

Natural Language Processing



Orevaoghene Ahia

Lecture 1: Introduction and History of NLP

Meeeee !

I am a research engineer interested in Machine Translation
and Dialogue Systems for Low-resourced Languages.

I am a songwriter and I play the guitar at leisure .

Co-instructor

Kelechi Ogueji

We are still open to volunteer tutors for this track too .

Private Slack Channel

Assignments

Mini projects

Final Projects

What we hope to teach ?

- The NLP Pipeline
 - Key Components for understanding text
- NLP Systems / Applications
 - Current techniques and Limitations

How important is Language to you ?

What is NLP ?

Ideas ?

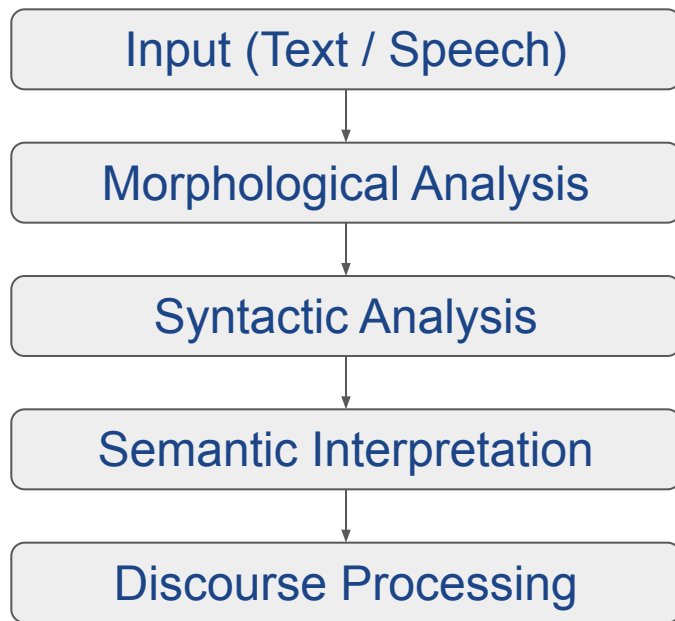
What is Natural Language Processing (NLP) ?

- Natural Language Processing is a field that intersects:
 - **Computer Science**
 - **Artificial Intelligence**
 - **Linguistics**
- Goal: Correctly determining semantic content of natural language in order to perform useful tasks. For example
 - Machine Translation; *Google translate*
 - Dialogue systems; *Siri, Alexa*
- Fully **understanding** and **representing** the meaning of language is a difficult goal .

History of NLP

- NLP has been through at least 3 major eras:
 - 1950s - 1980s: Linguistic Models and HandWritten Rules
 - Too complex to maintain, can't scale, can't generalize .
 - 1980s - Now: Corpus/Statistical Methods
 - Using statistical learning over huge datasets of unstructured texts.
 - Now - ??? : Deep Learning
 - Deep learning provides a very flexible, (almost?) universal, learnable framework for representing world, visual and linguistic information
 - Major state of the art breakthroughs in NLP

Levels of NLP



So what are some applications of Natural Language Processing ?

Some NLP Applications

Range from Simple to Complex

- Spell checking, keyword search
- Information extraction from websites
 - Finding product prices, dates, location, people
- Classifying text, e.g positive and negative sentiments in documents.
- Automatic Summarization
- Dialogue Systems
- Machine Translation
- Question Answering

Machine Translation

The task of translating a sentence x from one language (the **source language**) to a sentence y in another language (then **target language**) .

X: Quand rien ne va bien, allez á gauche.




Y: When nothing goes right, go left.

Dialogue Systems

- Computer Systems intended to converse with humans .
 - Task Oriented
 - Non-task Oriented

Gift shop

Items such as caps, t-shirts, sweatshirts and other miscellanea such as buttons and mouse pads have been designed. In addition, merchandise for almost all of the projects is available.





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Question Answering


- Question Answering (QA) systems enable users to retrieve exact answers for questions posed in natural language.

what is the capital of nigeria

All Images Maps News Videos More Settings Tools

About 212,000,000 results (0.79 seconds)

Nigeria / Capital



Abuja

Abuja (/əˈbuːdʒə/) is the capital city of Nigeria located in the centre of the country within the Federal Capital Territory (FCT). It is a planned city and was built mainly in the 1980s, replacing the country's most populous city of Lagos as the capital on 12 December 1991.

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Hello, Orevaoghene!

Hey Siri what are Newton's three laws


I found this on the web:

WEBSITES

- Newton's Three Laws of Motion - CCRMA - Stanford University**
ccrma.stanford.edu
- Newton's Laws of Motion - Nasa**
grc.nasa.gov
- What Are Newton's Three Laws of Motion? - ThoughtCo**
thoughtco.com
- Newton's Three Laws of Motion**
pas.rochester.edu
- Newton's laws of motion - Wikipedia**
en.wikipedia.org

See more in Safari...

?



NLP in Industry

- Automated Translation
- Speech Recognition
- Chatbots / Dialogue agents
- Sentiment Analysis for customer reviews
- Automated Hiring and Recruitment
- Online Advertisement
- Text Mining in Healthcare

Why is NLP Complex ?

- Complexity in language representation.
- Ambiguity
 - *For example, Rima went to Gauri. She said, “I am tired.” – Exactly who is tired?*
- Human Language Interpretation Variation
 - Depends on real world, common sense and contextual knowledge.

Challenges

- Bias
 - Eg. Bias in Word Vector and Text Generation
- NLP for low-resourced scenarios
- Model Explainability
- Cross-lingual Learning
- Evaluation
 - BLEU Score; It admits too many variations
- Multi-task Learning
 - DecaNLP; Salesforce

Prerequisites

- Proficiency in python
- Multivariate Calculus , Linear Algebra
- Basic Probability and Statistics
- Fundamentals of Machine Learning and Neural Networks
 - Loss functions
 - Taking simple derivatives
 - Performing optimization with gradient descent.

Lecture Plan for the Cohort

https://docs.google.com/document/d/18Tz5rQsW3l7rkGk9pPHHJvYwPcR_IFwGWzeLbpSjrYs/edit?ts=5d7669e8#