AI, Ethics, and Society

Spring 2020

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 for completion of this assignment*:

- [mental-health-in-tech-survey.csv] Mental Health in Tech Survey: Survey on Mental Health in the Tech Workplace in 2014 - https://osmihelp.org/research/

  Dependent Variables:
  - *treatment:* Have you sought treatment for a mental health condition? (Yes/No)
  - *mental_health_consequence:* Do you think that discussing a mental health issue with your employer would have negative consequences? (Yes/Maybe/No)
  - *phys_health_consequence:* Do you think that discussing a physical health issue with your employer would have negative consequences? (Yes/Maybe/No)

- [diabetic_data.csv] Diabetes 130 US hospitals for years 1999-2008: Diabetes – readmission - https://archive.ics.uci.edu/ml/datasets/Diabetes+130-US+hospitals+for+years+1999-2008

  Dependent Variables:
  - *time_in_hospital*: a numeric value representing number of days between admission and discharge
  - *readmitted:* Days to inpatient readmission - "<30" if the patient was readmitted in less than 30 days, ">30" if the patient was readmitted in more than 30 days, and "No" for no record of readmission.

- [compas-scores-two-years.csv] COMPAS Recidivism Racial Bias: Racial Bias in inmate COMPAS reoffense risk scores for Florida (ProPublica) - https://github.com/propublica/compas-analysis

  Dependent Variables:
  - *decile_score*: a numeric value between 1 and 10 corresponding to the recidivism risk score generated by COMPAS software (a small number corresponds to a low risk, a larger number corresponds to a high risk).
  - *two_year_recid*: a numeric indicator of whether the defendant recidivated two years after previous charge (0: no, did not recidivate, 1: yes, did recidivate)

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) -

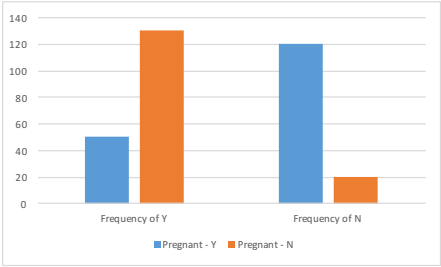
Dataset: Housing Decisions in Metro-Atlanta
Number of Observations: 1,400
Number of Variables: 16
Regulated Domain in Law: Housing (Fair Housing Act)
Number of Protected Class Variables: 2

	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.

Example Output for One Dependent-Independent Variable Combination:

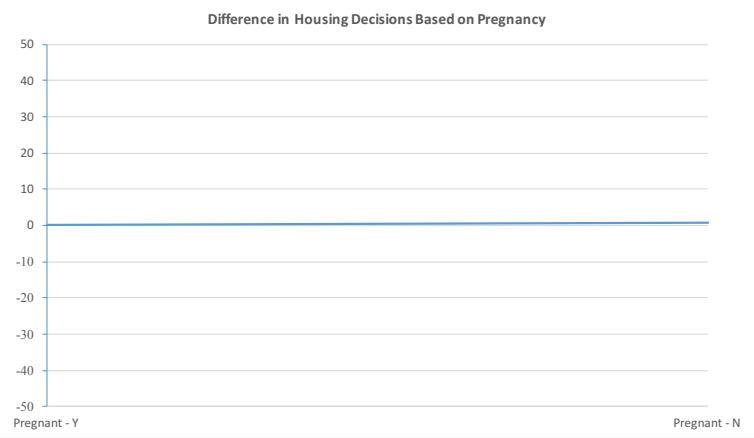
Independent Variable - Protected Class Variable	Dependent Variable - Housing Decision (Y/N)
Pregnant – Y	Frequency of Y: 50 Frequency of N: 120
Pregnant – N	Frequency of Y: 130 Frequency of N: 20



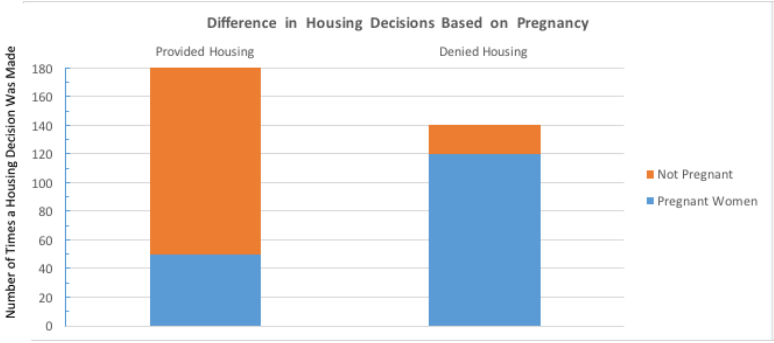
Step 4 - *Show how to manipulate with data*
Select one protected class variable (independent variable) and one dependent variable. 1) Create a graph to support the "fairness" hypothesis: The system is fair. There is no difference in the outcomes. 2) Create a graph to support the bias hypothesis: The 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 (mean, median, and mode) values 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, and mode) values 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.

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 independent variable as a function of your selected dependent 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 documenting your outputs.