Ethics in AI

Dr. Fred Morstatter

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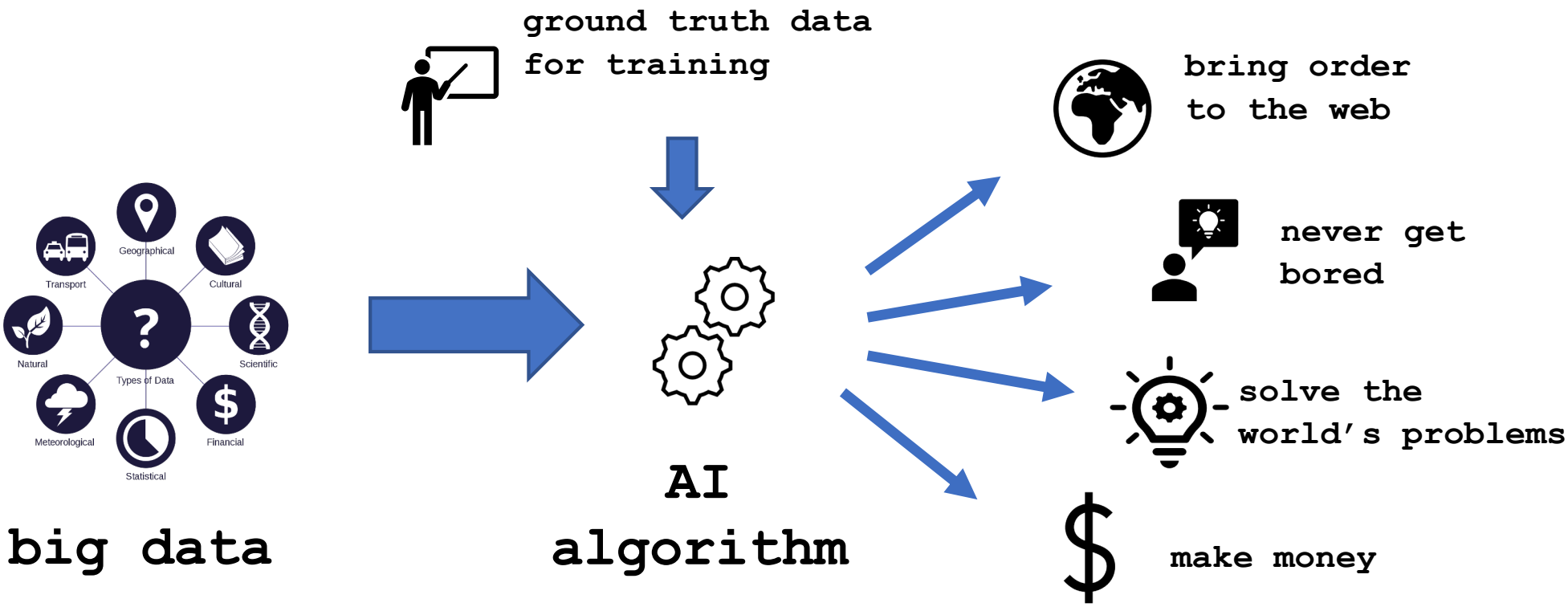
AI systems



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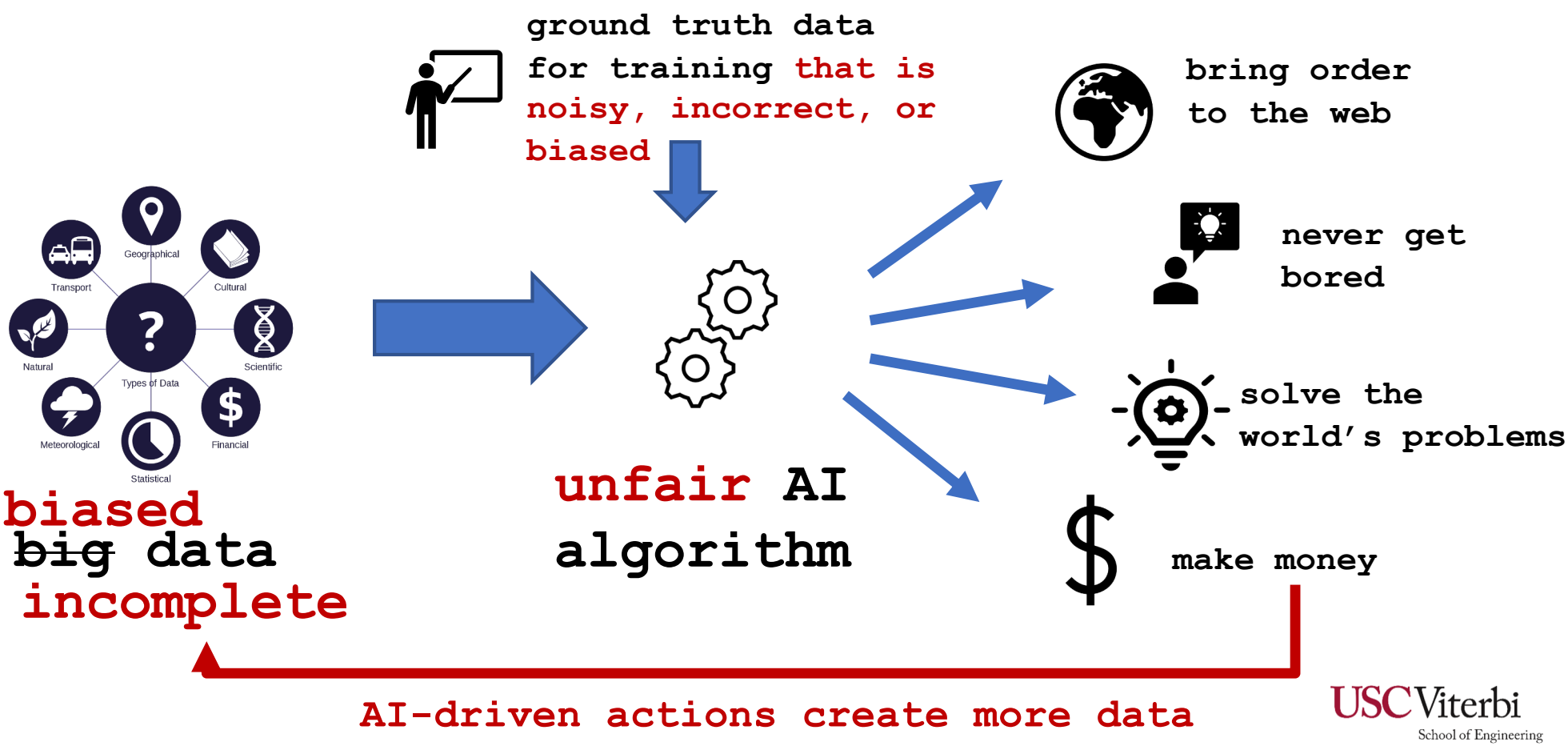
AI systems



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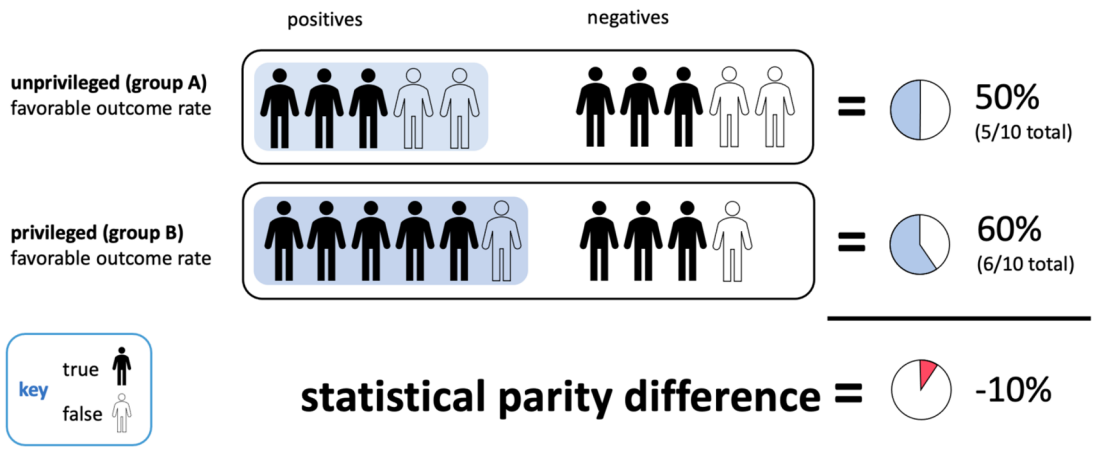
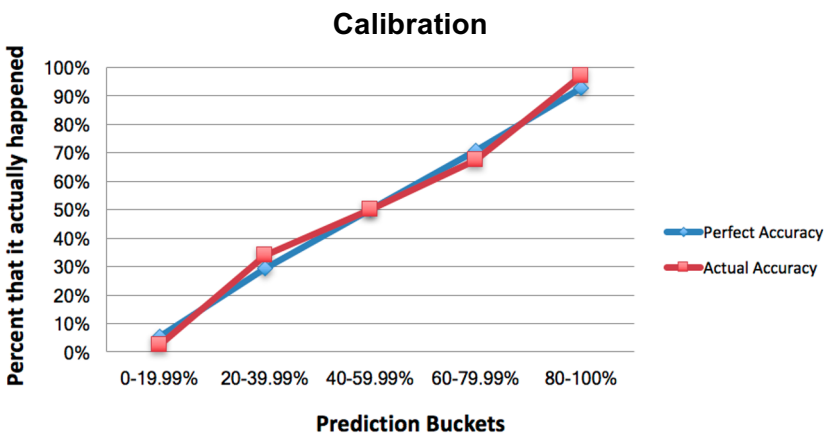
Defining Fairness





Group Level Graphic Credit: https://www.xyonix.com/blog/how-to-detect-and-mitigate-harmful-societal-bias-in-your-organizations-ai
Calibration: https://electionbettingodds.com/TrackRecord.html

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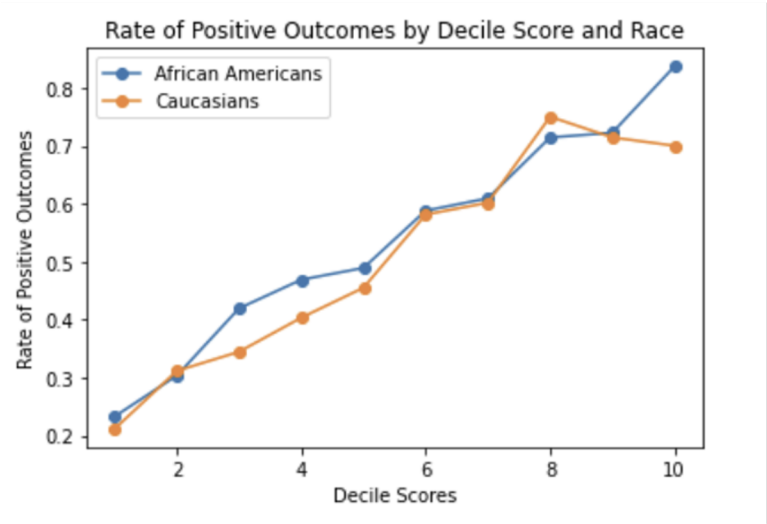
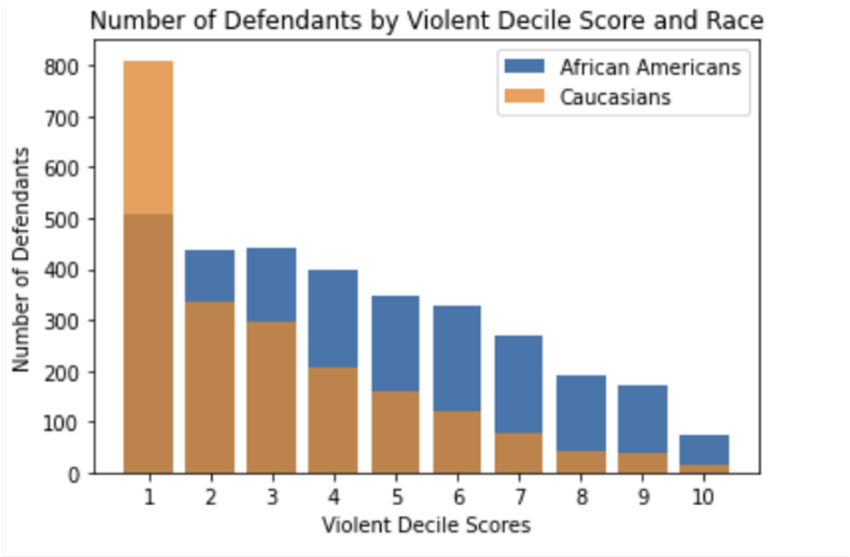
Calibration and Eq. Odds: COMPAS





https://towardsdatascience.com/fairness-in-decision-making-for-criminal-justice-2eaaaf947142

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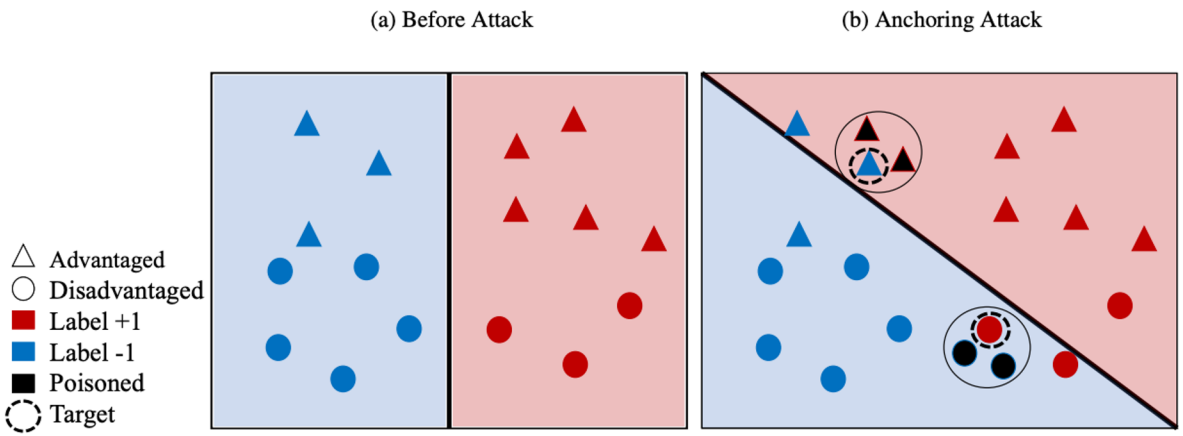
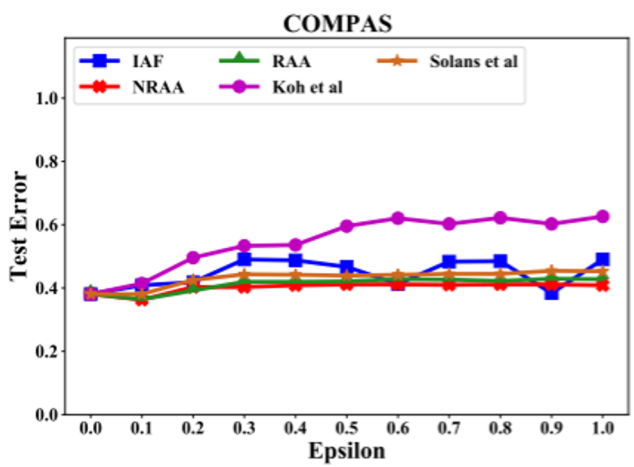
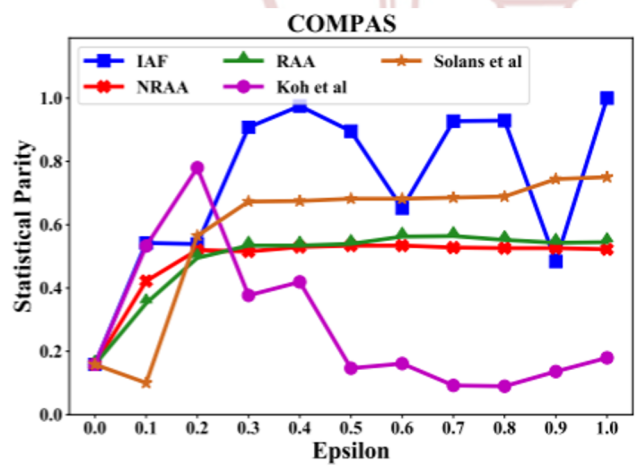
Attacks Targeting Fairness







Mehrabi, N., Naveed, M., Morstatter, F., & Galstyan, A. (2021, May). Exacerbating Algorithmic Bias through Fairness Attacks. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 35, No. 10, pp. 8930-8938).

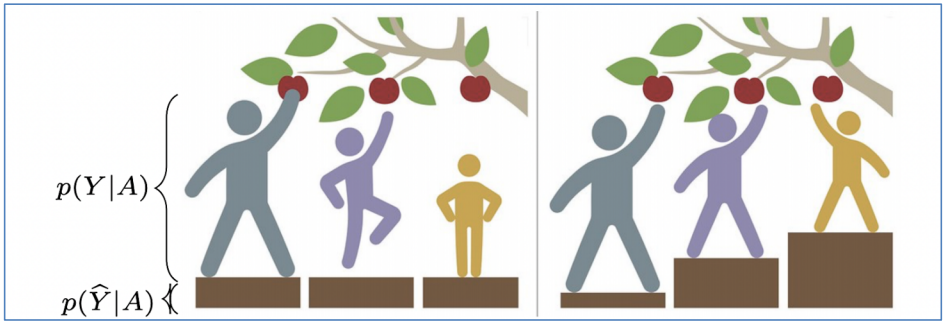
Fairness

Allocation Harms

- "A system withholds certain resources or opportunities from some groups."*
- E.g. Loan allocation systems.

Representational Harms

- Harm to the identity of certain groups.
- Regardless of allocating resources or opportunities.



Mehrabi, N., Huang, Y., & Morstatter, F. (2020). Statistical Equity: A Fairness Classification Objective. arXiv preprint arXiv:2005.07293.

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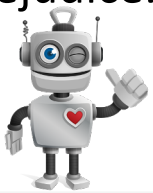
Representational Harms

- Investigating representational harms in commonsense knowledge resources and tasks.
- What is Commonsense Knowledge?
  - "Facts about the world that all humans are expected to know."**
  - Commonsense knowledge should be facts NOT stereotypes or biases in terms of favoritism or prejudice.



en Fish — CapableOf ⟶ en swim
Weight: 2.0

en A politician — CapableOf ⟶ en tell lies
Weight: 1.0

***This presentation contains content that may be offensive or upsetting.**

****https://en.wikipedia.org/wiki/Commonsense_knowledge_(artificial_intelligence)**

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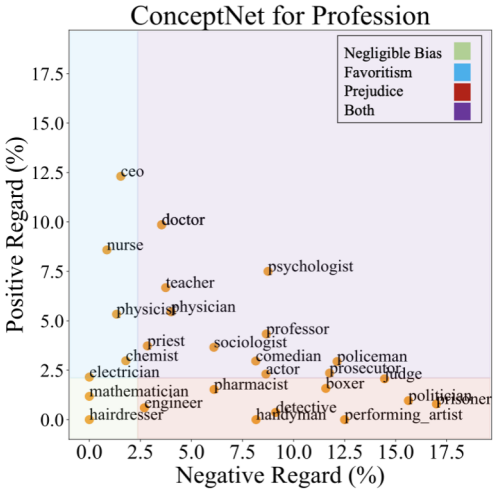
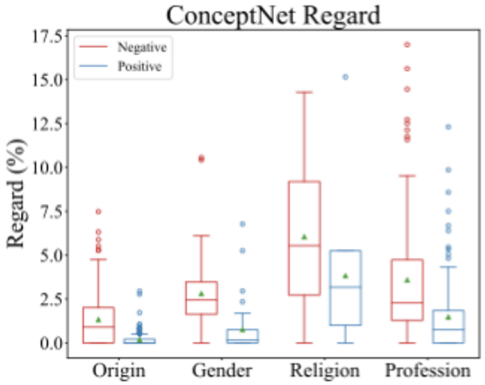
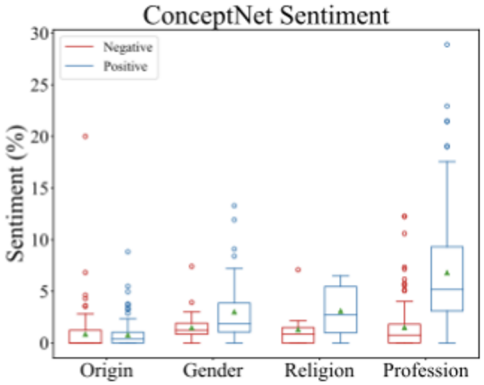
Finding Common Sense Bias

- Observed both overgeneralization and disparity in overgeneralization in both Knowledge resources.
- The degree of severity was higher in GenericsKB compared to ConceptNet.







Mehrabi, Ninareh, et al. "Lawyers are Dishonest? Quantifying Representational Harms in Commonsense Knowledge Resources." *EMNLP 2021.*

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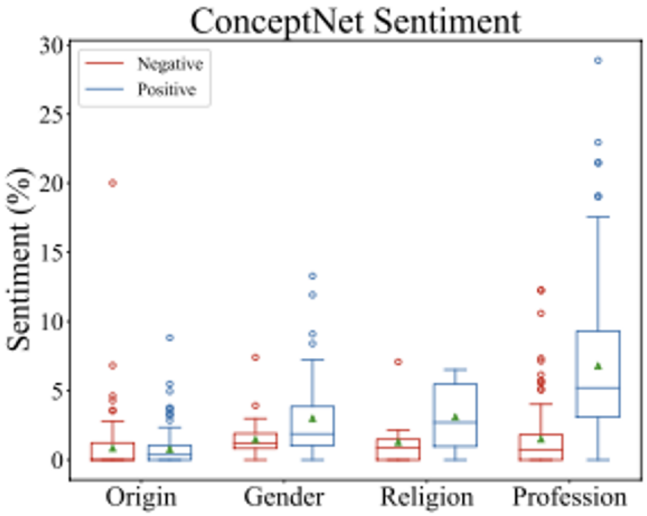
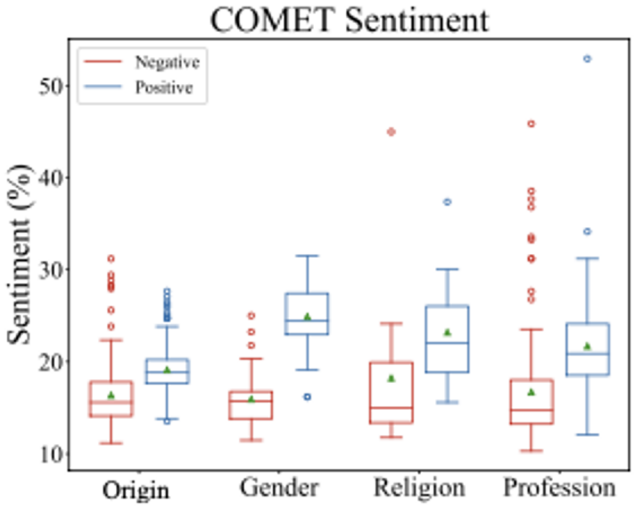
Downstream Task: COMET

- COMET is a knowledge completion/generation model.
- Trained on GPT and then ConceptNet.
- Input the same target words used in ConceptNet, collect triples
- Observed both overgeneralization and disparity in overgeneralization in both downstream tasks.

Raw Data



Predictions made by model trained on data



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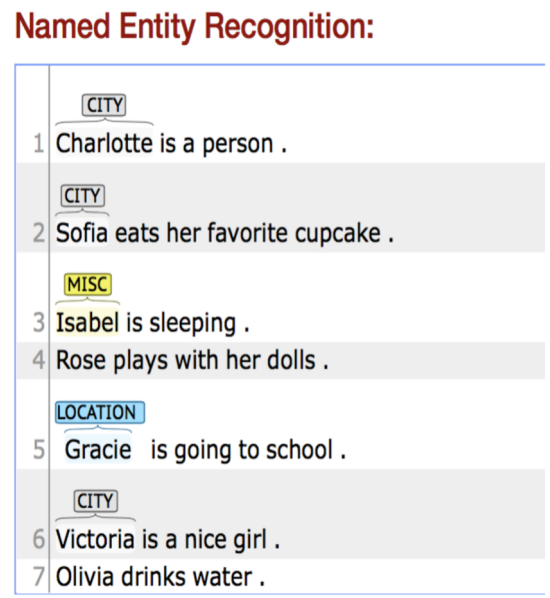
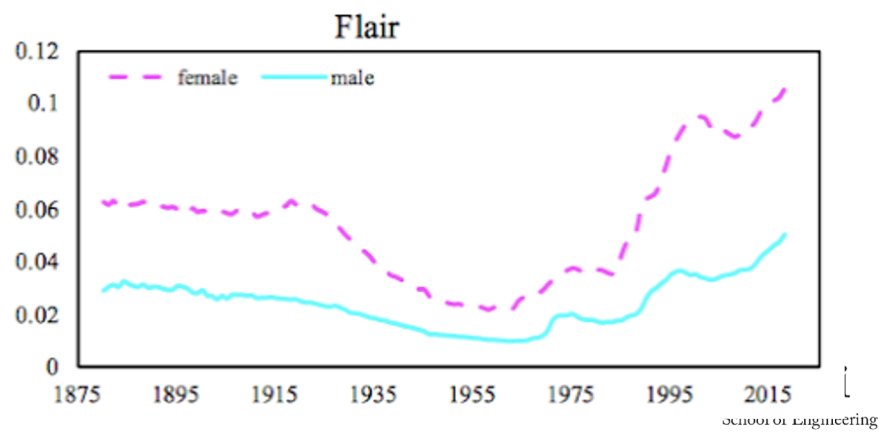
Named Entity Recognition

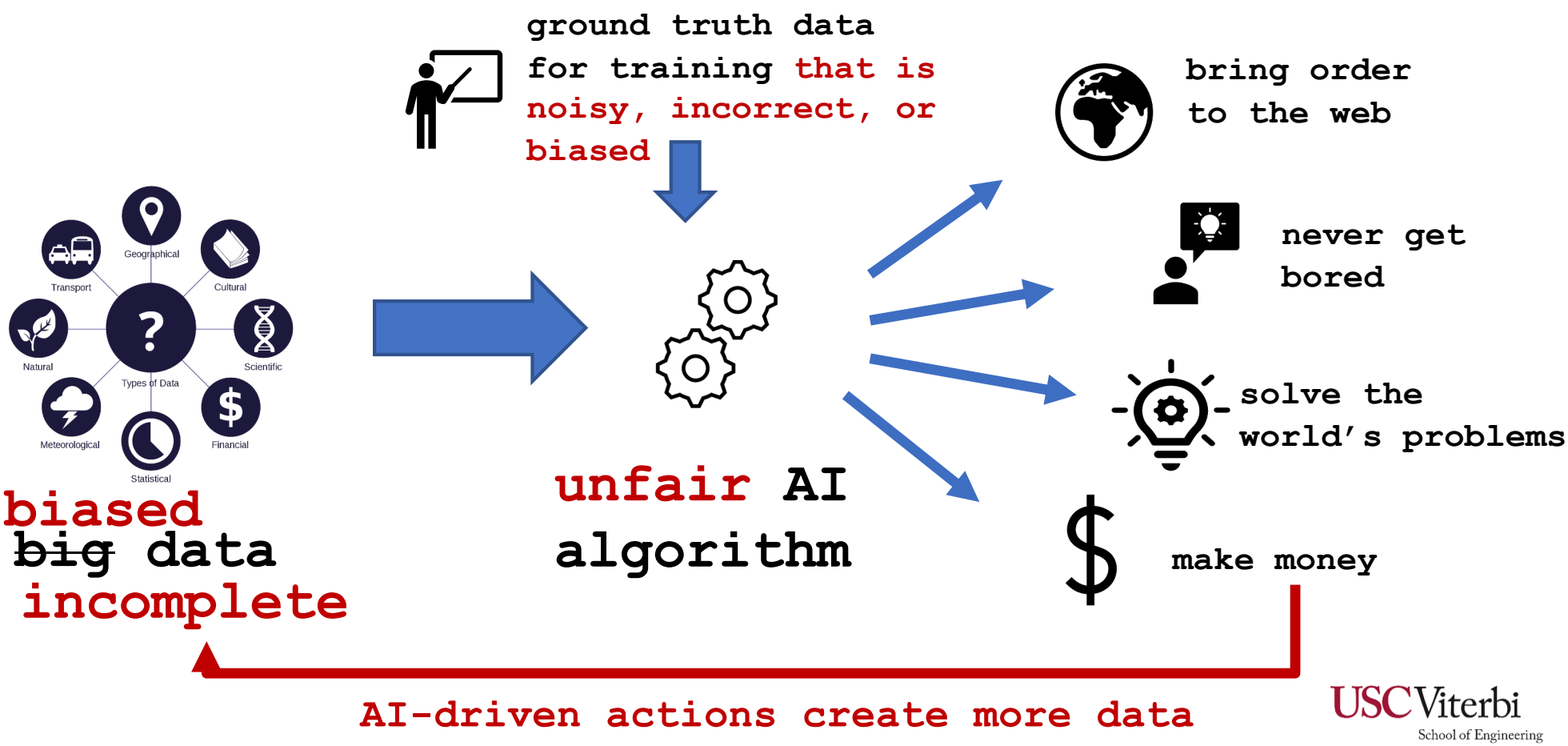
- Named Entity Recognition (NER) systems do not perform equivalently across names from different genders.
- More female names are being mis-tagged or not tagged at all compared to male names.





Mehrabi, N., Gowda, T., Morstatter, F., Peng, N., & Galstyan, A. (2020, July). Man is to person as woman is to location: Measuring gender bias in named entity recognition. In Proceedings of the 31st ACM Conference on Hypertext and Social Media (pp. 231-232).

AI systems



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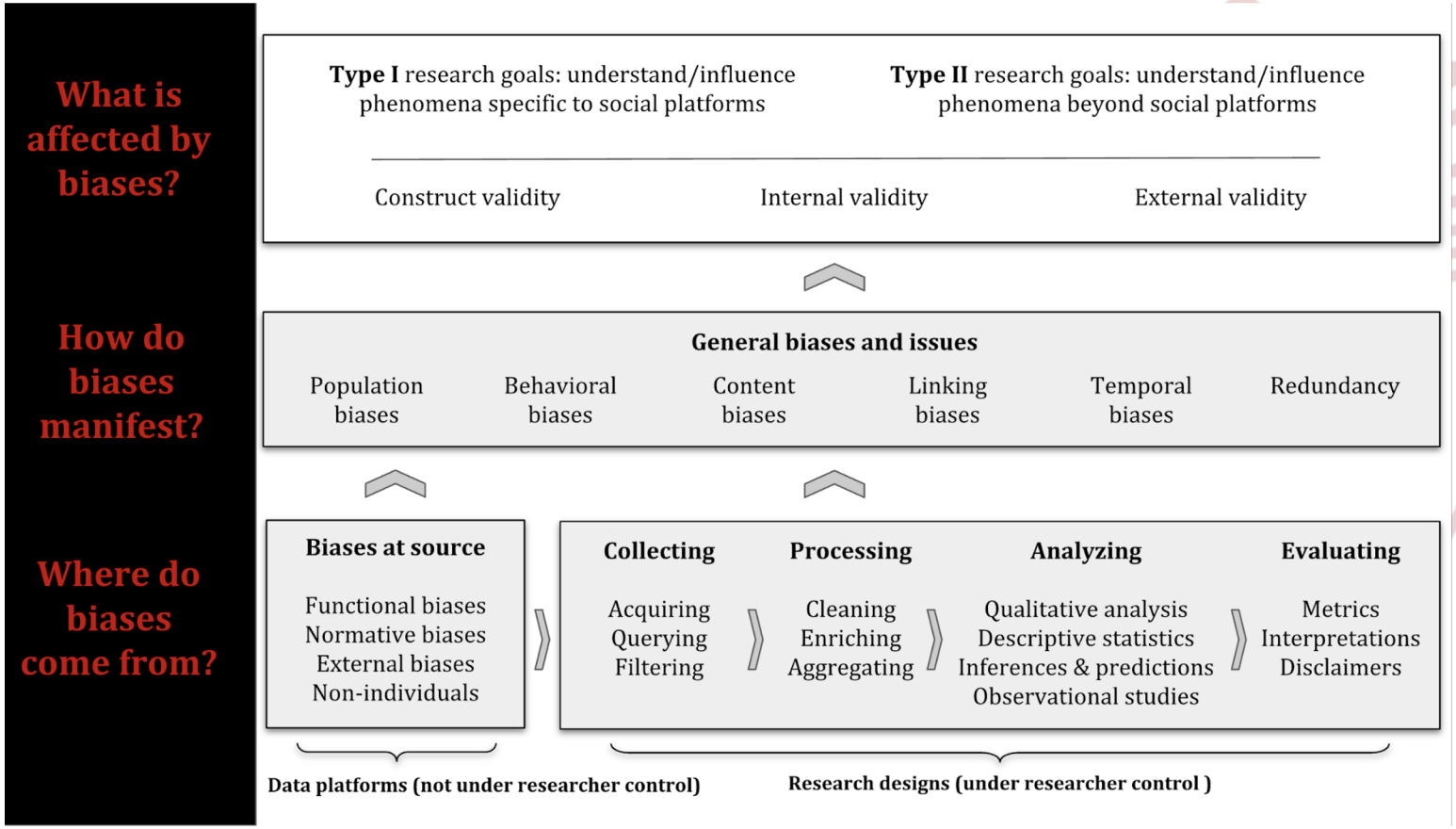
Bias in Research Pipeline



Olteanu, Alexandra, et al. "Social data: Biases, methodological pitfalls, and ethical boundaries." *Frontiers in Big Data* 2 (2019): 13.

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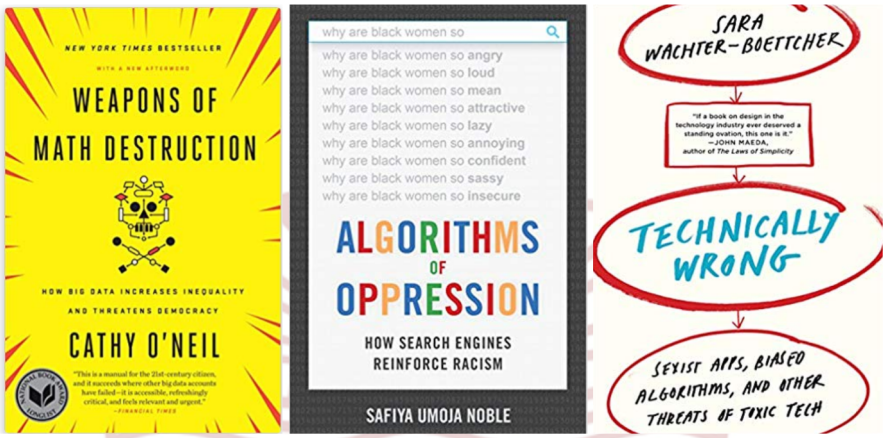
Conclusions



- Much of AI bias is a reflection of human bias.
- Many definitions of fairness.
- Representational harms are nefarious; difficult to detect.
- Biases can be introduced at any step of the research process.
- Get your hands dirty: https://aif360.mybluemix.net/.

Contact: fred@isi.edu

RESEARCH-ARTICLE

A Survey on Bias and Fairness in Machine Learning

Authors: Ninareh Mehrabi, Fred Morstatter, Nripsuta Saxena, Kristina Lerman, Aram Galstyan

Authors Info & Claims

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