

8/21/23 notes

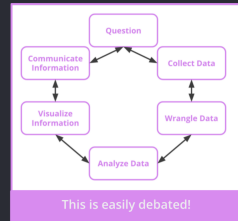
What Is Data Science?

- Using advanced analytics to extract and interpret data for business
- Is used in almost all areas of business

The Data Science Lifecycle

6 Steps:

1. Question
2. Collect Data
3. Wrangle Data
4. Analyze Data
5. Visualize Information
6. Communicate Information



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Python Fundamentals

- Datasets - collection of data
 - List - **ordered** and **changeable** with duplicates **allowed**
 - Dictionary - **ordered** and **changeable** with duplicates **not allowed**
 - Set - **unordered** and **unchangeable** with duplicates **not allowed**
 - Tuple - **unordered** and **unchangeable** with duplicates **allowed**
- Representing the data
 - Column-oriented - grouping my features, or column
 - Each column has values associated with the first row of that column
 - Row-oriented - grouping by observation, or row
 - Each row has the values associated with the first column of that row
- Indexing
 - List - **name[index]**
 - Index must be whole number, starts at 0 and counts up by 1
 - Dictionary **name[key]**
 - Keys can be any valid data type within used language, keys must be unique within dictionary
 - Set - **for value in set**
 - Tuple - **name[index]**
- Iteration
 - While loop
 - Runs as long as condition is true
 - For loop
 - Runs through all values in a collection

- Useful functions
 - Dictionaries:
 - values()
 - items()
 - keys()
 - Lists:
 - len()
 - append()
 - sort()
 - Other:
 - range()
 - print()
 - split()
 - type()
 - int()
 - str()
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Central Tendency

- An attempt to use statistical measures to describe the behavior of the collection of data
 - Mean
 - Takes the sum of all data points and divides by the number of datapoints
 - “Expected” values for data
 - Best for symmetrical data with a normal distribution
 - Can be misleading if there are outliers
 - Median
 - The middle value of the data when arranged smallest to largest
 - Works for all distributions of data, resistant to outliers
 - Mode
 - The value that shows up the most in a set of data
 - Multimodal data - Data with more than one significant modes
 - Skewed data
 - Result of outliers - skews the way of the outlier(right or left)
 - Median and mode dont really change, but mean is pulled the way of the outlier
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Pandas

- A Python library that makes it easier to analyze data
 - Dataframes
 - An object that stores a dataset
 - Information is organized into rows and columns
 - Simplify common operations, like sorting data and doing math
 - `.mean()`, `.median()`, and `.mode()` for example
 - Can turn dictionaries into dataframes where the keys become the columns
 - Series
 - Used to create a dataframe
 - A one-dimensional list of data, one column of the dataframe
 - Indexing
 - `.loc[]` - name.loc[row_label , col_label]
 - Takes in the name of the row and column
 - `.iloc[]` - name.iloc[row_index , col_index]
 - Takes in the index of the row and column
 - Selsection - the process of accessing a subset of a dataframe
 - Uses `.loc[]` and `.iloc[]`
 - Can specify a range of rows
 - Ex: `df.loc[0:2, ["A","B"]]`
 - Grabs the first 3 rows of columns "A" and "B"
 - Filtering - select parts of data that meet a given condition
 - `Evens = df[df.iloc[:,:] % 2 == 0]`
 - Checks all rows and columns and adds value to Evens if the values is an even number
 - Combining datasets
 - Concatenate - naively combines along an axis
 - Merge - combine through shared column
 - Join - combine using shared indices
 - Inner join - only keeps shared data, anything else is deleted
 - Left Outer join - keeps shared data and extra values in the left, deletes excess in the right
 - Right outer join - does the same as left but for the right
 - Full outer join - keeps everything
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Distributions

- Distributions are graphs that tell us about a characteristic of a population
 - Distribution tells about shape and spread of data
 - Only represents some of the data, not ALL
 - Skews show that median is either greater than or less than the mean, implies outliers in direction of skew
 - Multimodal data has more than one peak
 - Implies 2 or more variables that affect the data being measured together
 - Uniform distribution
 - Each value in th distribution has the same probability
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Visualising Data

- A graph or picture that helps viewers understand an important trend or pattern
- Visualizations must be easy to read and not misleading

Seaborn Fundamentals

- A python library built ontop of matplotlib (another library) that makes datavisualization easier
 - Types:
 - Bar Chart - uses bars to depict a value, usually categorical
 - Histogram - makes a histogram, continuous quantitative data\
 - Scatterplot - shows correlation between 2 or more quantitative variables
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Collecting Data

- Techniques:
 - Observe a sample
 - Collect data unobtrusively
 - Must specify constraints of data
 - Survey a sample
 - Ask people to fill out a survey or conduct interviews
 - Usually use multiple choice questions
 - More used for qualitative variables
 - Experiment on a sample

- Conduct your own experiment where you control measurement of variables
 - Use already collected data
 - Can use data from Gov surveys
 - No control over what and how to measure
- Http requests - access data collected and maintained by other people
 - Clients communicate with servers by requesting data and waiting for a response
 - Get request - only retrieves data
 - Post request - create new data
 - Put request - reads data
 - Delete request - removes data from server
- Web scraping - extracting data from websites

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HTML

- HyperText Markup Language is used to display content on a webpage
 - Uses angle brackets to signify statements
 - all pages have two major sections
 - Head
 - Where all metadata lives (describing information found in webpage; cannot be seen on page)
 - Body
 - All content that is seen on web page like text and pictures
 - Html uses tags, most have an opening and closing tag
 - `<p> paragraph text </p>`
 - Tag attributes
 - Some tags require or allow more information to make it work or change the base tag such as the url for an image, or changing the size of the image
 - Important meta data and attributes
 - `<title>`
 - `<meta>`
 - `<link>`
 - Alt
 - Lang
 - Accessibility
 - Want the webpage accessible to as many people as possible
 - Involves low bandwidth, visually impaired readers, low english proficiency readers, etc.
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CSS

- Cascading Style Sheets
 - Allows you to stylise html sheets
 - Css uses “{}” as opposed to “<>” to mark statements
- Selector
 - Targeted html tag
 - General
 - All tags of a specific type such as all <p> tags
 - Class
 - All tags with the specified class (class=“class-name”)
 - .class-name{ property}
 - ID
 - Only works for one tag given the specific id (id=“id-name”)
 - #id-name{ property}
 - Takes priority over class tag
- Property
 - The style to be added to the tag
 - Things like color, borders, padding, font size, etc.
- Box model
 - margin>boarder>padding>content

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JavaScript

- The proگرامing language of the web
 - Uses functions and variables and can perform operations
- Can use an “on hover” function to tell if the mouse is hovering over a certain element
- Can randomize variables