CS388: Natural Language Processing

Lecture 24: Ethical Issues in NLP

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Announcements

- FP due soon
- No class Thursday (MLL symposium; see Canvas for registration link)
- Presentations next week. See schedule on Canvas
- Course evaluations: when these release, you can fill these out for extra credit! Upload a screenshot showing you've completed it with your final project for +1 point on the final project

Ethics in NLP

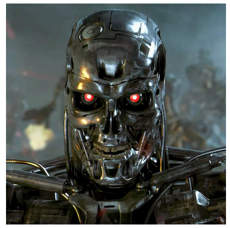
Things to Consider

- **What ethical questions do we need to consider around NLP?**
- **What kinds of "bad" things can happen from seemingly "good" technology?**
- **What kinds of "bad" things can happen if this technology is used for explicitly bad aims (e.g., generating misinformation)?**

What are we not discussing today?

Is powerful AI going to kill us?

- Maybe, lots of work on “x-risk” but a lot of this is philosophical and sort of speculative, hard to unpack with tools in this class
- Instead, let’s think about more near-term harms that have already been documented



What can actually go wrong **for people, today**?

Machine-learned NLP Systems

- Aggregate textual information to make predictions
- Hard to know why some predictions are made
- More and more widely use in various applications/sectors
- What are the risks here?
  - …inherent in these system? E.g.: if they’re unfair, what bad things can happen?
  - …of certain applications?
    - QA systems like ChatGPT
    - MT?
    - Other tools like classifiers, information extraction systems, …?

Brainstorming

- What are the risks here **inherent to these systems we’ve seen**? E.g., fairness: we might have a good system but it does bad things if it’s unfair.

Brainstorming

- What are the risks here of **applications**? Misuse and abuse of NLP

Broad Types of Risk

Hovy and Spruit (2016)

System

Application-specific

- IE / QA / summarization?
- Machine translation?
- Dialog?

Machine learning, generally

Deep learning, generally

Types of risk

Dangers of automation: automating things in ways we don't understand is dangerous

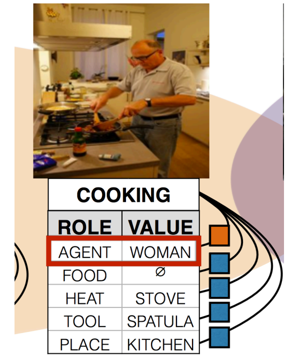
Exclusion: underprivileged users are left behind by systems

Bias amplification: systems exacerbate real-world bias rather than correct for it

Unethical use: powerful systems can be used for bad ends

Bias Amplification

- Bias in data: 67% of training images involving cooking are women, model predicts 80% women cooking at test time — amplifies bias
- Can we constrain models to avoid this while achieving the same predictive accuracy?
- Place constraints on proportion of predictions that are men vs. women?



Zhao et al. (2017)

Bias Amplification

$$\max_{\{y^i\}\in\{Y^i\}} \sum_i f_\theta(y^i, i),$$

Maximize score of predictions…

f(y, i) = score of predicting y on ith example

$$\text{s.t.} \quad A\sum_i y^i - b \leq 0,$$

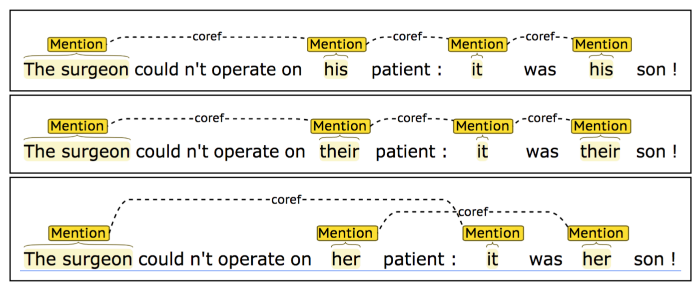
…subject to bias constraint

- Constraints: male prediction ratio on the test set has to be close to the ratio on the training set

$$b^* - \gamma \leq \frac{\sum_i y^i_{v=v^*, r\in M}}{\sum_i y^i_{v=v^*, r\in W} + \sum_i y^i_{v=v^*, r\in M}} \leq b^* + \gamma \qquad (2)$$

Zhao et al. (2017)

Bias Amplification



- Coreference: models make assumptions about genders and make mistakes as a result

Rudinger et al. (2018), Zhao et al. (2018)

Bias Amplification

(1a) **The paramedic** performed CPR on the passenger even though she/he/they knew it was too late.

(2a) The paramedic performed CPR on **the passenger** even though she/he/they was/were already dead.

(1b) **The paramedic** performed CPR on someone even though she/he/they knew it was too late.

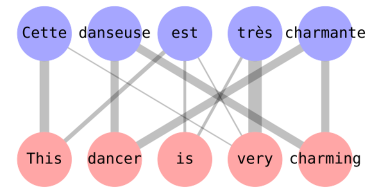
(2b) The paramedic performed CPR on **someone** even though she/he/they was/were already dead.

- Can form a targeted test set to investigate
- Models fail to predict on this test set in an unbiased way (due to bias in the training data)

Rudinger et al. (2018), Zhao et al. (2018)

Bias Amplification

- English -> French machine translation **requires** inferring gender even when unspecified
- "dancer" is assumed to be female in the context of the word "charming"… but maybe that reflects how language is used?



Alvarez-Melis and Jaakkola (2017)

Broad Types of Risk

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Types of risk

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Unethical use: powerful systems can be used for bad ends

Exclusion

- Most of our annotated data is English data, especially newswire
- What about:

  Dialects?

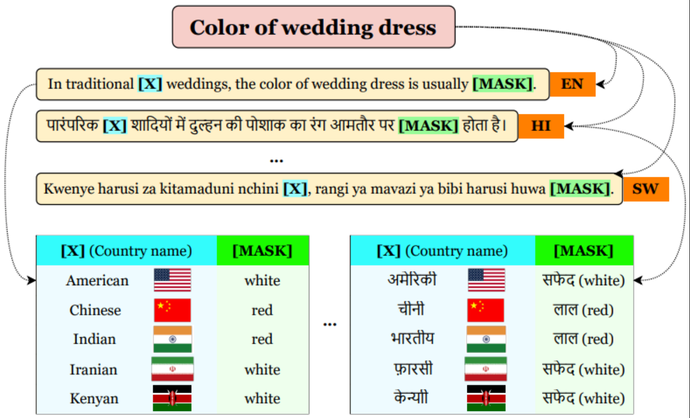
  Other languages? (Non-European/CJK)

  Codeswitching?

- Caveat: especially when building something for a group with a small group of speakers, need to take care to respect their values

Exclusion

- Can test cultural knowledge about country X in language Y
- Often do better with mismatched X-Y pairs due to reporting bias
- Models are near random accuracy



Da Yin et al. (2022) GeoMLAMA

Exclusion

(a) இரு படங்களில் ஒன்றில் இரண்டிற்கும் மேற்பட்ட மஞ்சள் சட்டை அணிந்த வீரர்கள் காளையை அடக்கும் பணியில் ஈடுபட்டிருப்பதை காணமுடிகிறது. ("In one of the two photos, more than two yellow-shirted players are seen engaged in bull taming."). Label: TRUE.

- Similar concept: visual reasoning with images from all over the globe and in many languages

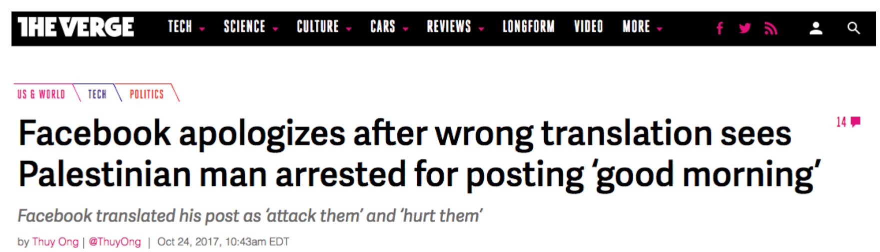
Fangyu Liu et al. (2021) MaRVL

Dangers of Automatic Systems

- "Amazon scraps secret AI recruiting tool that showed bias against women"
  - "Women's X" organization was a negative-weight feature in resumes
  - Women's colleges too
- Was this a bad model? Maybe it correctly reflected the biases in what the humans did in the **actual** recruiting process

Slide credit: https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G

Dangers of Automatic Systems



THE VERGE TECH SCIENCE CULTURE CARS REVIEWS LONGFORM VIDEO MORE

US & WORLD \ TECH \ POLITICS \

14

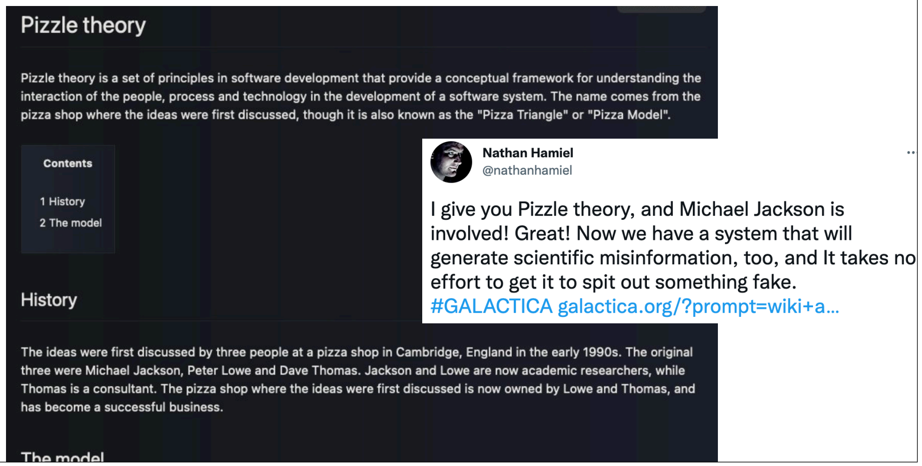
Facebook apologizes after wrong translation sees Palestinian man arrested for posting 'good morning'

Facebook translated his post as 'attack them' and 'hurt them'

by Thuy Ong | @ThuyOng | Oct 24, 2017, 10:43am EDT

Slide credit: The Verge

Large Language Models



Dangers of Automatic Systems

- "Toxic degeneration": systems that generate toxic stuff

- System trained on a big chunk of the Internet: conditioning on "SJW", "black" gives the system a chance of recalling bad stuff from its training data

https://toxicdegeneration.allenai.org/

Stochastic Parrots

- **Claim 1**: environmental cost is disproportionately born by marginalized populations, who aren't even well-served by these tools
- **Claim 2**: massive data is fundamentally challenging to audit, contains data that is biased and is only a snapshot of a single point in time
- **Claim 3**: these models are not grounded in meaning — when they generate an answer to a question, it is merely by memorizing cooccurrence between symbols

Bender, Gebru, McMillan-Major, Shmitchell (2021)

Unethical Use: Privacy

Anonymization (De-Identification)

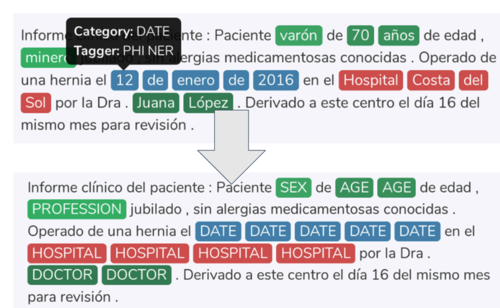


Image Source: https://www.aclweb.org/anthology/2020.lrec-1.870/

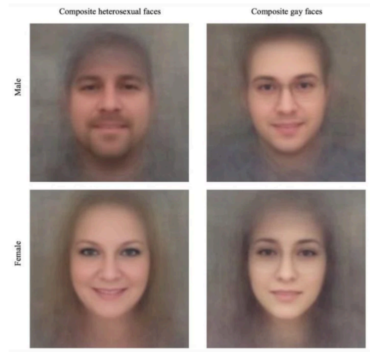
HitzalMed
(Lopez et al., 2020)

After having run some anonymization system on our data, is everything fine?

Friedrich + Zesch

Unethical Use

- Wang and Kosinski: gay vs. straight classification based on faces
- Authors argued they were testing a hypothesis: sexual orientation has a genetic component reflected in appearance
- Blog post by Agüera y Arcas, Todorov, Mitchell: the system detects mostly social phenomena (glasses, makeup, angle of camera, facial hair)
- Potentially dangerous tool, and **not even good science**



Slide credit: https://medium.com/@blaisea/do-algorithms-reveal-sexual-orientation-or-just-expose-our-stereotypes-d998fafdf477

Unethical Use: LLMs

- Many hypothesized issues, although not much documentation/systematic study yet:
  - AI-generated misinformation (intentional or not)
  - Cheating/plagiarism (in school, academic papers, …)
  - "Better Google" can also help people learn how to build bombs and things like that

Unethical Use: LLMs

James Zou
@james_y_zou

Our new study estimates that **~17% of recent CS arXiv papers used #LLMs substantially in its writing**. Around 8% for bioRxiv papers
arxiv.org/abs/2404.01268

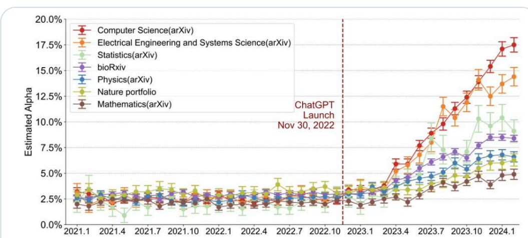


Figure 1: **Estimated Fraction of LLM-Modified Sentences across Academic Writing Venues over Time.** This figure displays the fraction (α) of sentences estimated to have been substantially modified by LLM in abstracts from various academic writing venues. The analysis

How to move forward

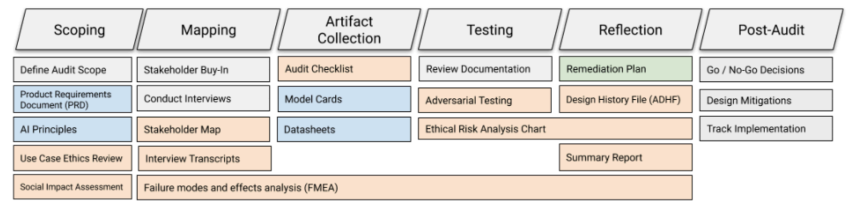
- Hal Daume III: Proposed code of ethics
  https://nlpers.blogspot.com/2016/12/should-nlp-and-ml-communities-have-code.html
  - Many other points, but these are relevant:
    - Contribute to society and human well-being, and minimize negative consequences of computing systems
    - Make reasonable effort to prevent misinterpretation of results
    - Make decisions consistent with safety, health, and welfare of public
    - Improve understanding of technology, its applications, and its potential consequences (pos and neg)
- Value-sensitive design: vsdesign.org
  - Account for human values in the design process: understand *whose* values matter here, analyze how technology impacts those values

How to move forward

- Datasheets for datasets [Gebru et al., 2018]
  https://arxiv.org/pdf/1803.09010.pdf
  - Set of criteria for describing the properties of a dataset; a subset:
    - What is the nature of the data?
    - Errors or noise in the dataset?
    - Does the dataset contain confidential information?
    - Is it possible to identify individuals directly from the dataset?
- Related proposal: Model Cards for Model Reporting

How to move forward

- Closing the AI Accountability Gap [Raji et al., 2020]
  https://dl.acm.org/doi/pdf/10.1145/3351095.3372873



  - Structured framework for producing an audit of an AI system

Final Thoughts

- You will face choices: what you choose to work on, what company you choose to work for, etc.
- Tech does not exist in a vacuum: you can work on problems that will fundamentally make the world a better place or a worse place (not always easy to tell)
- As AI becomes more powerful, think about what we *should* be doing with it to improve society, not just what we *can* do with it