the application of computers to the processing of a natural language.

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Traditionally [...] performed by **computer scientists** specialized in the application of computers to the processing of a natural language.

Today [...] interdisciplinary teams [...] **linguists, experts in the target language**, and computer scientists.

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Introduction

Rule-based vs Statistical NLP

Introduction

Rule-based NLP

Models are based on a number of hand-crafted rules or grammars.

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Diagram borrowed from L. Moroney's Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning

Introduction

Rule-based NLP

Models are based on a number of hand-crafted rules or grammars.

```
greeting_inputs = ("hey", "morning", "evening", "hi",
                    "whatsup", "hello")
greeting_responses = ["hey", "hey hows you?", "*nods*",
                      "hello, how you doing", "hello",
                      "Welcome, I am good and you"]

def generate_greeting_response(input):
    for token in input.split():
        if token.lower() in greeting_inputs:
            return random.choice(greeting_responses)
```

Derived from

<https://stackabuse.com/python-for-nlp-creating-a-rule-based-chatbot/>

Introduction

Statistical NLP

Models are tuned on annotated data

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Models are tuned on annotated data

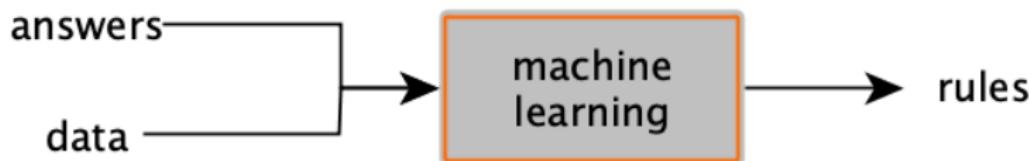
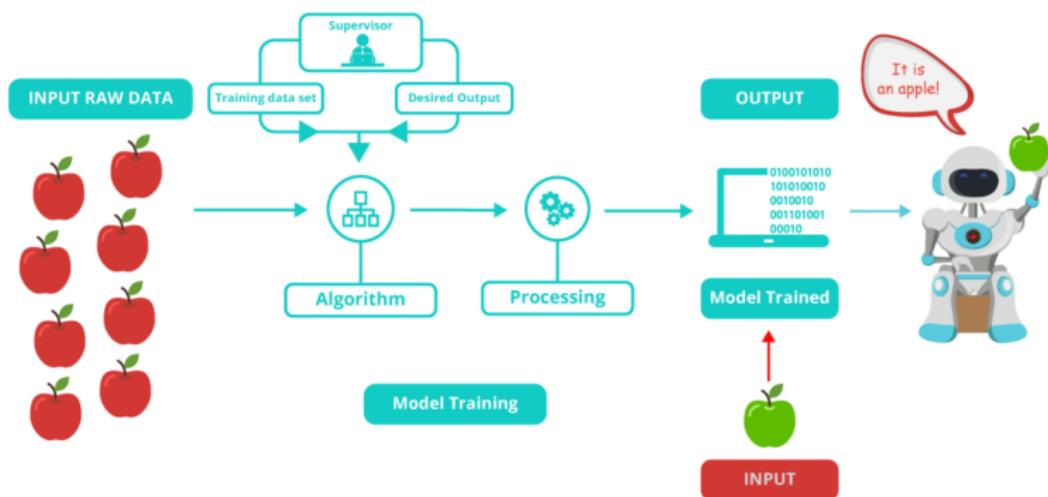


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Statistical NLP

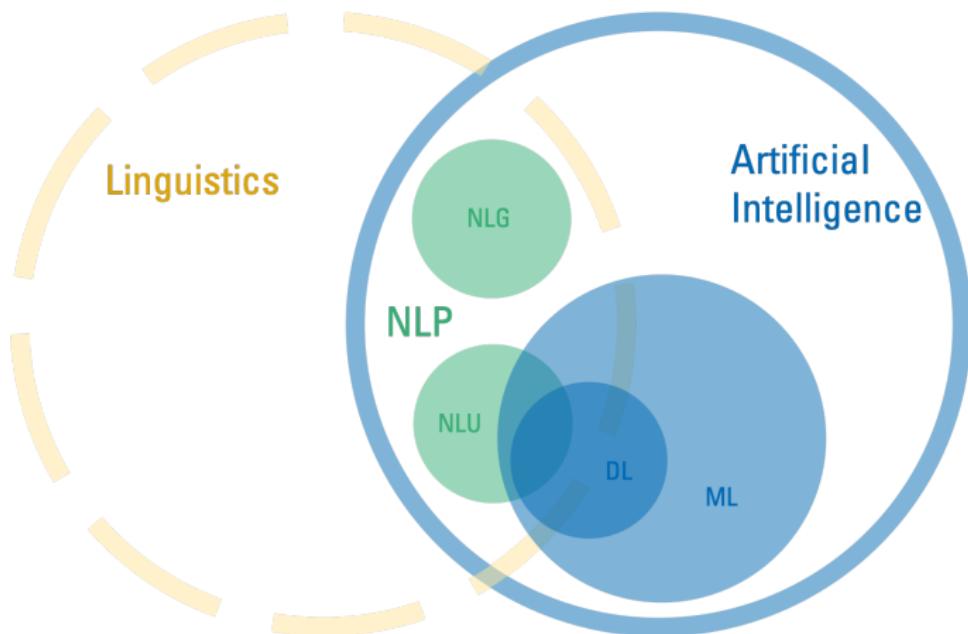
Models are tuned on annotated data



Borrowed from <https://www.edureka.co/blog/machine-learning-tutorial>

Introduction

The NLP neighborhood



Borrowed from

<https://www.retresco.de/en/how-to-ai-natural-language-processing/>

Introduction

Non-exhaustive list of NLP applications with examples

Partially derived from (Lane et al., 2019, p. 8)

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Search

web search engines · text autocomplete

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Non-exhaustive list of NLP applications with examples

Search Editing

web search engines · text autocompletion
grammar issues identification

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web search engines · text autocomplete

Editing

grammar issues identification

Dialog

chatbot creation

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Dialog	chatbot creation
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Sentiment analysis	product review ranking · customer care prioritising

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Translation	

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Requirements

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- Basic linguistics
- Basic algebra
- Python

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Desirable

- Intermediate programming (e.g., object-oriented, testing)
- High-performance computing (e.g., slurm)

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Unix for Poets



Python for Poets

Unix for Poets



Python for Poets

shorturl.at/iFMZ0



References

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