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Data Science Lifecycle

1. Data scientists use techniques to transform data into a visual representation that can be easier to understand by humans
2. Data science platform market is expected to grow by upwards of 20% annually.
3. Data science generally falls under math, statistics, and computer science.
4. The Life Cycle
 - a. Question
 - b. Collect Data
 - c. Wrangle Data
 - d. Analyze Data
 - e. Visualize Information
 - f. Communicate Information
5. All steps in the life cycle are all fluid

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Python Fundamentals

1. Datasets
 - a. The collection of data
 - b. Types of datasets
 - i. Lists
 1. Ordered, changeable, duplicates allowed
 - ii. Dictionaries
 1. Ordered, changeable, duplicates not allowed
 - iii. Sets
 1. Unordered, unchangeable*, duplicates not allowed
 - iv. Tuples
 1. Unordered, unchangeable, duplicates allowed
2. Representing datasets with code
 - a. Column-oriented
 - i. Grouping by features
 - b. Row-oriented
 - i. Grouping by a single observation
3. Indexing

- a. Used to access values of a collection type
 - b. Python syntax to access values
 - i. List
 - 1. name[index]
 - ii. Dictionary
 - 1. name[key]
 - iii. Set
 - 1. for loop
 - iv. Tuple
 - 1. Name[index]
4. Iteration
- a. Can repeat processes with loops or recursion in Python
 - b. Python loop types
 - i. While loop
 - 1. while condition: statements
 - ii. For loop
 - 1. for thing in collection: statements
5. Useful methods
- a. [Dictionaries](#)
 - i. values()
 - ii. items()
 - iii. keys()
 - b. [Lists](#)
 - i. len()
 - ii. append()
 - iii. sort()
 - c. [Other](#)
 - i. range()
 - ii. print()
 - iii. split()
 - iv. type()
 - v. int()
 - vi. str()

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Central Tendency

1. Measures of Central Tendency
 - a. Statistical measures that help describe the behavior of a collection of data points
 - b. Mean
 - i. The average of all the values in a dataset
 - ii. Summation of all the values, divided by the count of values
 - iii. Can be misleading, because outliers skew the result
 - c. Median
 - i. The value in the direct center of a sorted dataset
 - ii. Gives a more proportional representation of data that excludes outliers
 - d. Mode
 - i. The most frequently occurring value in a dataset
 - ii. Most useful in a relatively large sample size
2. The center of a dataset is a good measure of determining the behavior or distribution of a dataset
 - a. Gives examples of a whole dataset, not data points individually.
3. Distribution
 - a. Shows how often data occurs in a dataset
4. Outliers
 - a. Unusually large or small values
 - b. Skew the result of a mean in a dataset
5. Bimodal
 - a. When two values are most common
6. Unimodal
 - a. When one value is the most common value
7. Symmetric distribution
 - a. When the mean and median are the same
8. Skewed distribution
 - a. When the dataset is offset by outliers, causing the mean to be an inaccurate representation of the population

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Pandas Fundamentals

1. Pandas
 - a. Pandas is a python library that can make analyzing data easier.
2. Dataframes
 - a. A pandas object that is used to store a dataset
 - b. Information is organized in rows and columns
 - c. Dataframes simplify common operations such as sorting data
3. Series
 - a. A pandas object used to create dataframes
 - b. Seen as a one-dimensional list of data
 - i. Think of it as a single column of a dataframe
4. Indexing into Dataframes
 - a. [df.loc\[\]](#)
 - i. name.loc[row_label, col_label]
 - b. [df.iloc\[\]](#)
 - i. name.iloc[row_index, col_index]
5. Selection
 - a. The process of accessing a subset of a dataframe
 - b. Can select subsets using loc and iloc
6. Filtering
 - a. Selecting values of a dataset where certain conditions are true
 - b. df[condition]
7. Combining Dataframes
 - a. Concatenating
 - i. Naively combines along an axis
 - b. Merge
 - i. Combine through a shared column
 - c. Join
 - i. Combine using shared indices
 - ii. Inner Join
 1. Keep similar pieces
 - iii. Left Outer Join
 1. Keep the left
 - iv. Right Outer Join
 1. Keep the right

- v. Full Outer Join
 - 1. Keep everything

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Distributions

1. Distributions
 - a. Graphs that tell us about some characteristic of a population
 - b. Mean and median are important parts of the graphs
 - c. Tells us about the shape and spread of data
2. Normal distribution
 - a. The mean, median, and mode are all the same
 - b. Empirical Rule
 - i. 68% of data is within 1 standard deviation from the mean
 - ii. 95% within 2 standard deviations
 - iii. 99.7% within 3 standard deviations
 - c. Unimodal
 - i. Only one peak
3. Standard deviation
 - a. The average distance between any point and the mean
4. Skewed distribution
 - a. Skew is towards outliers
 - i. Can be seen on graphs by a "tail"
5. Bimodal
 - a. Has two peaks on a graph
6. Uniform distribution
 - a. Each value has the same frequency

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Data Visualization

1. Data Visualizations
 - a. A graph or picture that helps humans understand important patterns in a dataset

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Seaborn Fundamentals

1. Seaborn
 - a. A python library that can make visualizing data easier
2. Bar Charts
 - a. A graph type that uses bars to depict a value associated with a category
3. Histogram
 - a. A graph that shows the frequency distribution of a variable in a dataset
4. Scatterplots
 - a. A graph that uses points to show the relationship between 2 quantitative variables in a dataset.

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Data Collection

1. Techniques
 - a. Observe a sample
 - b. Survey a sample
 - c. Experiment on a sample
 - d. Use data that somebody else has responsibly collected
2. Sourcing Digital Datasets: API Requests
 - a. The act of using HTTP requests in order to access datasets collected and maintained by other people
 - b. Common HTTP requests:
 - i. GET
 1. Requests for information
 2. Only retrieves data
 3. Does not modify data
 - ii. POST
 1. Modify the underlying data
 2. Create new resources
 - iii. PUT
 1. Modify the underlying data
 2. Update existing resources

iv. DELETE

1. Remove existing resources

3. Sourcing Digital Datasets: Web Scraping

- a. The act of extracting data from websites using the structure of its HTML
- b. Scraping and crawling exists in legal gray zones
 - i. The TOS determines the legality of web scraping