DATA VISUALIZATION USING PYTHON

D-VELOP WORKSHOP SERIES – Summer 2021

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PURDUE UNIVERSITY | Libraries and School of Information Studies

D-VELOP WORKSHOP SERIES – Summer 2021

Jun 9	• Data Visualization: ggplot2
Jun 16	• Data Visualization using Python: Matplotlib and Seaborn
Jun 23	• Exploratory Data Analysis in R
July 7	• Data Visualization using Python: Bokeh (Interactive Plots)
July 14	• Exploring and Visualizing Time Series Data
July 21	• Data Visualization: introduction to Tableau

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What will we cover today?

- Motivation
- Useful Python Libraries
- Types of Plots
- Learn by Doing

Visualization Objectives

- Record information
- Analyze data to support reasoning
- Confirm hypotheses
- Communicate ideas to others

Why Visualize

To record information

Why Visualize

To point out interesting things

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ARDCAIREQGHLVKMFPSTWYARN
GFPSVCEILQGKMFPSNDRCEQDIFP
SGHLMFHKMVPSTWYACEQTWRN

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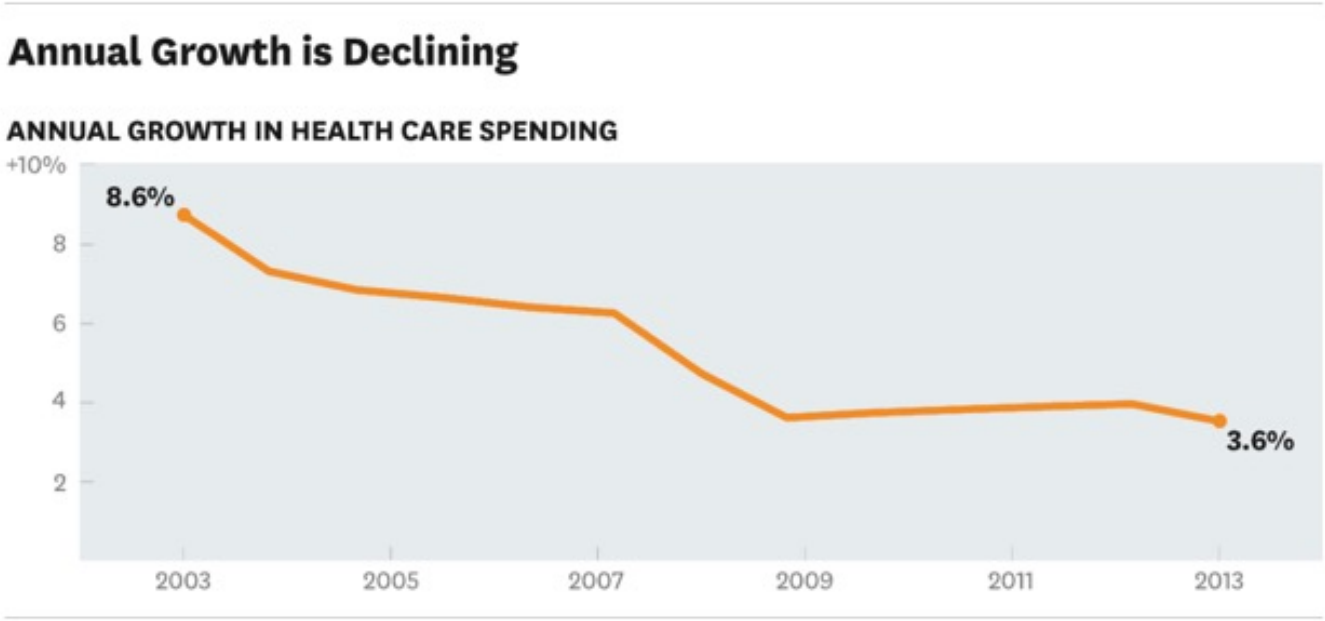
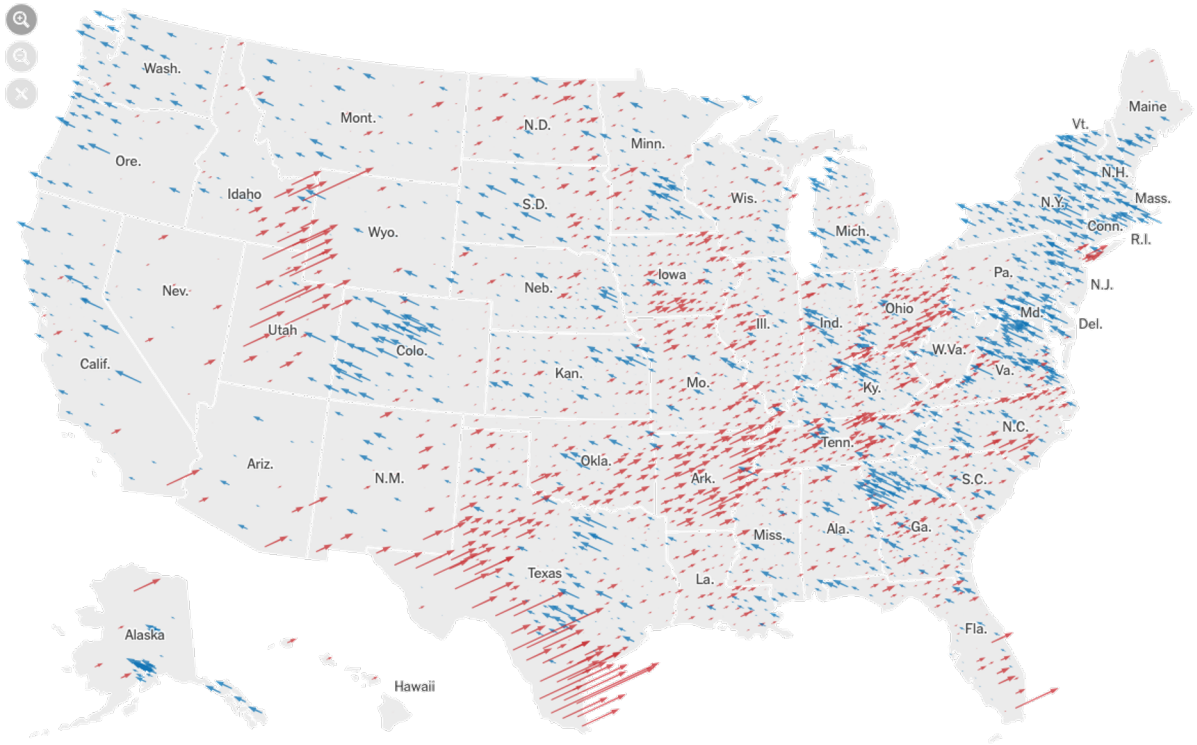
Why Visualize

To communicate information



Why Visualize

To analyze data



2020 US Elections (NYTimes)

Useful Python Libraries

NumPy

pandas

matplotlib

seaborn

bokeh

NumPy

- Fundamental package for scientific computing
- Exceptionally fast – written in C
- Main data structure:
  - *ndarray* : n-dimensional arrays of homogeneous data types
- Data manipulation ≈ NumPy array manipulation
- Used in other libraries - Matplotlib, pandas, scikit- learn

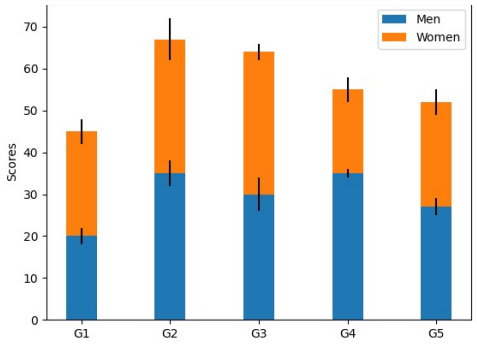
Link: NumPy for MATLAB USERS

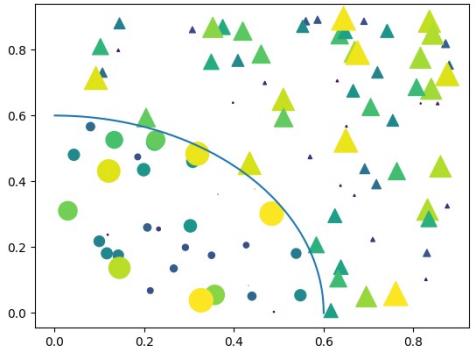
Pandas

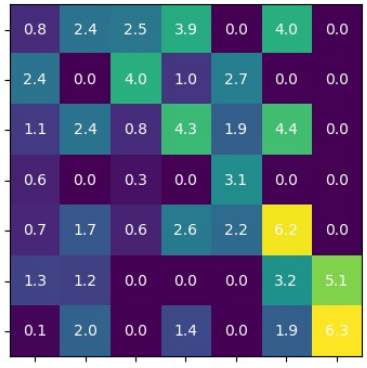
- Fundamental tool for handling and analyzing input data
- Particularly suited for tabular data
- Implements powerful data operations
- Main data structures:
  - *DataFrame*: A table with rows and columns
  - *Series*: A single column

Matplotlib

- Used for basic plotting
- Highly customizable
- Works with NumPy and pandas

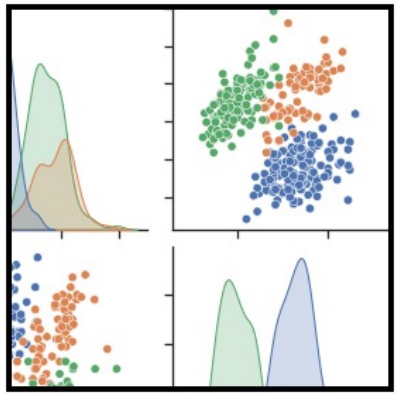


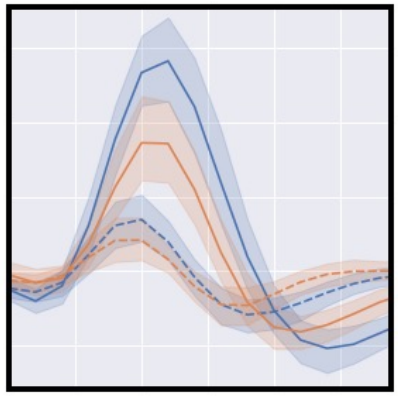


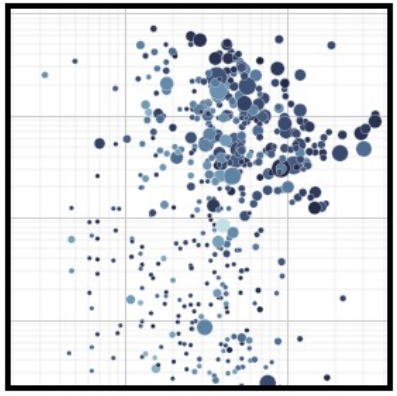


Seaborn

- Used for statistical data visualization
- Uses fewer syntax with good default themes
- Integrated to work great with pandas data-frame
- Uses Matplotlib under the hood

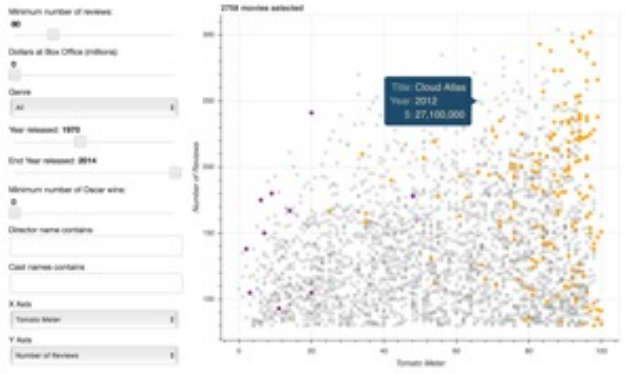


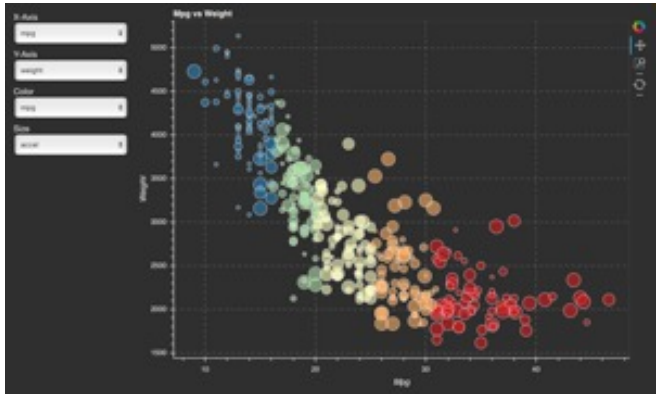




Bokeh

- Used for interactive visualization
- Requires modern web browsers
- Integrates with JavaScript



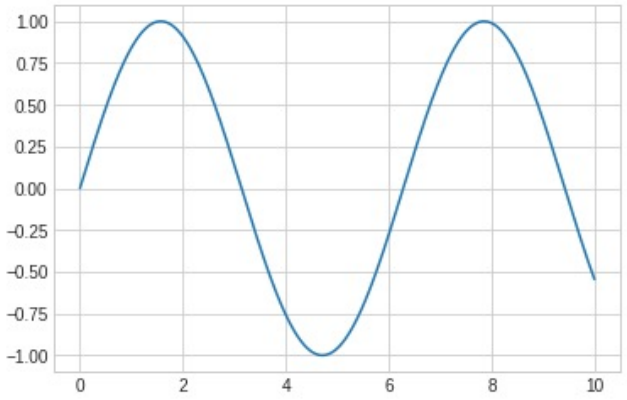


Types of Plots

- Line plots
- Bar plots
- Scatter plots
- Box plots
- Histograms

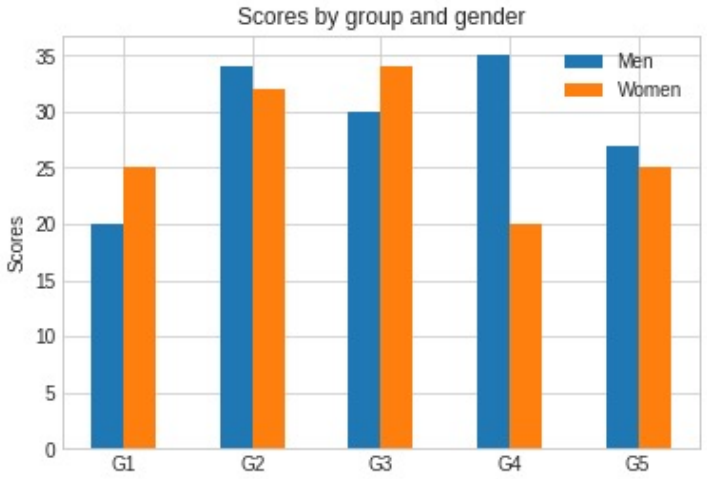
Line plots

- Used for numeric data
- Used to show trends
- Compare two or more different variables over time
- Could be used to make predictions



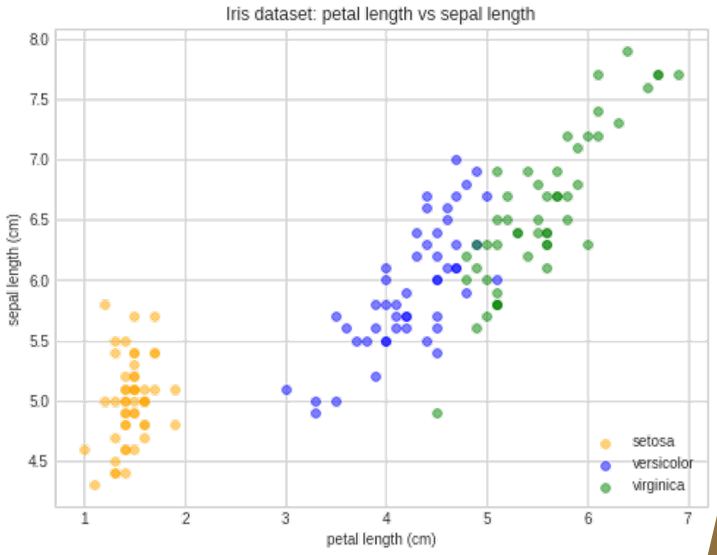
Bar plots

- Used for nominal or ordinal categories
- Compare data amongst different categories
- Ideal for more than 3 categories
- Can show large data changes over time



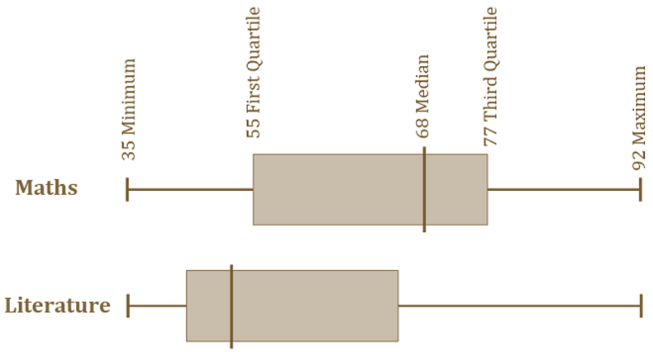
Scatter plots

- Used to visualize relation between two numeric variables
- Used to visualize correlation in a large data set
- Predict behavior of dependent variable based on the measure of the independent variable.



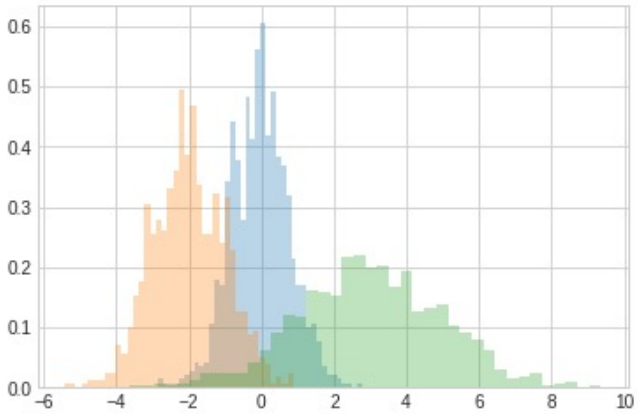
Box plots

- *aka* whisker plot
- Statistical graph used on sets of numerical data
- Shows the range, spread and center
- Used to compare data from different categories



Histograms

- Used for continuous data
- Displays the frequency distribution (shape)
- Summarize large data sets graphically
- Compare multiple distributions



LEARN BY DOING

To access the videos and material from the workshop series please visit:
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