The Ethics of Gathering & Using Data

Matt Brems

PLAGIARISM

➢ Simply put, plagiarism involves both:
  ○ stealing someone else's work or idea
  ○ and lying about it afterward.

➢ Plagiarised work includes turning in code that you didn't write or building someone else's idea without giving credit.

USING OTHERS' WORK OR IDEAS

➢ We do this all the time!

  ○ We see how others have solved a problem.

  ○ We search for examples of code online.

  ○ We reference solution code.

LYING ABOUT IT AFTERWARD

➢ This is where things get messy.

➢ By putting your name (or username) on a piece of work, you are accepting credit for the work!
  ○ Blog Post
  ○ Lab
  ○ Assessments
  ○ Projects

➢ [How do I safely write code in my own words and not plagiarize?](#)

EXAMPLE

2. Plot the rolling_mean for Weekly_Sales. What general trends do you observe?

```
#This function here will
role1  = store1_sales.rolling(window = 1).mean()

role4  = store1_sales.rolling(window = 4).mean()

role13 = store1_sales.rolling(window = 13).mean()
```

```
#plot the figure here to compare the different rolling means.

fig = plt.figure(figsize=(12, 8))

mean = plt.plot(role1, color='red', label='Rolling Mean (1 week)')

mean = plt.plot(role4, color='blue', label='Rolling Mean(4 week)')

mean = plt.plot(role13, color='green', label='Rolling Mean(13 week)')

plt.legend(loc='best')
plt.title('Rolling Mean for 1,4 and 13 Months')
plt.show()
```

Rolling Mean for 1,4 and 13 Months

2400000

Rolling
Rolling
Rolling

2. Plot the rolling_mean for Weekly_Sales. What general trends do you observe?

```
rolmean1  = store1_sales.rolling(window = 1).mean()
rolmean4  = store1_sales.rolling(window = 4).mean()
rolmean13 = store1_sales.rolling(window = 13).mean()

fig = plt.figure(figsize=(12, 8))
mean = plt.plot(rolmean1, color='red', label='Rolling Mean (1 week)')
mean = plt.plot(rolmean4, color='blue', label='Rolling Mean(4 week)')
mean = plt.plot(rolmean13, color='green', label='Rolling Mean(13 week)')

plt.legend(loc='best')
plt.title('Rolling Mean for 1,4 and 13 Months')
plt.show()
```

Rolling Mean for 1,4 and 13 Months

2400000

2200000

2000000

Ro
Ro
Ro
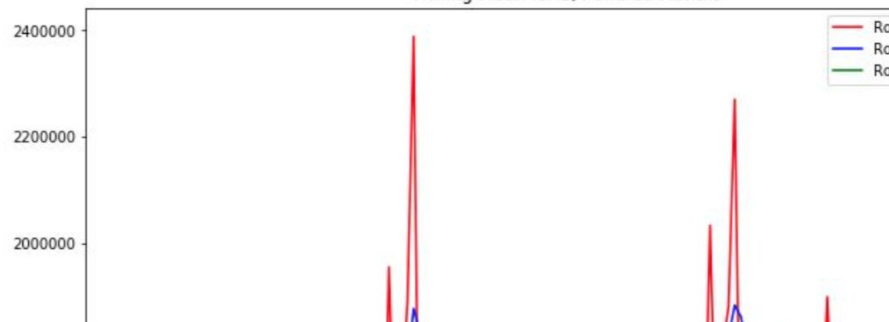
HOW DO WE AVOID LYING ABOUT WHO DESERVES CREDIT?

➢ By providing credit!
   ○ Add a comment, Markdown cell, or reference.

```
In [2]:  # This code has been slightly adapted from code

         def plot_continuous_pdf(low, high, dist_name =
         w = 5):
```

My classmate Riley Dallas shared this line of code.

https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm

WHY IS PLAGIARISM IMPORTANT?

➢ Suppose there is a student who plagiarized work.

  ○ This isn't fair to students who did their work "the right way."

  ○ This isn't fair to the career coaches who are evaluated on their ability to get students into roles.

  ○ This isn't fair to an instructor who recommends that student.

  ○ This isn't fair to all of the other General Assembly students who are seeking jobs.

  ○ That student is getting credit for work they didn't do!

GENERAL ASSEMBLY POLICY

➢ All of the following are considered plagiarism or cheating:
  ○ Turning in work that is not your own.
  ○ Turning in someone else's work as your own.
  ○ Hiring, or paying someone to do your work for you.
  ○ Copying words or code without giving credit.
  ○ Building or copying someone else's idea without their knowledge or giving credit.
  ○ Giving incorrect information about a source.
  ○ Changing words, variable names, etc. but copying the code or files of a source without giving credit.
  ○ Copying so many ideas or code blocks from a source that it makes up the majority of your work, whether you give credit or not.
  ○ Failing to put a quotation in quotation marks.

HOW TO AVOID PLAGIARISM

➢ Avoid copying or "copying" where possible.

➢ Provide credit to any source you copy or "copy" from.

➢ If you're unsure whether or not you need to provide credit, err on the side of providing credit!

GENERAL ASSEMBLY POLICY

➢ General Assembly has a zero tolerance policy towards plagiarism and cheating. It is destructive to classroom culture, and exhibits a clear lack of respect for classmates, instructors, the company, and the greater community. Any work considered to have been plagiarised will not be accepted and will not count towards graduation requirements. If a project exhibits evidence of plagiarism or cheating, the student will not be able to display the project at a GA-sponsored class "science fair" or "meet & greet." Any student found plagiarising or attempting to plagiarise will be disciplined accordingly (including but not limited to removal from class).

GENERAL ASSEMBLY POLICY

➢ Open source code is inherently open and usually available for free use to modify and implement into any non-commercial project. However, please review their license and usage guidelines, give credit to the project and/or author, and do not try to hide or disguise the usage of such code.

DISCLAIMER

➢ I am neither a lawyer nor a professional ethicist.

➢ This can all be horribly out-of-date by the end of the day.

LEARNING OBJECTIVES

➢ Identify how data science is implemented every day in obvious and non-obvious ways.

➢ Understand some of the ethical responsibilities associated with gathering and using data.

➢ Identify how to improve gathering and using data.

➢ Constructively scrutinize others' gathering and using data.
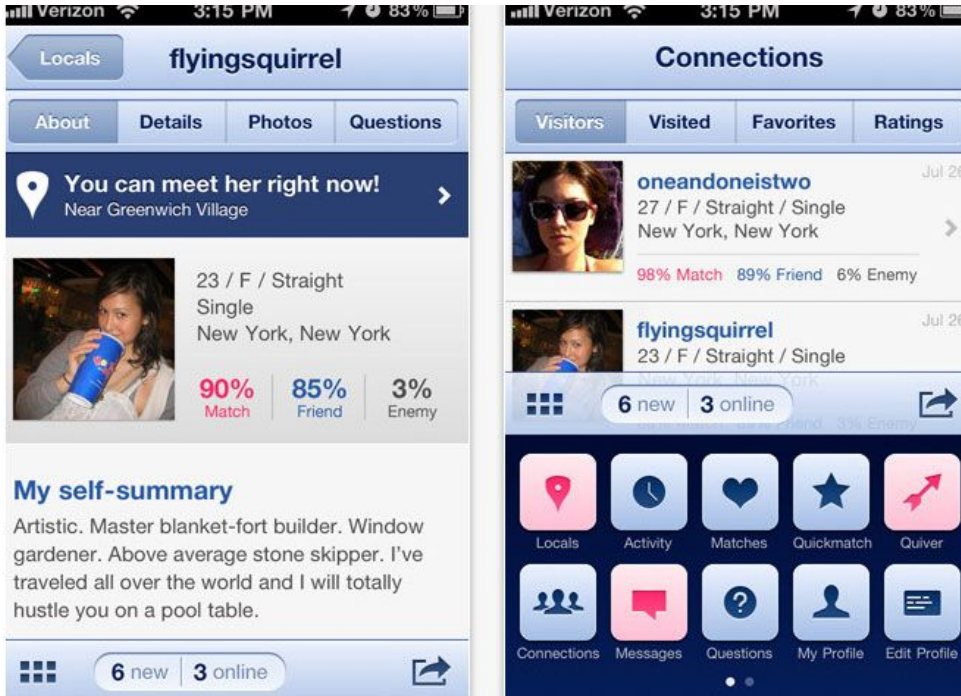
YOUR BACKGROUND

➢ You don't have to be a data scientist to get value out of this.

➢ Ethical obligations aren't a new thing.
  ○ Doctors

  ○ Lawyers

  ○ Businesses

  ○ Government

  ○ Parents

HOW IS DATA SCIENCE IMPLEMENTED?

➢ 2008 Obama campaign

➢ Conducted A/B test to see which of the 24 combinations got the highest rate of emails.

➢ Raised an estimated $60,000,000.

https://blog.optimizely.com/2010/11/29/how-obama-raised-60-million-by-running-a-simple-experiment/

HOW IS DATA SCIENCE IMPLEMENTED?

➤ Dating site OKCupid

➤ Conducted an A/B test where "bad matches" were marked as "good matches."

➤ Found no difference in how likely matches were to "hit it off."

HOW IS DATA SCIENCE IMPLEMENTED?

➢ COMPAS score utilized in court proceedings to identify how likely a defendant is to commit a[nother] crime.

➢ Scores provided to Black and White defendants were starkly different.

https://www.propublica.org/article/how-we-analyzed-the-compas-recidivism-algorithm
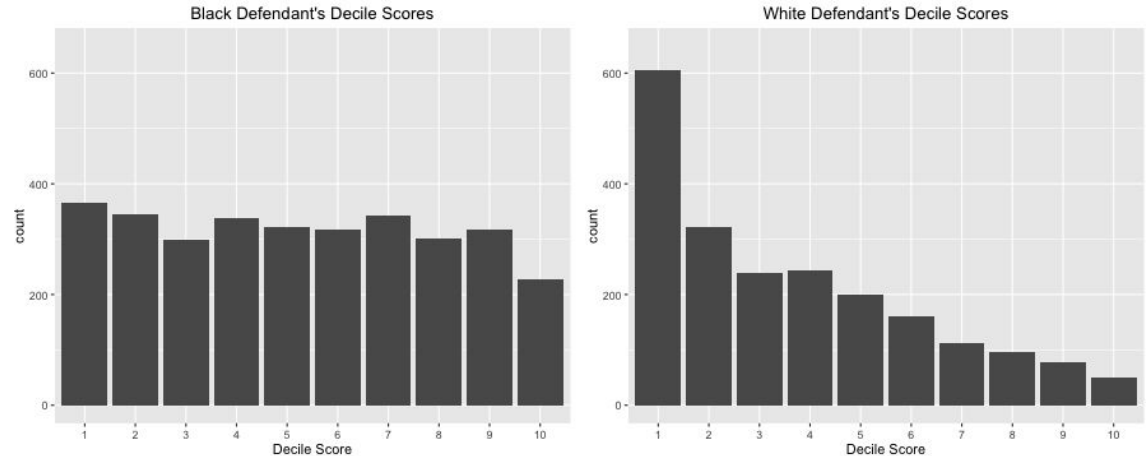
HOW IS DATA SCIENCE IMPLEMENTED?

➢ Facebook *allowed* advertisers to include or exclude individuals based on race and religion.

➢ This seems to have been discontinued in the fall of 2018.

https://www.propublica.org/article/facebook-lets-advertisers-exclude-users-by-race
https://www.buzzfeednews.com/article/alexkantrowitz/facebook-is-removing-ad-targeting-options-race-religion

HOW IS DATA SCIENCE IMPLEMENTED?

How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did

Kashmir Hill Forbes Staff

Every time you go shopping, you share intimate details about your consumption patterns with retailers. And many of those retailers are studying those details to figure out what you like, what you need, and which coupons are most likely to make you happy. Target TGT +1.63% , for example, has figured out how to data-mine its way into your womb, to figure out whether you have a baby on the way long before you need to start buying diapers.

Charles Duhigg outlines in the New York Times how Target tries to hook parents-to-be at that crucial moment before they turn into rampant -- and loyal -- buyers of all things pastel, plastic, and miniature. He talked to Target statistician Andrew Pole -- before

Target has got you in its aim

➢ Target Rewards Card

➢ A teenager went to Target to purchase items and was flagged as pregnant.

➢ Ads for maternity-related items were sent to the family's home in the daughter's name.

https://www.forbes.com/sites/kashmirhill/2012/02/16/how-target-figured-out-a-teen-girl-was-pregnant-before-her-father-did
TRIGGER WARNING: https://twitter.com/gbrockell/status/1072589687489998848

ETHICAL CONSIDERATIONS

➢ Worst-Case Scenario

➢ Anonymity vs. Confidentiality

➢ Consent

➢ Explainability

WORST-CASE SCENARIO

➢ Think: "If this data were to fall into the hands of the individual who could do the most harm with it, what would happen?"

➢ While we don't always want to focus on the worst thing that can happen, it's important to keep this in mind!
  ○ This mindset can help us identify what data we don't actually need to collect.

ANONYMITY VS. CONFIDENTIALITY

➢ For data to be **anonymous**, that means it is impossible to connect the data back to the original individual.

➢ For something to be **confidential**, that means somebody could connect the data back to the original individual, but chooses not to do so.

➢ Where possible, we should err on the side of anonymity.

➢ **Differential privacy** allows us to preserve anonymity of the group… *even if our data gets hacked*!

DIFFERENTIAL PRIVACY

➢ How many of the following statements are true?
- Consumed soda in the last 12 hours.
- Ever owned a truck.
- Worked 40 or more hours in the last seven days.

DIFFERENTIAL PRIVACY

➢ How many of the following statements are true?
  ○ Consumed soda in the last 12 hours.
  ○ Ever owned a truck.
  ○ Worked 40 or more hours in the last seven days.

➢ How many of the following statements are true?
  ○ Consumed soda in the last 12 hours.
  ○ Ever owned a truck.
  ○ Worked 40 or more hours in the last seven days.
  ○ Ever used heroin.

DIFFERENTIAL PRIVACY

➢ Researcher: Have you ever used heroin?
  ○ Subject: Flip a coin.
    ■ If the coin flip is heads, "say yes."
    ■ If the coin flip is tails, answer honestly.

DIFFERENTIAL PRIVACY

➢ Split into groups of 3 and identify who is person 1, who is person 2, and who is person 3.

DIFFERENTIAL PRIVACY

➢ Split into groups of 3 and identify who is person 1, who is person 2, and who is person 3.

➢ Every person should make up a salary and a random number.

DIFFERENTIAL PRIVACY

➢ Person 1: Add your salary and your random number together. Whisper this total to person 2.

  ○ Do not explain what your salary or your random number are - just share the total with person 2!

  ○ Do not share with person 3!

DIFFERENTIAL PRIVACY

➢ Person 2: Take the total person 1 whispered to you. Add your salary and your random number to this total. Whisper this full total to person 3.

○ Just share the total with person 3! Don't let person 1 hear.

DIFFERENTIAL PRIVACY

➢ Person 3: Add your salary and your random number to the number person 2 just shared with you. Whisper this full total to person 1.

○ Don't let person 1 hear.

DIFFERENTIAL PRIVACY

➢ Person 1: Remember your random number from before? Subtract your random number from the number person 3 shared with you. Whisper the result to person 2.

DIFFERENTIAL PRIVACY

➢ Person 2: Remember your random number from before? Subtract your random number from the number person 1 shared with you. Whisper the result to person 3.

DIFFERENTIAL PRIVACY

➢ Person 3: Remember your random number from before? Subtract your random number from the number person 2 shared with you.
  ○ Share this result with everybody.

DIFFERENTIAL PRIVACY

➢ What happened here?

CONSENT

➢ All else held equal, we should be getting informed consent where possible.
  ○ This usually doesn't include someone signing a 45 page terms-of-service agreement.

➢ When conducting an A/B test, this may not be reasonable. (It might skew your results!)

EXPLAINABILITY

➢ When models and algorithms that have important implications, it is important for them to be explainable and interpretable.

➢ We cannot rely on "black box" algorithms where we don't understand what is happening, then throw our hands up and say "I don't actually know how race is used in my model!"

FINAL RECOMMENDATIONS

1. Don't collect data you don't need to collect.

2. If you need to collect data, try to apply differential privacy.

3. Choose anonymity over confidentiality where possible.

4. Get consent where possible.

5. Ensure your models are explainable.
   - If your models are biased, then get new models!

RESOURCES (roughly organized from least to most technical)

- [Airline algorithm splits families up to encourage them to pay more to sit together](#)
- [Twitter Thread on the Effect of Easy Machine Learning on Ethics](#)
- [Troubling Trends in Machine Learning Scholarship](#)
- [Tweet about Pregnancy Predictions when Pregnancies Don't Come to Term](#)
- [Can a Set of Equations keep US Census Data Private?](#)
- [Whose Health Data Is It Anyway?](#)
- [World Bank Video on Data Privacy & Open Data](#)
- [Is there are a right to explanation for Machine Learning in the GDPR?](#)
- [Why a Right to Explanation of Automated Decision-Making Does Not Exist in the General Data Protection Regulation](#)
- [Towards Interpretable Reliable Models](#)
- [GDPR and you](#)
- [Hold Your Machine Learning and AI Models Accountable](#)
- [How GDPR Affects Data Science](#)
- [Why Should I Trust You? Explaining the Predictions of Any Classifier](#)
- [Explaining Complex Machine Learning Models with LIME](#)
- [Scaleable Bayesian rule lists](#)