

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 candidates
- 3. Do you pass?
- 4.  

Interview Assessment

 E-mail

 Phone

Name

LAST NAME

JOB OCCUPIED

ABOUT ME

Briefly describe yourself... Consectetur adipiscing elit. Aliquam nec varius mauris. Duauque magna, bibendum at nunc id, gravida ultrices tellus. Pellentesqu, ehicula ante id, dictum arcu hicula ante gravida ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam nec varius mauris augue magna.

EDUCATION

DIPLOMA XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX20XX – 20XX

University or school

DIPLOMA XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX20XX – 20XX

University or school

WORK EXPERIENCE

SUMMER JOB - NAME OF THE COMPANYSept. 20XX – Jan. 20XX

Missions or tasks realized: duis augue magna, bibendum at nunc id, gravida ultrices tellus. Pellentesqu, ehicula ante id, dictum arcu hicula ante gravida ultrices. Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, varius mauris. bibendum at nunc id, gravida ultrices .

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LANGUAGES

English

Spanish

German

INTERESTS

✓ Judo

✓ Basket-ball

✓ Judo

✓ Basket-ball

✓ Judo

✓ Basket-ball

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)

“I hate ____, but the others eat anything.”

Word Embeddings

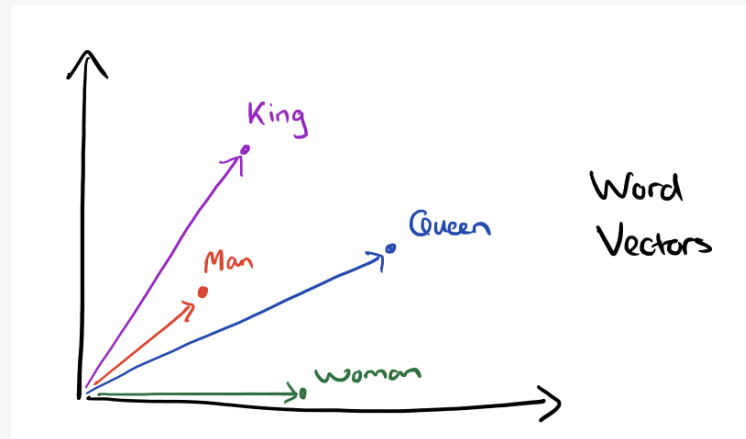
word2vec (Mikolov et al. 2013)

- words as continuous vectors
accounting for similarity between words
- semantic similarity

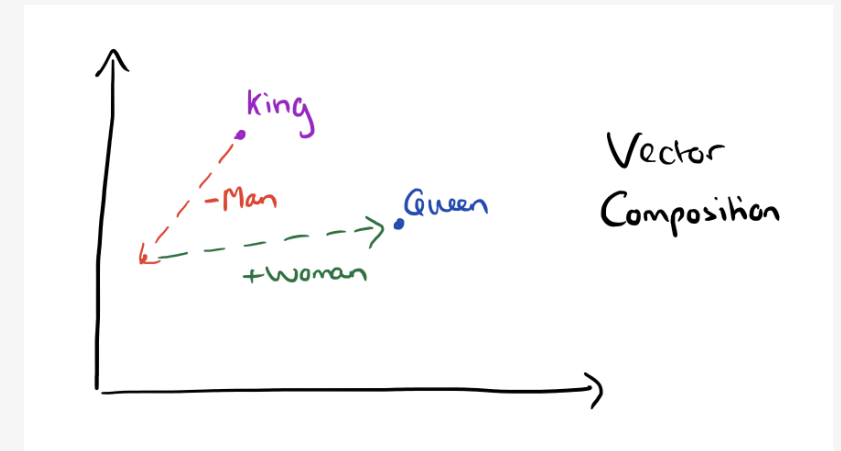
$$\text{King} - \text{Man} + \text{Woman} = \text{Queen}$$

King	Queen	Woman	Princess
0.99	0.99	0.02	0.98
0.99	0.05	0.01	0.02
0.05	0.93	0.999	0.94
0.7	0.6	0.5	0.1
⋮			

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

- « becomes 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

Explaining vs. Solving

- understanding matters in **science: data analysis**
- automating matters 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 ~~bandwidth~~ **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.**

Fair is a Fad

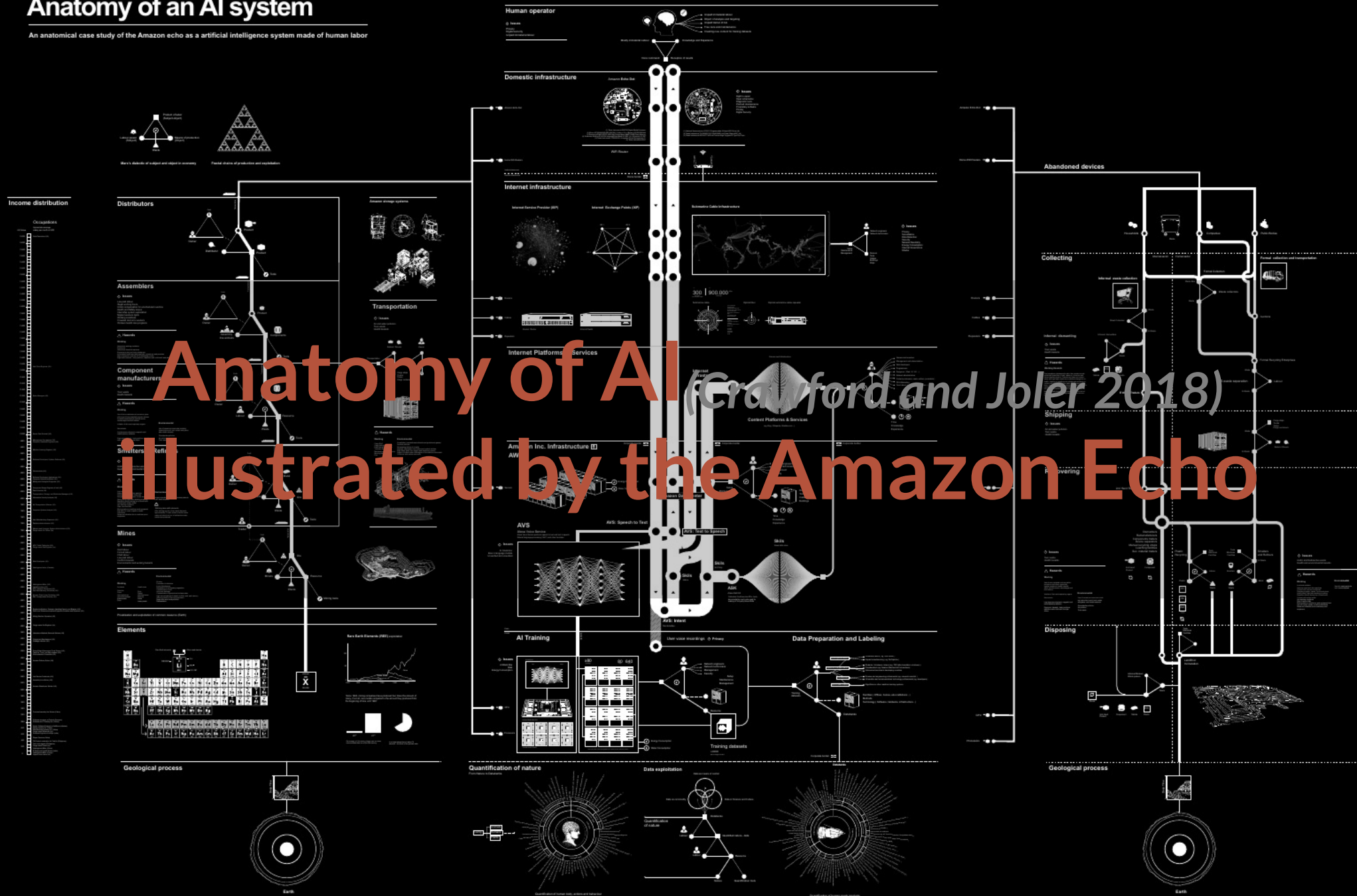
- *Fair and good* – but to whom? (Kalluri 2020)
- lacking democratic legitimacy
- debiasing data to avoid regulation
- looking beyond data
 - invading privacy*
 - economic monopolies*
 - (unpaid) AI-trainers and click-workers*
 - environmental costs*

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

Kalluri (2020)

Anatomy of an AI system

An anatomical case study of the Amazon echo as a artificial intelligence system made of human labor



Data represents real life.

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



Questions?

References

- Bender, Emily M., Timnit Gebru, Angelina McMillan-Major, and Shmargaret Shmitchell. 2021. “On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? 🦜.” In *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–23. Virtual Event Canada: ACM. <https://doi.org/10.1145/3442188.3445922>.
- Church, Kenneth, and Mark Liberman. 2021. “The Future of Computational Linguistics: On Beyond Alchemy.” *Frontiers in Artificial Intelligence* 4. <https://doi.org/10.3389/frai.2021.625341>.
- Colyer, Adrian. 2016. “The Amazing Power of Word Vectors.” the morning paper. 2016. <https://blog.acolyer.org/2016/04/21/the-amazing-power-of-word-vectors/>.
- Crawford, Kate, and Vladan Joler. 2018. “Anatomy of an AI System.” *Anatomy of an AI System*. 2018. <http://www.anatomyof.ai>.
- Devlin, Jacob, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2019. “BERT: Pre-Training of Deep Bidirectional Transformers for Language Understanding.” May 24, 2019. <http://arxiv.org/abs/1810.04805>.
- Drucker, Johanna. 2011. “Humanities Approaches to Graphical Display.” *Digital Humanities Quarterly* 5 (1). <http://www.digitalhumanities.org/dhq/vol/5/1/000091/000091.html>.
- Firth, John R. 1957. “A Synopsis of Linguistic Theory, 1930-1955.” In *Studies in Linguistic Analysis: Special Volume of the Philological Society*, edited by John R. Firth, 1–32. Oxford: Blackwell. <http://ci.nii.ac.jp/naid/10020680394/>.
- Gitelman, Lisa. 2013. *Raw Data Is an Oxymoron*. Cambridge: MIT.
- Kalluri, Pratyusha. 2020. “Don’t Ask If Artificial Intelligence Is Good or Fair, Ask How It Shifts Power.” *Nature* 583 (7815, 7815): 169–69. <https://doi.org/10.1038/d41586-020-02003-2>.