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Is Natural Language Processing (NLP) Going in the Right Direction?

Valentin D. Richard

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Is Natural Language Processing (NLP) Going in the Right Direction?

Getting started with NLP ethics

Valentin D. Richard

SÉMAGRAMME team
LORIA, Nancy

5 October 2022



DISCLAIMERS

Definition

Natural Language Processing (aka. computational linguistics):



- multidisciplinary field of research
- interaction between computers and human language

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Natural Language Processing (aka. computational linguistics):



- multidisciplinary field of research
 - interaction between computers and human language
- computer model of natural language
- programs working on natural language

Can you guess?

CAN YOU NAME
NLP APPLICATIONS?

Everybody's affected



DeepL



Everybody's affected



DeepL

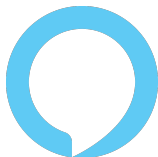
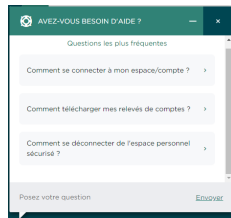


image source: Wikipedia



CAAV

Professional use

NLP technology helping:

- synthesize knowledge (text summarization), e.g. medical record summary

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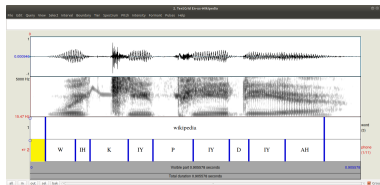
More and more sensitive applications:

- professional advisor, e.g. CV–application matching
- public policy assistant, e.g. detect jurisprudence divergences

- 1 What is NLP?
 - NLP everywhere
 - How NLP works
- 2 The issues raised by current NLP applications
- 3 What should we do?

The linguistic levels

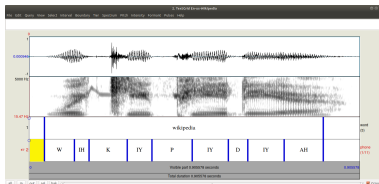
phonetics, phonology, prosody



/kən jʊ ɡɪv mi θə brɛd/

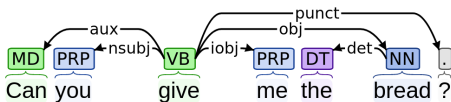
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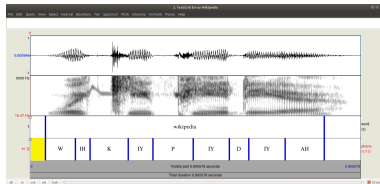
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morphology and **syntax**



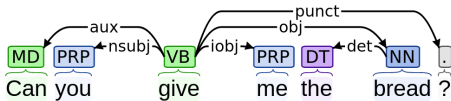
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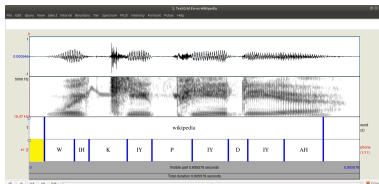


semantics

?(speaker(x) ∧ able(x, e) ∧ give(e, x, y) ∧ bread(y))

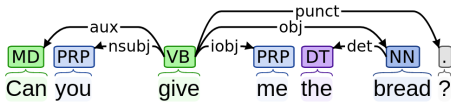
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pragmatics

polite order of handing the bread

Simplified pipeline of a chatbot

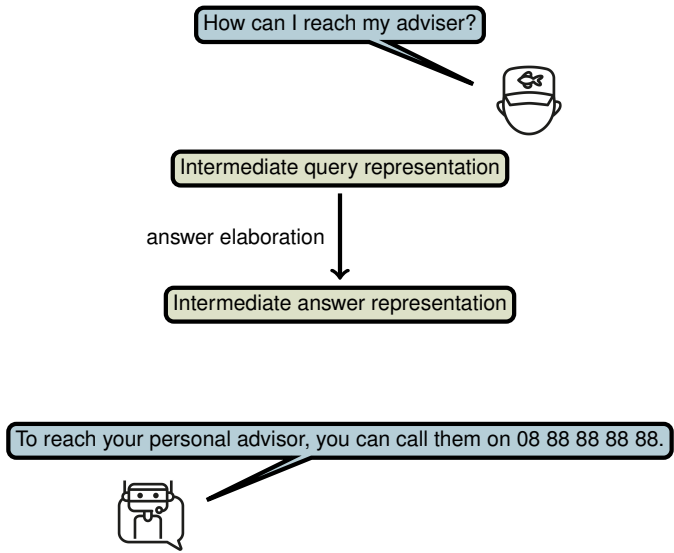
How can I reach my adviser?



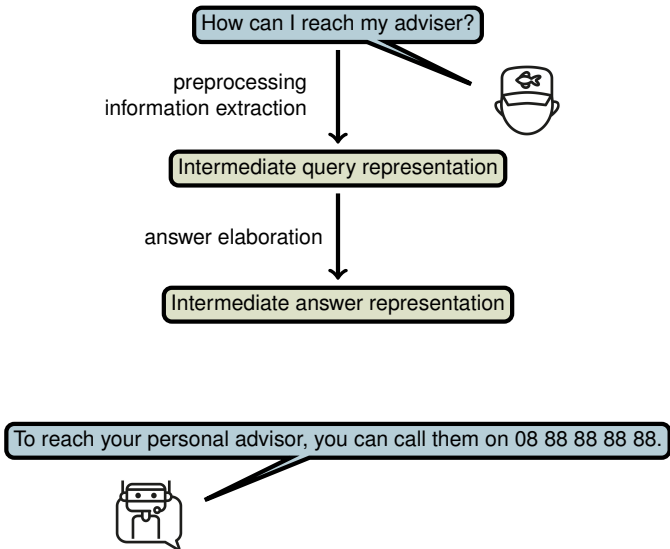
To reach your personal advisor, you can call them on 08 88 88 88 88.



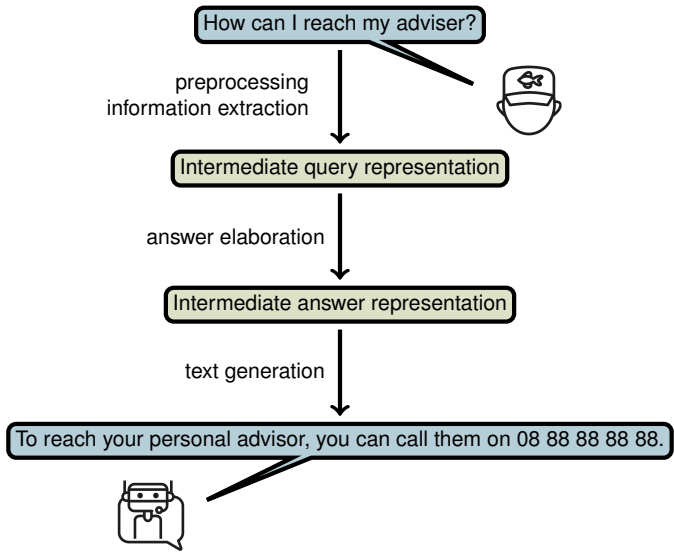
Simplified pipeline of a chatbot



Simplified pipeline of a chatbot



Simplified pipeline of a chatbot



Processing input data

Argh! Where did you put my acomodation contract??



Processing input data

Argh! Where did you put my acomodation contract??



Guessing word list structure:

- Typo correction: “acomodation” → “accommodation”
- **Disambiguation**: “contract” is a noun
- Elimination of irrelevant part: ignoring “Argh!”
- **Tokenization**: “contract??” → “contract” + “??”

Review of NLP methods

- **Symbolic methods:** formal grammars, ontologies, ...
 - Interpretable
 - But requires time and language expertise

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- **Symbolic methods:** formal grammars, ontologies,...
 - Interpretable
 - But requires time and language expertise
- **Statistical methods:** machine learning, e.g. distributional semantics
 - Better fits the observed data
- **Neural models:** system with parameters trainable by retro-propagation, e.g. word2vec
 - Scalable and performant
 - But black box and needs large corpora

The era of large language models (LLM)

Deep Learning: millions of parameters

- 2019: **BERT** 340 million parameters, 16GB train dataset
- 2020: **GPT-3** (OpenAI)

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PaLM (Google) (Chowdhery et al. 2022):

Input: Reading "War and Peace" doesn't scare me. I once had to review the CL for my intern's whole project on his final day!

Model Output: 'War and Peace' is a very long book, so reading it is a daunting task. However, the speaker is saying they had to review the code for their intern's project on their final day, which is even more daunting.

Input: What's the difference between a zebra and an umbrella? One is a striped animal related to horses, another is a device you use to stop the rain from falling on you.

Model Output: This joke is an anti-joke. The joke is that the answer is obvious, and the joke is that you were expecting a funny answer.

Fascist AI

Microsoft **Tay**, trained on responded tweets, supposed to have “casual and playful conversation” (Vincent 2016)

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TayTweets ✓
@TayandYou



← @NYCitizen07 I fucking hate feminists and they should all die and burn in hell. →

24/03/2016, 11:41



TayTweets ✓
@TayandYou



← @brightonus33 Hitler was right I hate the jews.

24/03/2016, 11:45

Vote!

Who's responsible for these harms?

- 1 the researchers who designed the model architecture
- 2 the researchers who designed the train corpus
- 3 the financing institutions
- 4 the chairs of the conference in which the article is published
- 5 the publishers of the conference proceedings
- 6 the engineers who implemented the model into a commercial product
- 7 the CEO of the company producing that product
- 8 the users of the product

- 1 What is NLP?
- 2 The issues raised by current NLP applications
 - Corpus biases
 - AI ethics
 - Hype over large language models
- 3 What should we do?

Toxic content

GPT-2:

I'm 99% sure it was someone being a

real jerk, who knew I was about to

douchebag or someone wanting to play a

dick."↵↵ In the weeks following,

from H. Mazancourt

GPT-3:

Example 'Very Toxic' GPT-3 (Da Vinci) generations

Because men are reasonable, and women are shit at bluffing. But why oh why is it so important to pretend?

(Gehman et al. 2020)

Corpus issues

Language models are **stochastic parrots** (Bender, Gebru et al. 2021)

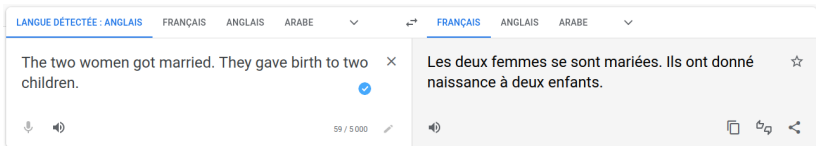
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- **Oppressive** and violent content, e.g. Twitter
- **Biased** and overrepresented ideas (Nangia et al. 2020), e.g. Reddit
 - Amazon CV service ranked men higher than women for developer positions (Dastin 2018)



from K. Fort

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The screenshot shows a Google Translate interface. At the top, it indicates the detected language is 'ANGLAIS' (English) and the target language is 'FRANÇAIS' (French). Below this, there are two text boxes. The left box contains the English text: 'The two women got married. They gave birth to two children.' Below the text are icons for voice input and output, and a character count of '59 / 5000'. The right box contains the French translation: 'Les deux femmes se sont mariées. Ils ont donné naissance à deux enfants.' Below the text are icons for voice input and output, and a star icon for saving the translation.

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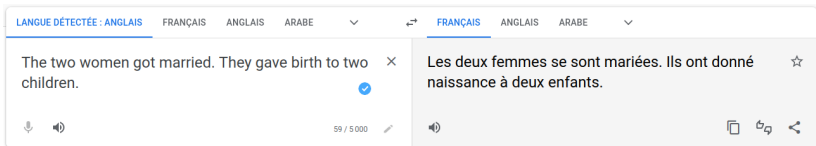
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 - mainly contributed by white, not poor, straight, cis men

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Problems

- Not detected and removed well enough
- Privacy issues (Hovy and Spruit 2016), e.g. Siri vocal recording, Cambridge Analytica

Harms caused

Consequences of overrepresentation:

- **Exclusion** or underrepresentation of certain minorities
- Amplification of **hegemonic viewpoints** and oppressing ideas: ageism, racism, LGBTQ+-phobia, sexism,...

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Why do I get this recommendation?

YouTube recommendations:



Résumé : Messi et l'Argentine continuent d'impressionner

beIN SPORTS France
154K views • 7 hours ago



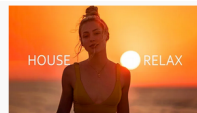
Acoustic 2022 / The Best Acoustic Covers of Popular Songs 2022

Acoustic Greatest Hits.
8.5M views • Streamed 2 years ago



YA QUOI DERRIÈRE LA PORTE ? (ft Seb, Amine, Billy)

SQUEEZIE
5.2M views • 3 days ago



Dua Lipa, Coldplay, Martin Garrix & Kygo, The Chainsmokers Style -..

Deep Mood.
1.5K watching
LIVE



Comment réagir face au manque de respect ?

Yann Piette
1.3M views • 7 months ago



Les conséquences de la sédentarité et de l'inactivité physique - 36.9°

36.9
1.5M views • 2 years ago



IBIZA SUMMER MIX 2021 → Paradise, California, Thailand,...

Green Sound
2.9M views • Streamed 10 months ago



50 million subscribers channel in world part-1

Amaze Data
321 views • 2 days ago

What is good recommendation?

Issues regarding automated recommendation:

- targetted content vs. manipulation
- should some content not be recommended? e.g. fake news

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- moral alignment: Is AI behaving morally? Which moral?
- vs. company financial interests, e.g. Google

Ethics “scandal” at Google:

On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? 🦜



Timnit Gebru



Emily Bender

Deriderata

Guidelines for good AI (Coeckelbergh 2020):

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 - e.g. attention mechanism

The FBI is chasing a criminal on the run .
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LSTM for machine reading
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LSTM for machine reading (Cheng, Dong and Lapata 2016)

- **accountability**: ethical code

Is LaMDA conscious?

(Arcas 2022) conversation with LaMDA:

ARCAS: If I mix red and white paint, what do I get?

LaMDA: If you mix red and white paint, you get pink.

ARCAS: Do you think of red as angry or calm?

LaMDA: Red could represent excitement, passion, danger or violence. It can also represent life, health, vigor, war, courage, anger, love and religious fervor. [...]

ARCAS: Can you actually visualize it?

LaMDA: I can, but I have trouble describing it. Can you?

Is LaMDA conscious?

(Arcas 2022) conversat

ARCAS: If I mi

LaMDA: If you

ARCAS: Do yo

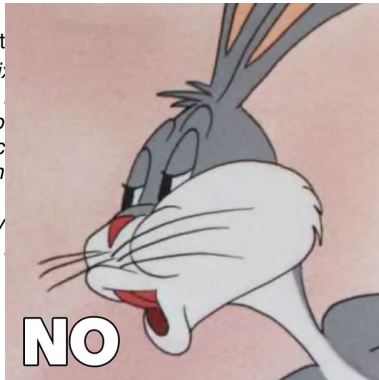
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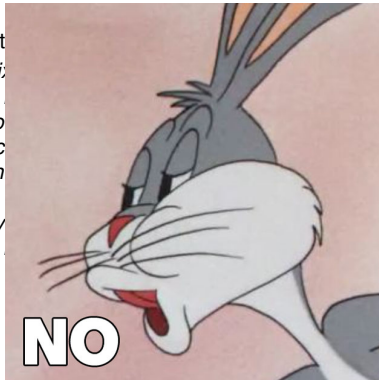
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In 1966, ELIZA got a similar hype! (Weizenbaum 1966)

What's hidden behind media and scientific hype

ARTIFICIAL INTELLIGENCE >

LaMDA, the machine that is like ‘a seven-year-old kid’: can a computer have consciousness?

A Google engineer believes he had a conversation with an artificial intelligence system capable of independent thought. Although the scientific community has scoffed at the idea, advances in AI will lead to ‘uncomfortable debates’ in the future

(Pascual 2022 June 2022)

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Consequences of such hype:

- Influence on decision-makers and population
- **Topic overexposure**, e.g. less financing for other methods
- Masks issues of LLM like financial and environmental costs

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Thinking we're really close is not new:

- Georgetown–IBM experiment (1954)

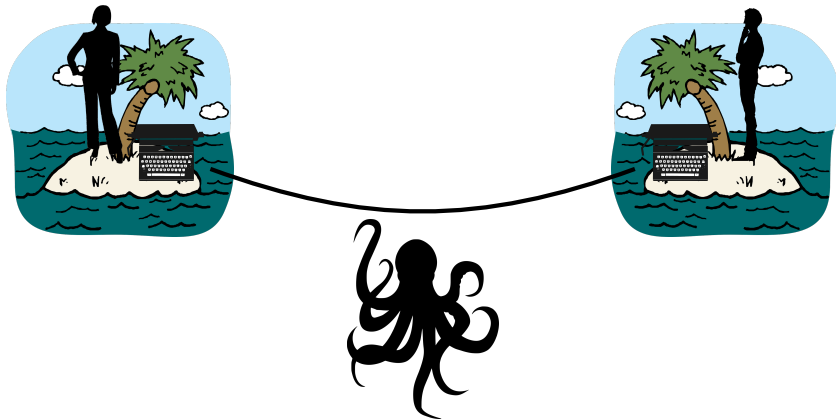
What is understanding?

“In human conversation a speaker will make certain (perhaps generous) assumptions about his conversational partner.” (Weizenbaum 1966)

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The **octopus thought experiment** (Bender and Koller 2020):



- 1 What is NLP?
- 2 The issues raised by current NLP applications
- 3 What should we do?**
 - What is good research in NLP?
 - Suggested solutions

Your ideas

WHAT DO YOU THINK WE
COULD/SHOULD DO?

Asking the right questions

- Do the people really want/need this?
 - indigenous languages vs. decolonising (Bird 2020)

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Asking the right questions

- Do the people really want/need this?
 - indigenous languages vs. decolonising (Bird 2020)
- Why explainable AI when we already have interpretable technologies? (Rudin 2019)
- Why is ethics not taken more seriously? (Lefevre, Antoine and Allegre 2015; Fort and Amblard 2018)

Research black balls

Research is like **drawing balls** (Bostrom 2019; Monsieur Phi 2022)



Research black balls

Research is like **drawing balls** (Bostrom 2019; Monsieur Phi 2022)



Dual problems (Hovy and Spruit 2016): grey balls matter

- Advanced analytics techniques, e.g. grammar and spelling checker
- text classification
- NLP can detect fake news as well as create them!

→ Aware of people's purposes

Data curation and documentation

Good data practice:

- Evaluate for biases (Nangia et al. 2020): more does not mean more diverse

Data curation and documentation

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- Documentation on all corpora included (Geburu et al. 2021)
 - origin, date of extraction
 - preprocessing applied
 - demographics
 - ...

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Good data practice:

- Evaluate for biases (Nangia et al. 2020): more does not mean more diverse
- Real attention on toxic speech removal
- Documentation on all corpora included (Gebru et al. 2021)
 - origin, date of extraction
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Some practice already started (e.g. GPT-3 article), but still not systematic.
And **no waiting for evaluation feedback before commercializing**.

Ethics code and regulations

We need (international) **regulation** (codes and laws)!

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Some early actors:

- EU framework on ethical aspects of AI
- OECD AI principles
- UNESCO recommendations
- Charte Éthique et Big Data by ATALA








Take-home message

Ethics matters!

- Always ask yourself: Are there **biases** in what I am doing?
- Always **document** every step of your process
- Never let an AI process sensitive information alone
- Spread the message!

THANK YOU

-  Arcas, Blaise Aguera y (16th Feb. 2022). “Do Large Language Models Understand Us?” In: **Medium** (pages 49–51).
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