The ABC of Computational Text Analysis

#8 Ethics and the Evolution of NLP

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Recap last Lecture

- an abundance data sources
  JSTOR, Nexis, few datasets

- creating your own dataset
  converting any data to `.txt`

Outline

- cover last lecture's batch processing 📝

- ethics is your responsibility 🙈🙉🙊

- understand the development of modern NLP 🚀
  ... or how to put words into computers

A primer on Ethics

Ethics doesn't need to be abstract

CV Assessment

1. You send a CV for a job.

2. The company automatically pre-filters candida

3. Do you pass?

4. 🔴 🟢

Interview Assessment

Don't worry about the future ...

... worry about the present.

- AI is persuasive in everyday's life

- AI is extremely capable

- AI is not so smart

💡 what is going on behind the scene?

An (R)evolution of NLP

From Bag of Words to Embeddings

Putting Words into Computers *(Smith 2020; Church and Liberman 2021)*

- from **coarse, static** to **fine, contextual** meaning

- how to measure similarity
    string-based
    syntactic (e.g., part-of-speech)
    semantic (e.g., animate)
    embedding

- from counting to learning representations
    end2end deep learning

Bag of Words

- word as arbitrary, discrete numbers

    King = 1, Queen = 2, Man = 3, Woman = 4

- intrinsic meaning

    derived from data
    defined by experts

- how are these words similar?

Corpus Representation

Collection of Documents

1. `NLP is great. I love NLP.`

2. `I understand NLP.`

3. `NLP, NLP, NLP.`

Document Term Matrix

	NLP	I	is	*term*
Doc 1	2	1	1	...
Doc 2	1	1	0	...
Doc 3	3	0	0	...
Doc ID	...	...	...	*term frequency*

«You shall know a word by the company it keeps!»

Firth (1957)

Context is everything

"I hate ___ but they will eat anything."

Word Embeddings

word2vec *(Mikolov et al. 2013)*

- words as continuous vectors
  accounting for similarity between words

- semantic similarity

  King − Man + Woman = Queen

Single continuous vector per word (Colyer 2016)
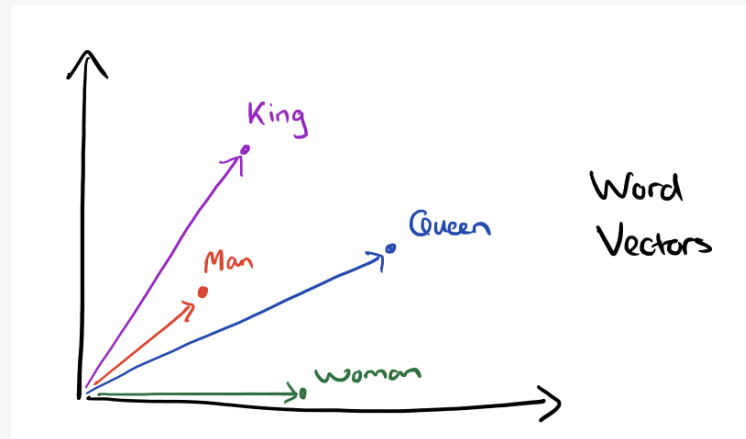
Words as points in a semantic space (Colyer 2016)
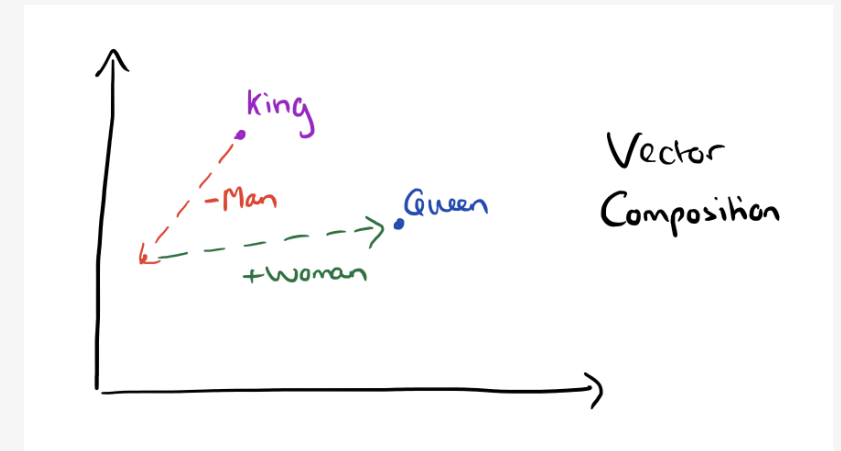
Doing arithmetics with words (Colyer 2016)

Contextualized Word Embeddings

BERT *(Devlin et al. 2019)*

- recontextualize static word embedding
    different embedding in different contexts
    accounting for ambiguity (e.g., `bank`)

- acquire linguistic knowledge from language models (LM)
    LM predict next/missing word
    pre-trained on massive data (> 1 billion words)

💥 embeddings mark a new era of NLP

Cultural Associations in Data

- «___ became a doctor.»

- «___ takes care of the children.»

- «Doing illegal things is bad.»

- «A recent study by the Swiss state secretariat for migrants (SEM) estimates that there were 76,000 illegal immigrants.»

🤔 Are migrants somehow bad, then?

Word vectors are biased …

… because ~~our data is~~ we are biased. *(Bender et al. 2021)*

Two Sides of the AI Coin

Solving vs. Understanding

- understanding is key in **science**: **data analysis**

- automating is key in **business**: **applied AI**

Biased Data and beyond

Data = Digital Traces = Social Artifacts

- collecting, curating, preserving traces

- data is a **tool** to refine questions **rather than reflection** of the world

Data vs. Capta

«*Differences in the etymological roots of the terms data and capta make the distinction between constructivist and realist approaches clear. Capta is* **"taken"** *actively while data is assumed to be a* **"given"** *able to be recorded and observed.*»

Imperfect Data: A Tail of Bias

- social bias

    view from somewhere, stereotypes

- data/archive holes

    lost, uncollected

- corpus curation

    supposition that key-word indicates topic

- noise in data

    OCR errors, inconsistent spelling, non-content

👉 think about the data and mitigate issues

«Raw data is an oxymoron.» Gitelman (2013)

Mind your Data

- Who has a voice in your data?
  social context

- bigger is not necessarily better
  more vs. more diverse data

- clean your data thoroughly
  noisy vs. clean data

DATA
HUMANISM

SMALL ~~big~~ data

data ~~bandwith~~ QUALITY

IMPERFECT ~~infallible~~ data

SUBJECTIVE ~~impartial~~ data

INSPIRING ~~descriptive~~ data

SERENDIPITOUS ~~predictive~~ data

data ~~conventions~~ POSSIBILITIES

data to ~~simplify complexity~~ / DEPICT

data ~~processing~~ DRAWING

data driven design

SPEND ~~save~~ time with data

data ~~is numbers~~ PEOPLE

data will make us more ~~efficient~~ HUMAN.

@giorgialupi

Fair is a Fad

- *Fair* and *good* – but to whom? *(Kalluri 2020)*

- lacking democratic legitimacy

- debiasing data to avoid regulation

- looking beyond data
  - *invading privacy*
  - *economic monopolies*
  - *(unpaid) AI-trainers and click-workers*
  - *environmental costs*

«Don't ask if artificial intelligence is good or fair, ask how it shifts power.»

Kalluri (2020)

Anatomy of AI illustrated by the Amazon Echo *(Crawford and Joler 2018)*
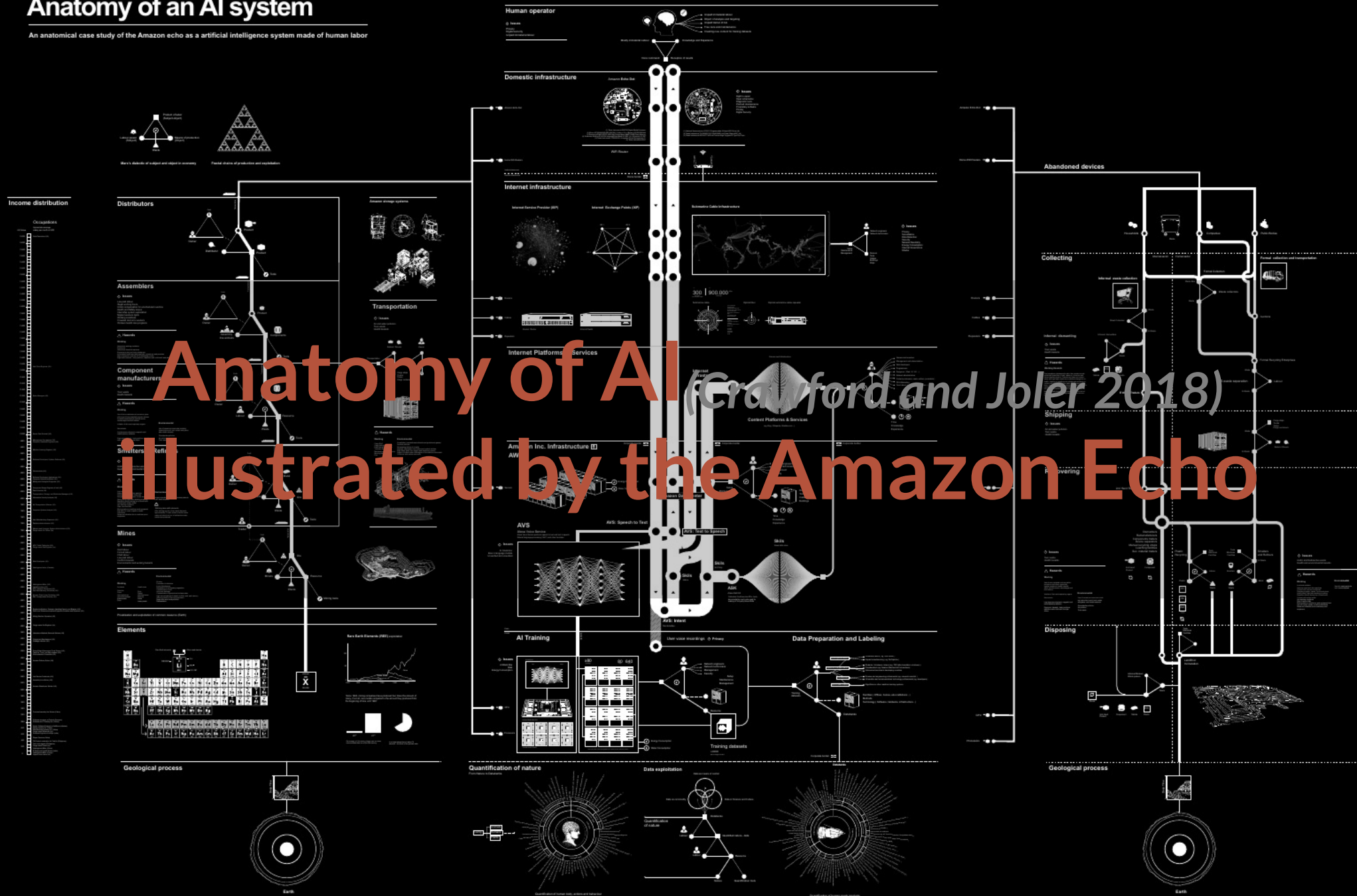
Data represents real life.

Don't be a fool. Be wise, think twice.

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