



INTRODUCTION TO DATA VISUALIZATION WITH PYTHON

-
- INTRODUCTIONS
 - LEARNING OBJECTIVES
 - PYTHON OVERVIEW

AGENDA

Frank Callaly



Technical Instructor

- Agile Software Development
- Python for Data Science
- Full-Stack Development
- Machine Learning Applications

Qualifications

- BSc Electronic & Computer Engineering
 - National University of Ireland, Galway (NUIG)
- Senior Researcher NUIG
 - A/V Compression Techniques
 - Neural Network Applications
 - Si-Elegans AI Project
- Development Team Lead
- Technical Architect

Key Technical Competencies

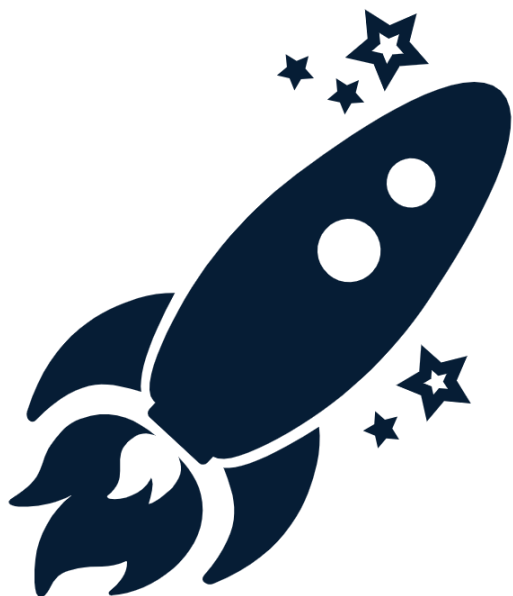
- Python, Java, C, JavaScript
- Web Applications
- Visualisation for Data Science
- Big Data Technologies
- Cloud Architectures
- Applied Machine Learning

Business Domains

- FinTech
- Mobile Telecoms
- Consumer Electronics Applications

WHAT IS PYTHON?

The world's fastest growing programming language



Software Engineers

Data Analysts

Accountants

Mathematics

Scientists

+ Kids

WHY IS IT SO POPULAR?



Beginner Friendly

uses considerably less code than other languages while producing similar outcomes, “reads like English”



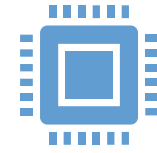
Batteries Included

ships with many standard libraries right out of the box



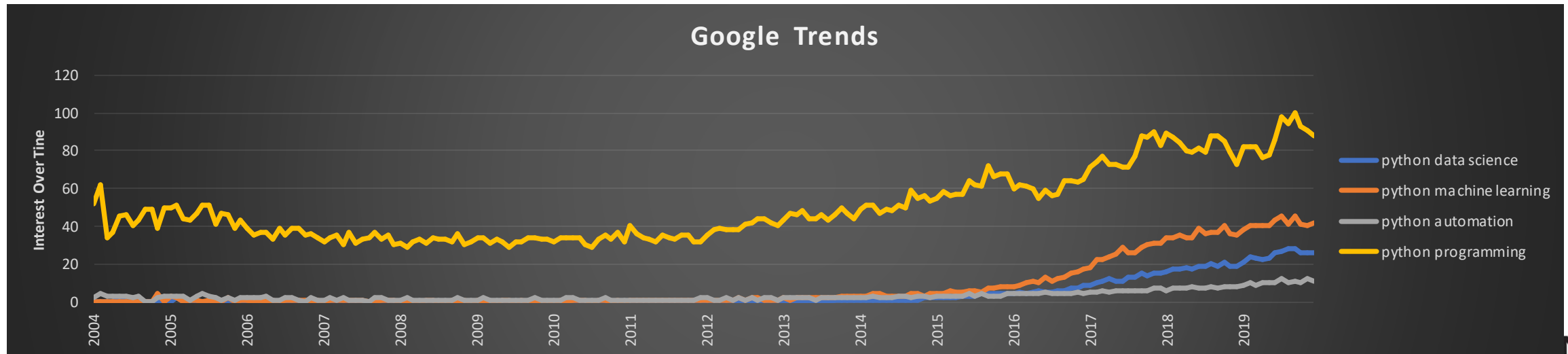
Libraries

a wealth of open source libraries built on Python

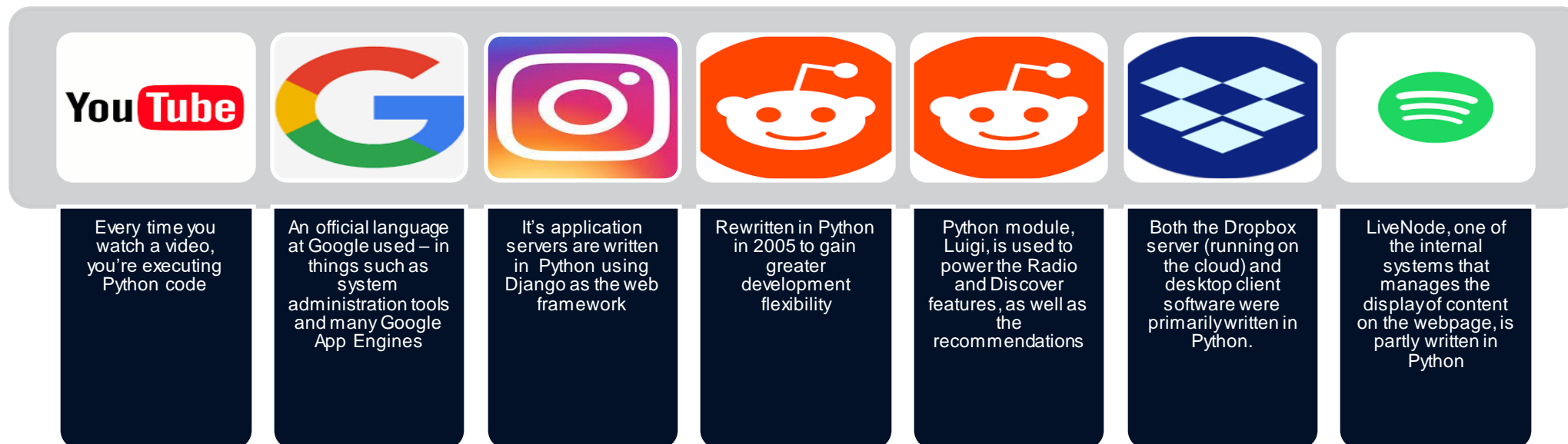
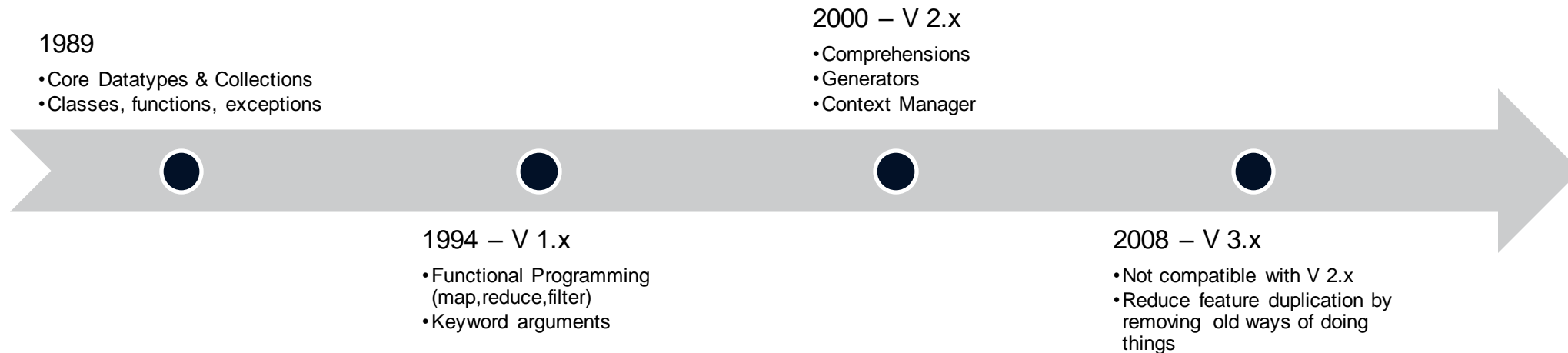


Versatility

mobile & web, ML, NLP
data science, gaming, task automation, finance



HISTORY & ADOPTION BY BUSINESS COMMUNITY



DATA VISUALIZATION WITH PYTHON

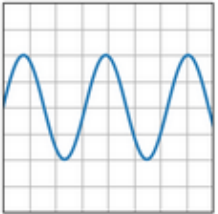
- Matplotlib – the "original" popular plotting library for python
 - Open-Source, first introduced in 2002
 - Originally designed to be similar to Matlab – hence the name!
 - Pandas ".plot()" uses Matplotlib by default
- Seaborn
 - Open-Source, 0.1 release in 2013
 - Built "on-top" of Matplotlib – often considered a superset of Matplotlib
 - Uses Pandas DataFrames
 - Has some important chart styles and features that Matplotlib lacks
- Plotly
 - Commercial, company founded in 2013
 - A set of data visualisation libraries for a number of languages, including Python, R & JS
 - Plotly commercial offering "dash" is built around the core libraries
- All commonly used in combination with Pandas!

matplotlib

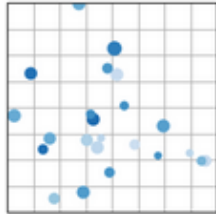


plotly

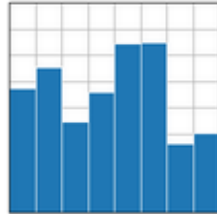
MATPLOTLIB – WHAT CAN WE DO WITH IT?



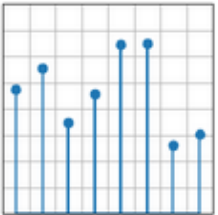
`plot(x, y)`



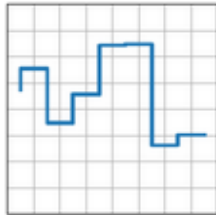
`scatter(x, y)`



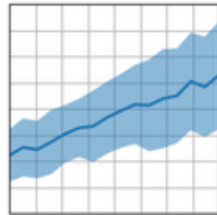
`bar(x, height)`



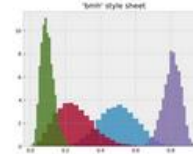
`stem(x, y)`



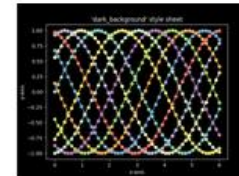
`step(x, y)`



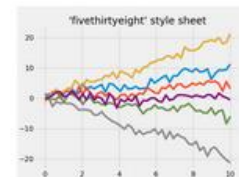
`fill_between(x, y1, y2)`



Bayesian Methods for Hackers style sheet



Dark background style sheet



FiveThirtyEight style sheet

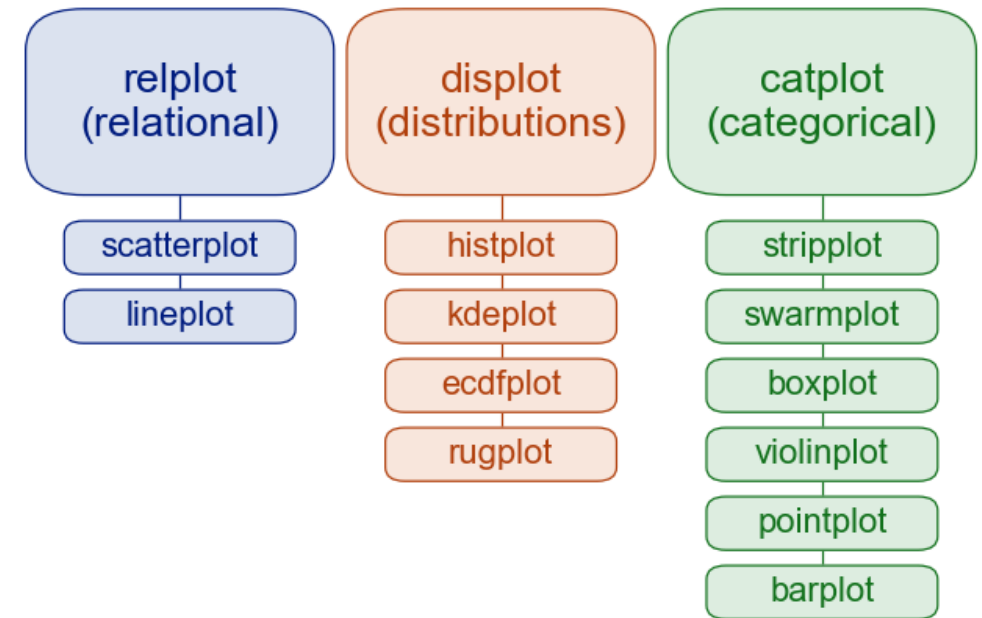
- https://matplotlib.org/stable/plot_types/index.html
- https://matplotlib.org/stable/gallery/style_sheets/index.html

SEABORN

- Related plot types are accessed through a single function

```
sns.relplot(  
    data=tips_df,  
    x="total_bill",  
    y="tip",  
    col="time",  
    hue="smoker",  
    style="smoker",  
    size="size",  
)
```

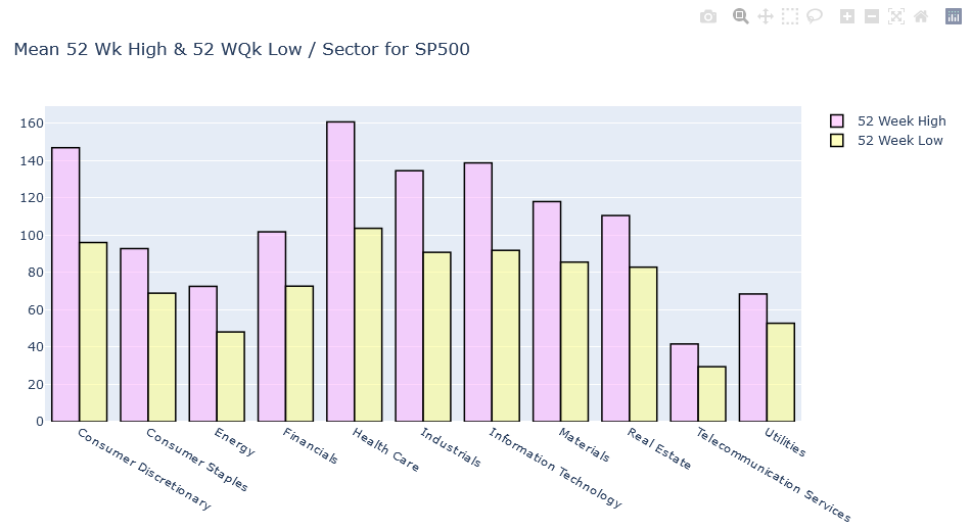
```
sns.relplot(  
    data=fmri_df,  
    kind="line",  
    x="timepoint",  
    y="signal",  
    col="region",  
    hue="event",  
    style="event",  
)
```



- https://seaborn.pydata.org/tutorial/function_overview.html

PLOTLY

- More interactive charts in a notebooks environment

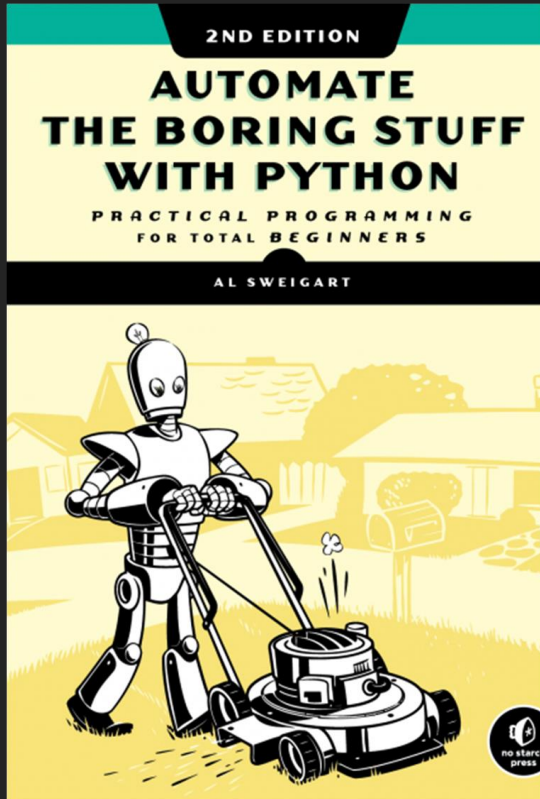


Sector	Price	Price/Earnings	Earnings/Share	52 Week High	52 Week Low
Consumer Discretionary	124.03	25.54	4.88	146.93	96.09
Consumer Staples	79.76	21.96	3.66	92.83	68.93
Energy	57.89	38.56	-1.65	72.59	48.14
Financials	89.06	17.20	4.44	101.82	72.69

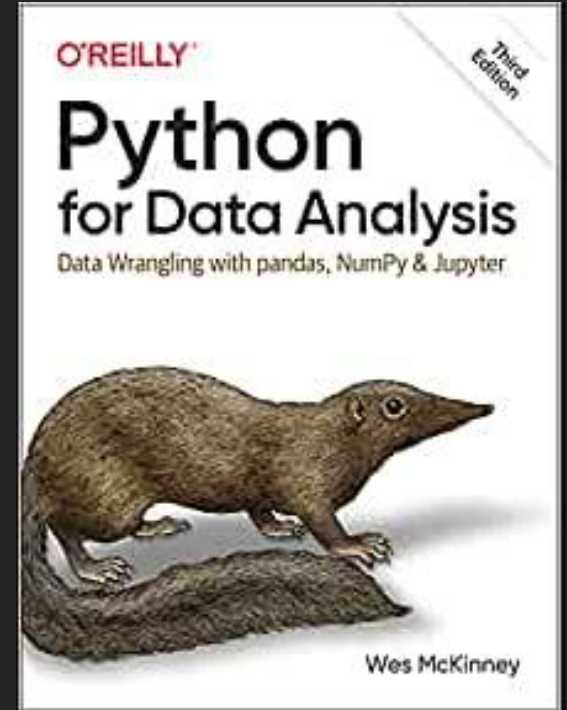
- <https://plotly.com/python/>

FURTHER TOOLS

- Dash – A data dashboard platform built around plotly
 - <https://plotly.com/dash/>
- Bokeh – In a similar vein to plotly, bokeh allow creating charts and exposing them on the web
 - <http://bokeh.org/>



BOOKS





QUESTIONS