Course Reminders

- Due Friday (11:59 PM)
  - D4
  - Q4
  - A2
  - Mid-quarter survey (*optional*)
  - Weekly Project Survey (*optional*)
- Scores posted on Canvas: Q3, D3, project review
- Project Proposal grading underway

Project Reviews

- Really well done overall; thoughtful, clear, and detailed
- Strengths:
    - Premise: interesting questions
    - Writing: background information clear; visualizations, consistency across/throughout; analysis and results explained and interpreted clearly
    - Code: code well commented and explained
- Weaknesses:
    - Flow: code question & hypothesis don't match; typos; poor variable naming; avoid output of large tables/datasets; inconsistencies between explanations and code; mislabeled visualizations
    - Writing: poor flow, wording, clarity; poor communication; confusing as to what was done; too wordy/long-winded; text hard to read/follow; failure to define initialisms/acronyms; used too much jargon; don't overwhelm the reader - subsections; bullet points
    - Data: unclear exactly what was being measured
    - Code: too repetitive, cluttered
    - Analysis: didn't quite have the data they needed (often time-related); explanations lacking for analysis

Approaches to Analysis

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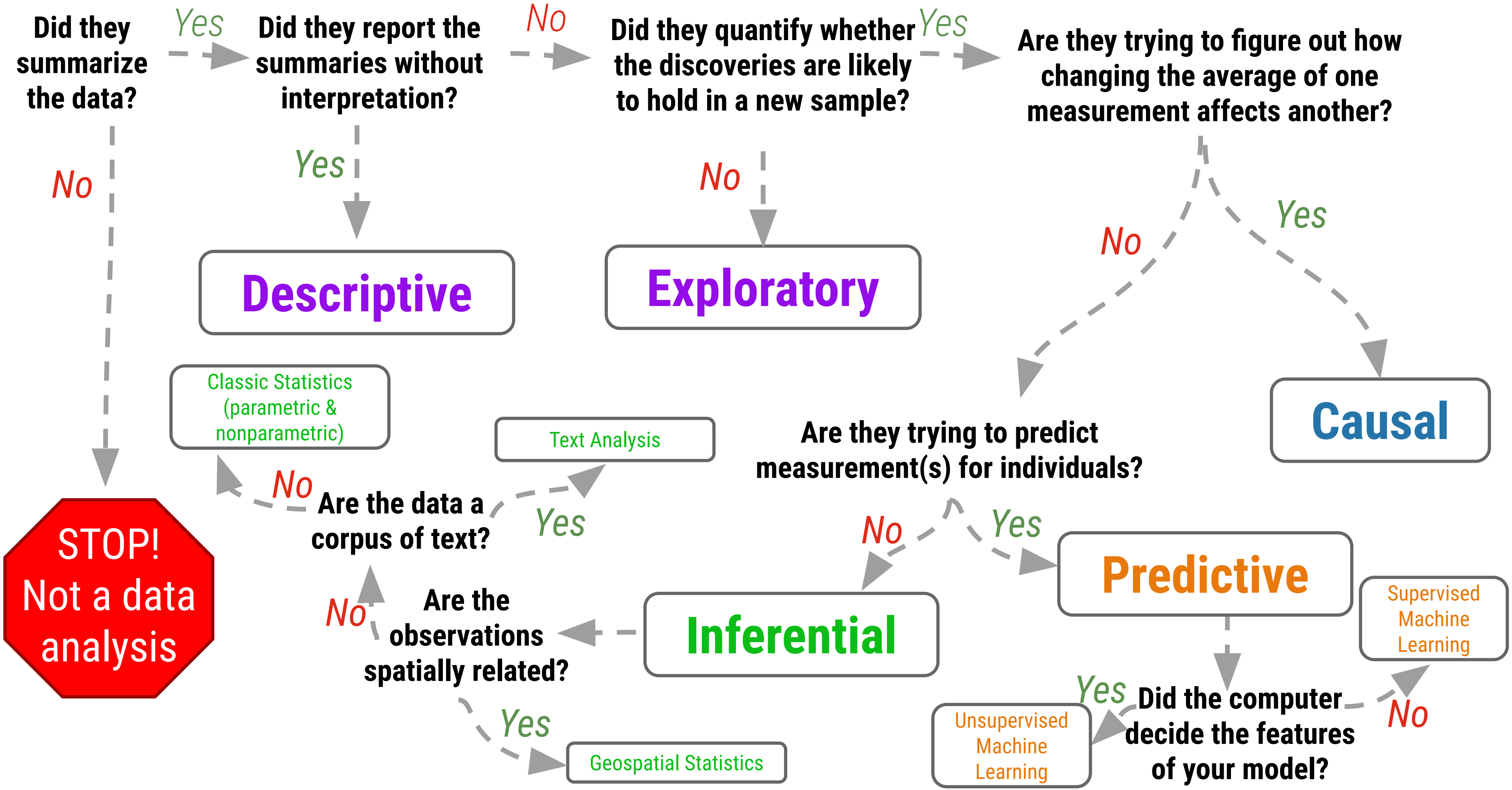
“Data science is the process of formulating a quantitative question that can be answered with data, collecting and cleaning the data, ***analyzing the data****, and communicating the answer to the question to a relevant audience.”*

To do this, you have to *look at, describe, and explore* the data

https://simplystatistics.org/2015/03/17/data-science-done-well-looks-easy-and-that-is-a-big-problem-for-data-scientists/



Did they summarize the data?

No

STOP! Not a data analysis

Yes

Did they report the summaries without interpretation?

Yes

Descriptive

No

Did they quantify whether the discoveries are likely to hold in a new sample?

No

Exploratory

Yes

Are they trying to figure out how changing the average of one measurement affects another?

Yes

Causal

No

Are they trying to predict measurement(s) for individuals?

Yes

Predictive

Did the computer decide the features of your model?

Yes

Unsupervised Machine Learning

No

Supervised Machine Learning

No

Inferential

Are the observations spatially related?

Yes

Geospatial Statistics

No

Are the data a corpus of text?

Yes

Text Analysis

No

Classic Statistics (parametric & nonparametric)

Summary: Analytical Approaches

1. **Descriptive** (and **Exploratory**) Data Analysis are the first step(s)
2. **Inference** establishes relationships
   a. Classic Statistics
   b. Geospatial Analysis
   c. Text Analysis
3. Machine Learning is for **prediction**
   a. Supervised
   b. Unsupervised
4. Experiments best way to establish **causality**

Exploring Analyses

General question: What impacts politics in America?

Data Science question: Is there a relationship between the sentiment of political words in South Park and America’s presidential approval rating?

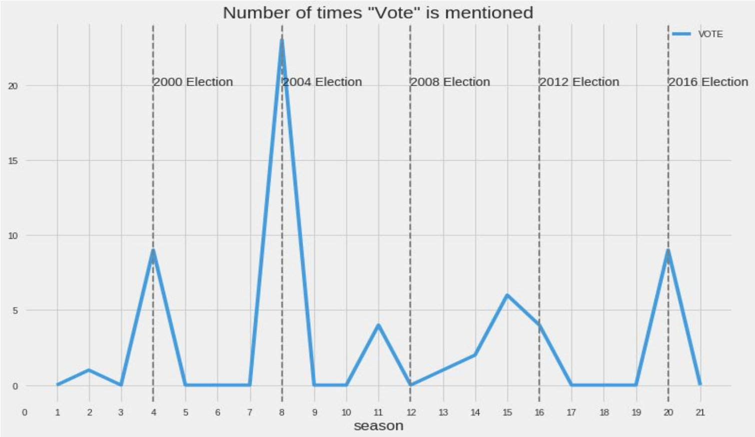
Descriptive

Exploratory

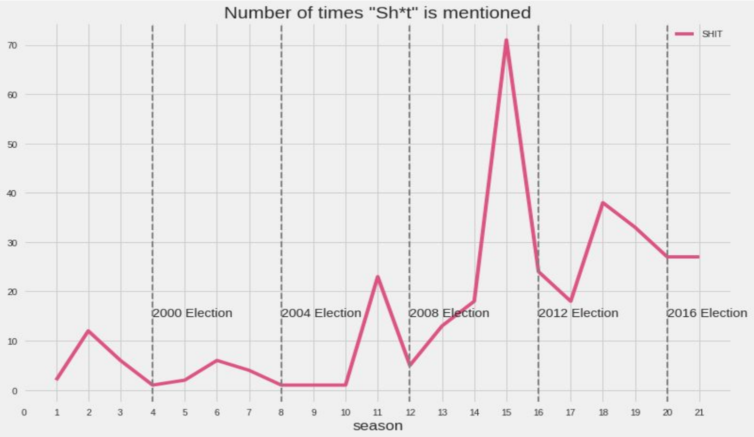
Inferential

Text Analysis

Classic Statistics (parametric & nonparametric)



Number of times "Vote" is mentioned



Number of times "Sh*t" is mentioned

https://github.com/COGS108/FinalProjects-Wi18/blob/master/071-FinalProject.ipynb

General question: What gets too much attention in the news?

Data Science Question: Is there a relationship over time between cause of death terms in the *NYT*, The Guardian, and Google trends data relative to data from the CDC?

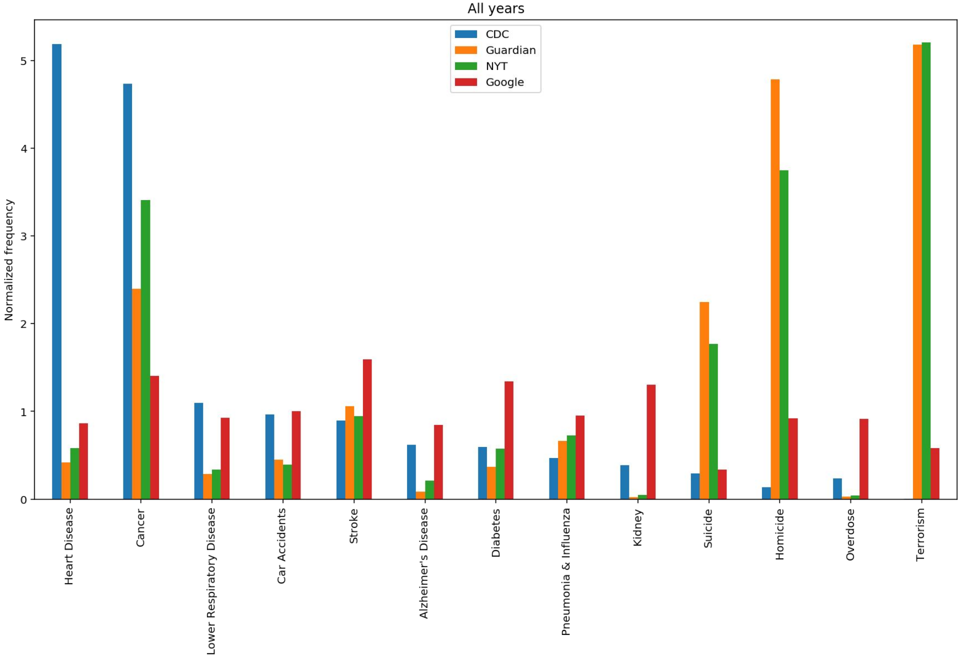
Descriptive

Exploratory

Inferential

Text Analysis

Classic Statistics (parametric & nonparametric)



https://github.com/COGS108/FinalProjects-Wi18/blob/master/010-FinalProject.ipynb

Descriptive

Exploratory

Predictive

Classification: Often we seek to assign a label to an item from a discrete set of possibilities.

Can we predict who will win next year's NCAA tournament? The Masters? The Super Bowl? The pennant? A game?

Can we predict the genre of a given movie (comedy, drama, or animation?) from just its script?

Descriptive

Exploratory

Predictive

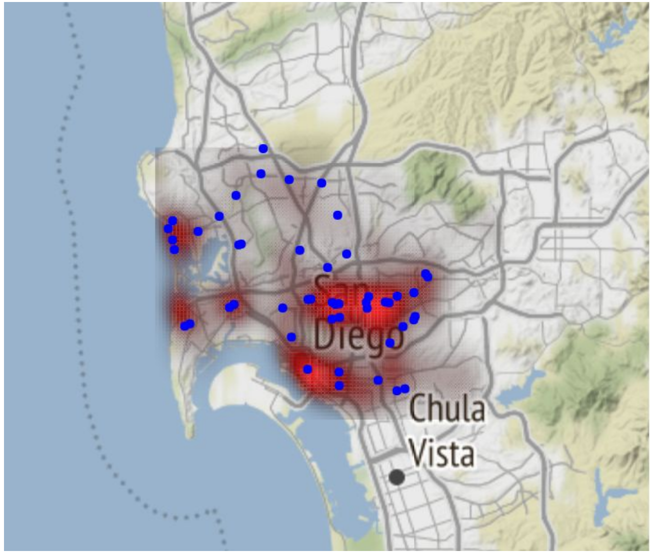
Regression: A way to forecast a given numerical quantity using other relevant features.

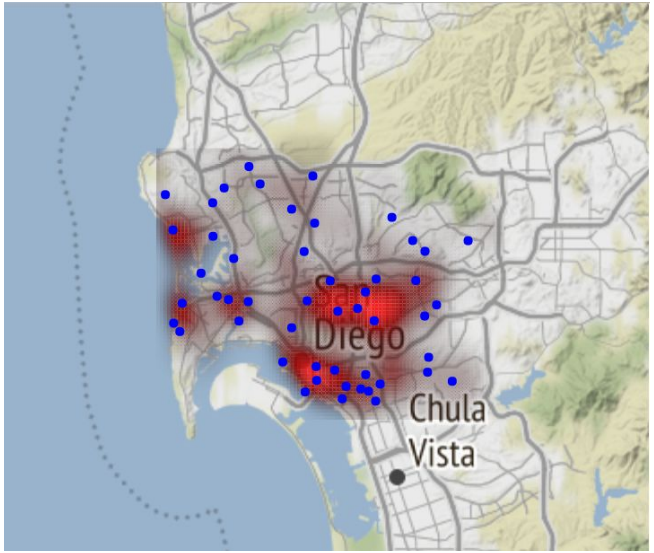
Can we predict someone's weight given other information?

How much snow will the East Coast get this year?

General question: Why isn't police response time always the same?

Data Science question: Where should police cars be stationed, accounting for crime levels and time of day, to make police response times equitable throughout San Diego?





Descriptive

Exploratory

Predictive

Inferential

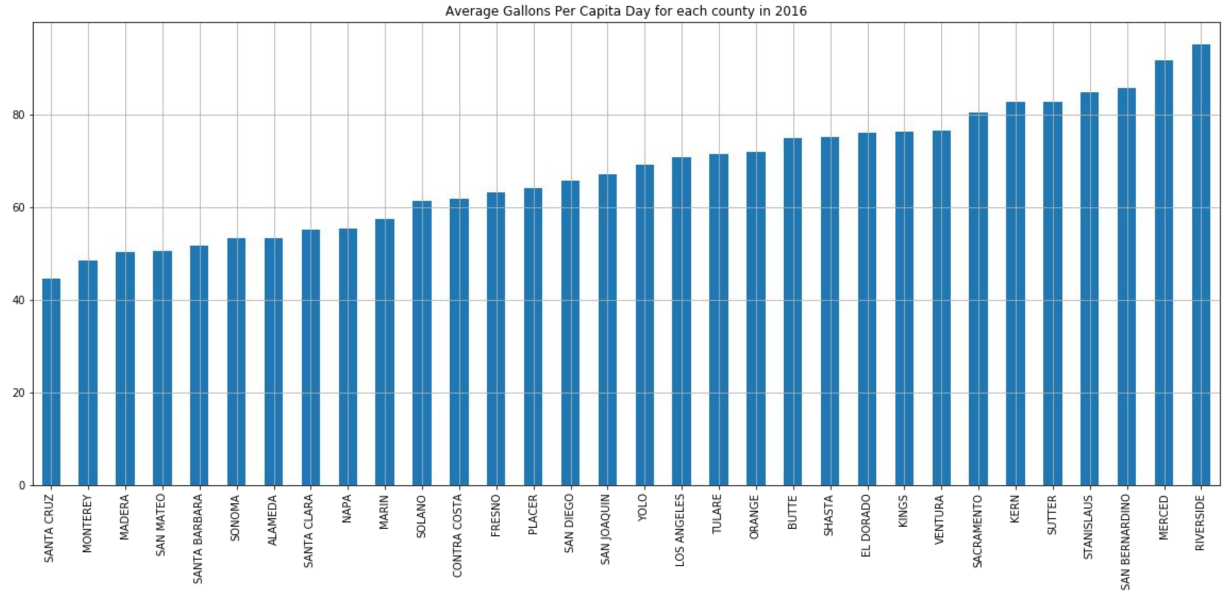
https://github.com/COGS108/FinalProjects-Sp17/blob/master/029-FinalProject.ipynb

In case of the total drought in California, how many desalination plant projects we need to supply residential use water for population who live in urban areas in California?

Descriptive

Exploratory

Predictive


Average Gallons Per Capita Day for each county in 2016

https://github.com/COGS108/FinalProjects-Sp17/blob/master/018-FinalProject.ipynb