Welcome to the CoGrammar

Tutorial: Data Sets, Frames and Visualisation

The session will start shortly...

Questions? Drop them in the chat. We'll have dedicated moderators answering questions.

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Data Science Session Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

Data Science Session Housekeeping cont.

- For all **non-academic questions**, please submit a query: **www.hyperiondev.com/support**
- Report a **safeguarding** incident: **www.hyperiondev.com/safeguardreporting**
- We would love your **feedback** on lectures: **Feedback on Lectures**

Skills Bootcamp
8-Week Progression Overview

Fulfil 4 Criteria to Graduation

✅ Criterion 1: Initial Requirements

Timeframe: First 2 Weeks
Guided Learning Hours (GLH): Minimum of 15 hours
Task Completion: First four tasks

Due Date: 24 March 2024

✅ Criterion 2: Mid-Course Progress

60 Guided Learning Hours

Data Science - **13 tasks**
Software Engineering - **13 tasks**
Web Development - **13 tasks**

Due Date: 28 April 2024

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Skills Bootcamp Progression Overview

✅ Criterion 3: Course Progress

Completion: All mandatory tasks, including Build Your Brand and resubmissions by study period end
Interview Invitation: Within 4 weeks post-course
Guided Learning Hours: Minimum of 112 hours by support end date (10.5 hours average, each week)

✅ Criterion 4: Demonstrating Employability

Final Job or Apprenticeship Outcome: Document within 12 weeks post-graduation
Relevance: Progression to employment or related opportunity

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SKILLS FOR LIFE
SKILLS BOOTCAMPS

Department for Education

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Tutorial: Data Sets, Frames and Visualisation

April 2024

Learning objectives

- Read and manipulate data with Pandas
- Generate plots in Python using Matplotlib and Seaborn.
- Gain an understanding of more advanced graphing techniques.

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Pandas dataframe

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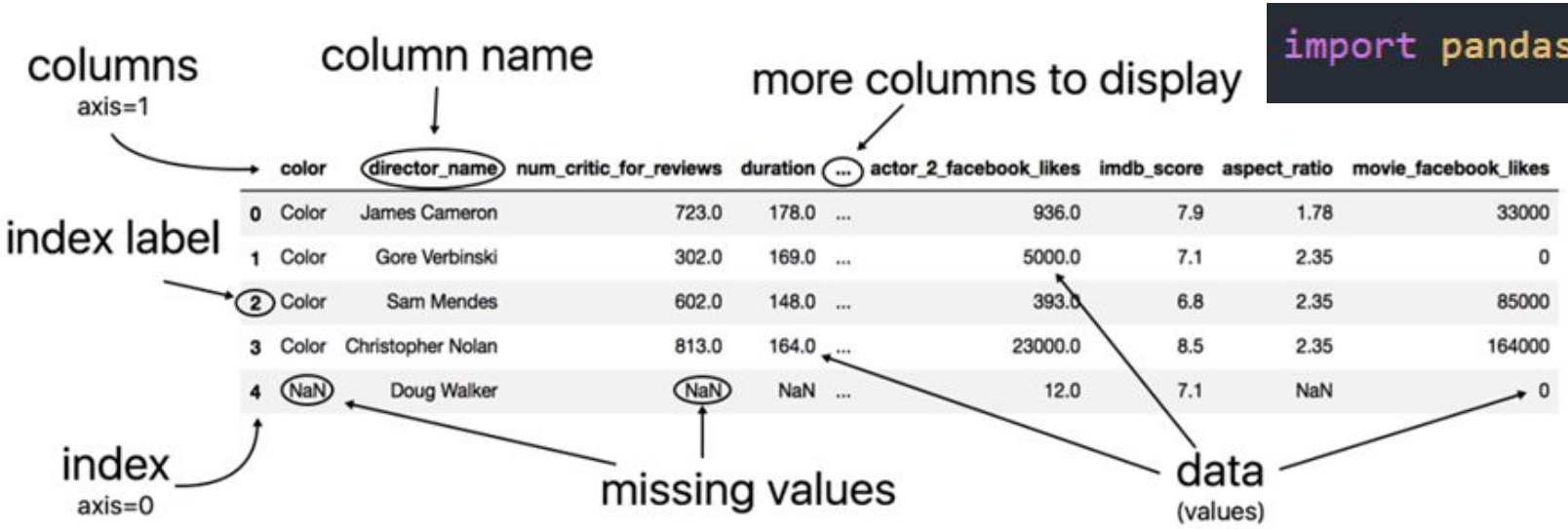
Pandas DataFrame

- The pandas' library documentation defines a DataFrame as a "two-dimensional, size-mutable, with labelled rows and columns."

```
import pandas as pd
```



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1	Color	Gore Verbinski	302.0	169.0	...	5000.0	7.1	2.35	0
2	Color	Sam Mendes	602.0	148.0	...	393.0	6.8	2.35	85000
3	Color	Christopher Nolan	813.0	164.0	...	23000.0	8.5	2.35	164000
4	NaN	Doug Walker	NaN	NaN	...	12.0	7.1	NaN	0

Anatomy of a DataFrame

Pandas cheat sheet

IMPORTING DATA

- `pd.read_csv(filename)` - From a CSV file
- `pd.read_table(filename)` - From a delimited text file (like TSV)
- `pd.read_excel(filename)` - From an Excel file
- `pd.read_sql(query, connection_object)` - Reads from a SQL table/database
- `pd.read_json(json_string)` - Reads from a JSON formatted string, URL or file.
- `pd.read_html(url)` - Parses an html URL, string or file and extracts tables to a list of dataframes
- `pd.read_clipboard()` - Takes the contents of your clipboard and passes it to `read_table()`
- `pd.DataFrame(dict)` - From a dict, keys for columns names, values for data as lists

EXPORTING DATA

- `df.to_csv(filename)` - Writes to a CSV file
- `df.to_excel(filename)` - Writes to an Excel file
- `df.to_sql(table_name, connection_object)` - Writes to a SQL table
- `df.to_json(filename)` - Writes to a file in JSON format
- `df.to_html(filename)` - Saves as an HTML table
- `df.to_clipboard()` - Writes to the clipboard

SELECTION

- `df[col]` - Returns column with label `col` as Series
- `df[[col1, col2]]` - Returns Columns as a new DataFrame
- `s.iloc[0]` - Selection by position
- `s.loc[0]` - Selection by index
- `df.iloc[0,:]` - First row
- `df.iloc[0,0]` - First element of first column

VIEWING/INSPECTING DATA

- `df.head(n)` - First **n** rows of the DataFrame
- `df.tail(n)` - Last **n** rows of the DataFrame
- `df.shape()` - Number of rows and columns
- `df.info()` - Index, Datatype and Memory information
- `df.describe()` - Summary statistics for numerical columns

DATA CLEANING

- `df.columns = ['a','b','c']` - Renames columns
- `pd.isnull()` - Checks for null Values, Returns Boolean Array
- `df.rename(columns={'old_name': 'new_name'})` - Selective renaming

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What does a DataFrame represent in Pandas?

1. A two-dimensional array with labeled axes.
2. A single-dimensional array of data.
3. A database management system.
4. A type of Python function.

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2. pd.csv_reader()
3. pd.read_csv()
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What does the df.describe() method provide?

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2. A count of missing values in each column.
3. The first five rows of the DataFrame.
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Manipulating Data

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How can you select a subset of columns from a DataFrame?

1. df['column1', 'column2']
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3. df(column1, column2)
4. df.columns['column1', 'column2']

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What does the groupby() method do?

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Which method is used to get a quick overview of a DataFrame's structure?

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2. df.describe()
3. df.summary()
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Data visualisation

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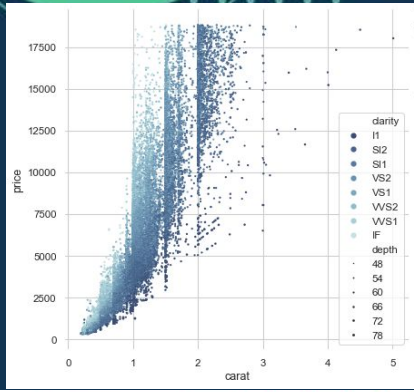
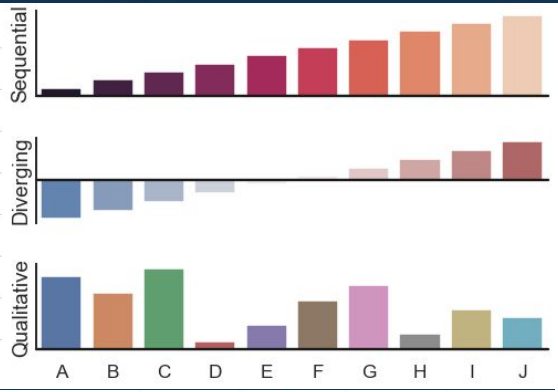
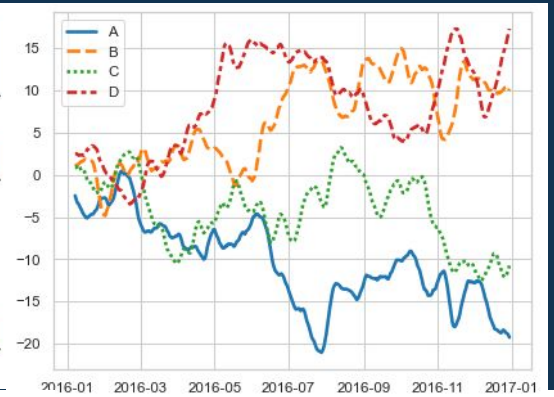
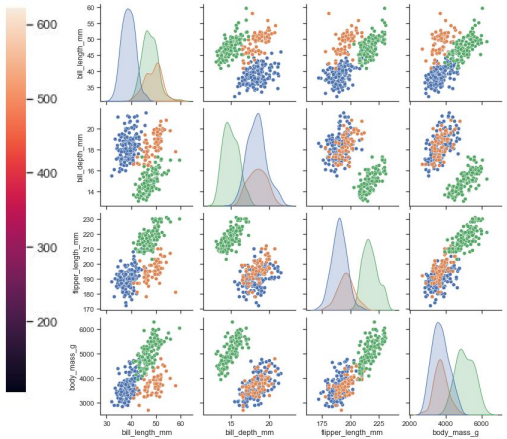
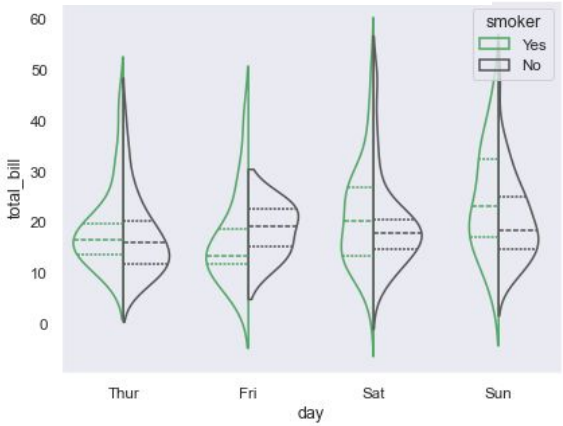
Seaborn examples











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Which plot is best for comparing distributions of several groups?

1. Scatter plot
2. Bar chart
3. Kernel density plots (KDEs)
4. Pie charts

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Violin plots are ideal for:

1. Showing relationships over time
2. Comparing individual values
3. Highlighting correlations only
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Advanced Box Plots can be enhanced by adding:

1. Color-coded matrices
2. Raw data points or swarm plots
3. Vertical axes for each feature
4. Pre-attentive attributes

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Heatmaps are excellent for:

1. Depicting pairwise relationships
2. Revealing structure, highlighting correlations, and identifying clusters
3. Comparing distributions
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Parallel Coordinates are used to:

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2. Compare individual values
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Which principle emphasizes the use of clear labels, thoughtful color choice, and minimal clutter for effective visualization?

1. Visual Perception
2. Chart Choice vs. Your Question
3. Less is More
4. The Principle of Detailed Complexity

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Jupyter notebook

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Jupyter Notebook

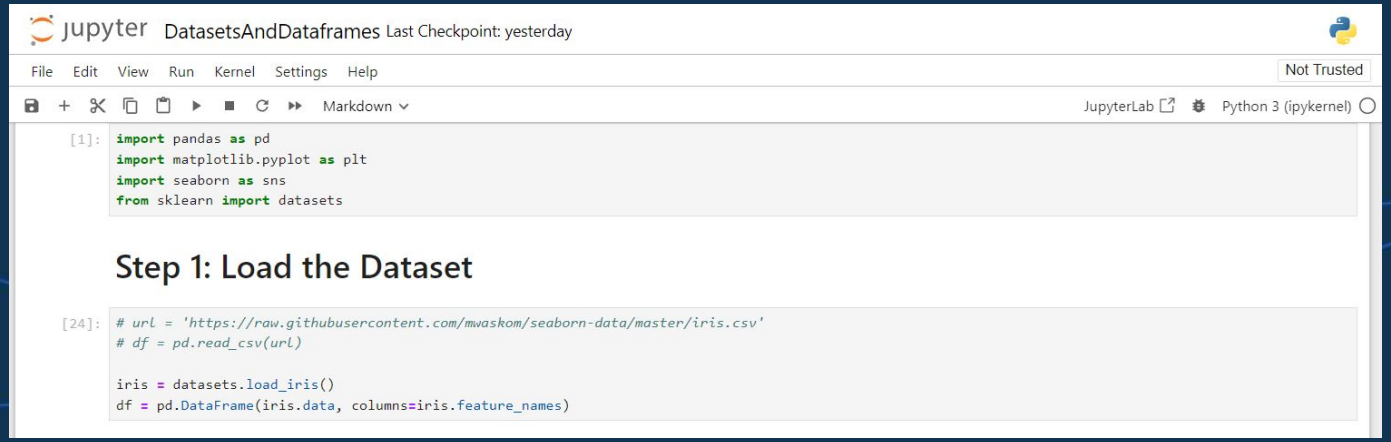
- An interactive environment perfect for data science work. They let you combine code, the results of the code (output), and explanatory text (like in a scientific report).

- This fosters clear data exploration and storytelling, all in one place

Running

```
jupyter notebook
```

```
python -m notebook
```



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Questions and Answers

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Thank you for attending

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