

# Data Science Ethics

## STA 102: Introduction to Biostatistics

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The following material was used by Yue Jiang during a live lecture.

Without the accompanying oral comments, the text is incomplete as a record of the presentation.

# Acknowledgements

These slides are adapted from earlier lectures by Drs. Mine Cetinkaya-Rundel and Maria Tackett for STA 112FS and STA 199 taught during Fall 2018 and Fall 2019, respectively.

What's wrong with this graph?

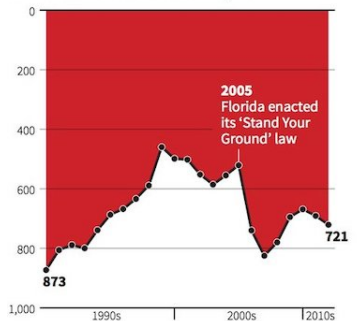


How would you fix it?

# What's wrong with this graph?

## Gun deaths in Florida

Number of murders committed using firearms



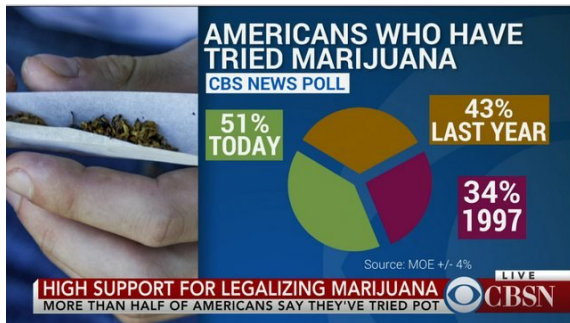
Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS

How would you fix it?

# What's wrong with this graph?



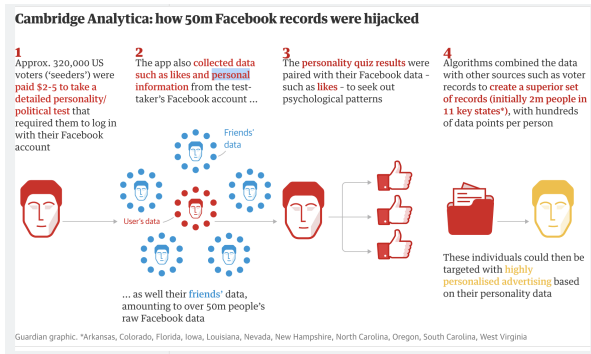
How would you fix it?

# OkCupid Data Breach



“OkCupid study reveals the perils of big-data science”

# Facebook and Cambridge Analytica



“How Cambridge Analytica turned Facebook 'likes' into a lucrative political tool”

# Algorithmic bias

## TECHNOLOGY

### Does Anne Hathaway News Drive Berkshire Hathaway's Stock?

ALEXIS C. MADRIGAL MAR 18, 2011

*Given the awesome correlating powers of today's stock trading computers, the idea may not be as far-fetched as you think.*



“Does Anne Hathaway news drive Berkshire Hathaway's stock?”



# Machine bias in law enforcement

	WHITE	AFRICAN AMERICAN
Labeled Higher Risk, But Didn't Re-Offend	23.5%	44.9%
Labeled Lower Risk, Yet Did Re-Offend	47.7%	28.0%

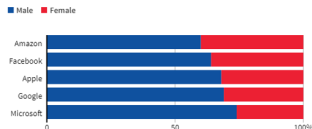
“There’s software used across the country to predict future criminals. And it’s biased against blacks.”

# Amazon's experimental hiring algorithm

## Dominated by men

Top U.S. tech companies have yet to close the gender gap in hiring, a disparity most pronounced among technical staff such as software developers where men far outnumber women. Amazon's experimental recruiting engine followed the same pattern, learning to penalize resumes including the word "women's" until the company discovered the problem.

### GLOBAL HEADCOUNT



### EMPLOYEES IN TECHNICAL ROLES



Note: Amazon does not disclose the gender breakdown of its technical workforce.

Source: Latest data available from the companies, since 2017.

By Han Huang | REUTERS GRAPHICS

“Amazon scraps secret AI recruiting tool  
that showed bias against women”

# Parting thoughts

At some point during your data science journey you will learn tools that can be used unethically

You might also be tempted to use your knowledge in a way that is ethically questionable either because of business goals or for the pursuit of further knowledge (or because your boss told you to)

**How do you train yourself to make the right decisions (or reduce the likelihood of accidentally making the wrong decisions) at those points?**

## Further reading

- ▶ Statistical Inference in the 21st Century: A World Beyond  $p < 0.05$  (Free access through Duke library!)
- ▶ Ethics and Data Science (free Kindle book download)
- ▶ How Charts Lie: Getting Smarter about Visual Information
- ▶ Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy

