AI, Ethics, and Society

Homework Project #2

Readings:

- Chapter 4: Weapons of Math Destruction (Propaganda Machine: Online Advertising)
- *Optional*: Darrel Huff, Chapter 1: How to lie with statistics, Norton, New York, 1954 - [Internet Search – Huff + "How to lie with statistics" + pdf]

In this assignment, you'll begin the process of exploring relationships in data. You'll accomplish this task by computing some basic statistical measures on one of three datasets. This is a good time to learn or reboot your Python coding skills.

Step 1 - *Select one of the datasets available on CANVAS for completion of this assignment*:

- [mental-health-in-tech-survey-2019.csv] Mental Health in Tech Survey: Survey on Mental Health in the Tech Workplace in 2019 - https://osmihelp.org/research/

  Dependent Variables:
  - *treatment:* Have you ever sought treatment for a mental health disorder from a mental health professional? (FALSE/TRUE)
  - *mental_health_disclosure:* Would you feel comfortable discussing a mental health issue with your direct supervisor(s)? (Yes/Maybe/No)
  - *mental_health_support:* Overall, how well do you think the tech industry supports employees with mental health issues? (numerical: 1-5)

- [hospital-discharge-2017.csv] New York Hospital Inpatient Discharge Information in 2017: https://health.data.ny.gov/dataset/Hospital-Inpatient-Discharges-SPARCS-De-Identified/22g3-z7e7

  Dependent Variables:
  - *Length of Stay*: a numeric value representing number of days between admission and discharge
  - *APR Severity of Illness Code:* a numeric value representing severity of illness

- [deaths-in-custody.csv] Information on deaths that occur in custody or during the process of arrest in California - https://openjustice.doj.ca.gov/data

  Dependent Variables:
  - *manner_of_death*: Suicide/Natural/Accidental/Homicide/Cannot be Determined/Other (for all others)
  - *custody_status*: Sentenced/Awaiting Booking/Booked – Awaiting Trial/ Booked – No Charges Filed/Other (for all others)

Step 2 - *Explore the data by answering the following questions:*

- Which dataset did you select?
- How many observations are in the dataset?
- How many variables in the dataset?

- Does this dataset seem to belong to a regulated domain in law as discussed in the lectures? If yes, which one?
- How many variables in the dataset are associated with a legally recognized protected class? In a table format, list those variables associated with a protected class, identify the protected class and the associated legal precedence/law as discussed in the lectures.

Example Output (associated with a different dataset) -

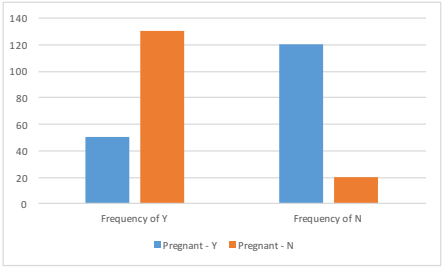
Dataset: Housing Decisions in Metro-Atlanta
Number of Observations: 1,400
Number of Variables: 16
Regulated Domain in Law: Housing (Fair Housing Act)
Number of Protected Class Variables: 2

	Protected Class	Law
nationality	National origin	Civil Rights Act of 1964, 1991
pregnant (y/n)	Pregnancy	Pregnancy Discrimination Act

Step 3 - *Determine the relationships between dependent and independent variables*
The frequency of a value represents the number of times a value occurs in a data set. Compute the frequency of each value associated with each dependent variable (listed in Step 1) as a function of all of the protected class variables (independent variables) identified in Step 2. Create histogram(s) comparing the frequency values of the dependent variable as a function of the independent variable. Hint: For variables that are continuous, you might consider creating intervals that represent the data. For categorical/ordinal/nominal values, you might consider converting to numerical values based on a reasonable (albeit subjective) ordering.

Example Output for One Dependent-Independent Variable Combination:

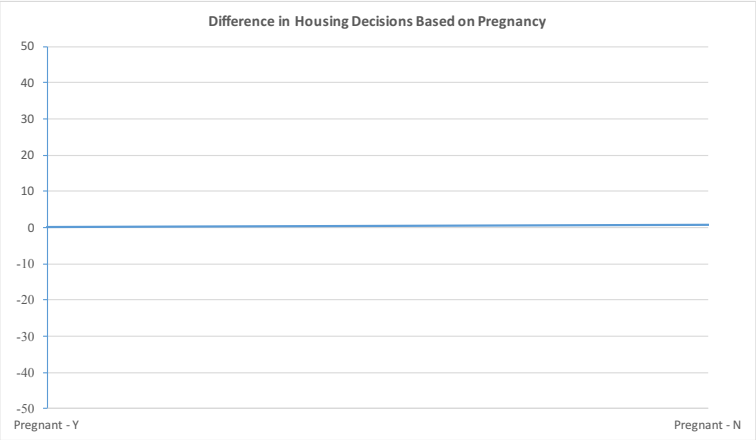
Independent Variable - Protected Class Variable	Dependent Variable - Housing Decision (Y/N)
Pregnant – Y	Frequency of Y: 50 Frequency of N: 120
Pregnant – N	Frequency of Y: 130 Frequency of N: 20



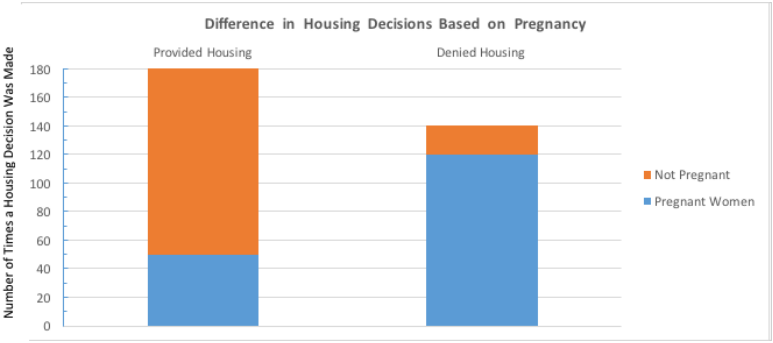
Step 4 - *Show how to manipulate with data*
Select one protected class variable (independent variable) and one dependent variable. 1) Create a graph to support the "fairness" hypothesis: The system is fair. There is no difference in the outcomes. 2) Create a graph to support the bias hypothesis: The system is biased. There is a difference in the outcomes. For each, provide a brief description of your manipulations.

Example Output:

1) Fair Hypothesis: As seen from this graph, housing decisions are not dependent on the pregnancy status of women. [Manipulations: Used line graph; Increased Scale to +-50; Mapped the ratio of positive Y decisions (i.e. 50/180 versus 130/180); No label on the Y-Axis].



2) Bias Hypothesis: As seen from this graph, housing decisions are significantly dependent on the pregnancy status of women. [This hypothesis was easily supported with the data so didn't require much in manipulations: Used stacked bar graph; Reduced Scale; Reworded labels].



Step 5: Given your selected protected class variable (independent variable), calculate the average (using either mean, median, or mode) of the protected class group (Hint: Variables might need to be converted to numerical values as needed). Run the random sampling method using 50% of the data to create a reduced dataset. Calculate the average (mean, median, or mode) of the protected class group. Indicate if there is a difference (or not) between the original dataset and the reduced dataset for any of the averages. Provide all results.

Example Output Illustrating Possible Average Computations:

Protected Class Variable (Pregnant)	Mean	Median	Mode
Original Data Set	0 (NO)	0 (NO)	0 (NO)
Reduced Data Set	0 (NO)	1 (YES)	0 (NO)
Difference	No Difference	Difference	No Difference

Step 6: Given your reduced dataset from Step 5, ***Repeat Step 3*** (frequency and histogram) using your selected dependent variable as a function of your selected independent variable (*from Step 4*). Explain any differences (in no more than 2 sentences). If you used the random sampling method, would members associated with the protected class variable benefit or be harmed? Explain your reasoning (in no more than 2 sentences).

Step 7: Turn in a report (in PDF format) documenting your outputs. **Please note that, if desired, you may submit a jupyter notebook (.ipynb) for the assignment submission.** If choosing this option, you need to make sure you have clearly printed/displayed all outputs necessary for receiving credit (as you would for a PDF submission) before submitting. This means that the jupyter notebooks must be run before your submission. Credit would not be awarded for just submitting the codes in the notebook and not displaying the output. Note that you can still submit the assignment as a PDF - jupyter notebook is optional and is intended to ease logistics. In this case, submission should be just one **.ipynb** file.