Meet Pandas

3/28/2023

FinTech

Lesson 3.x

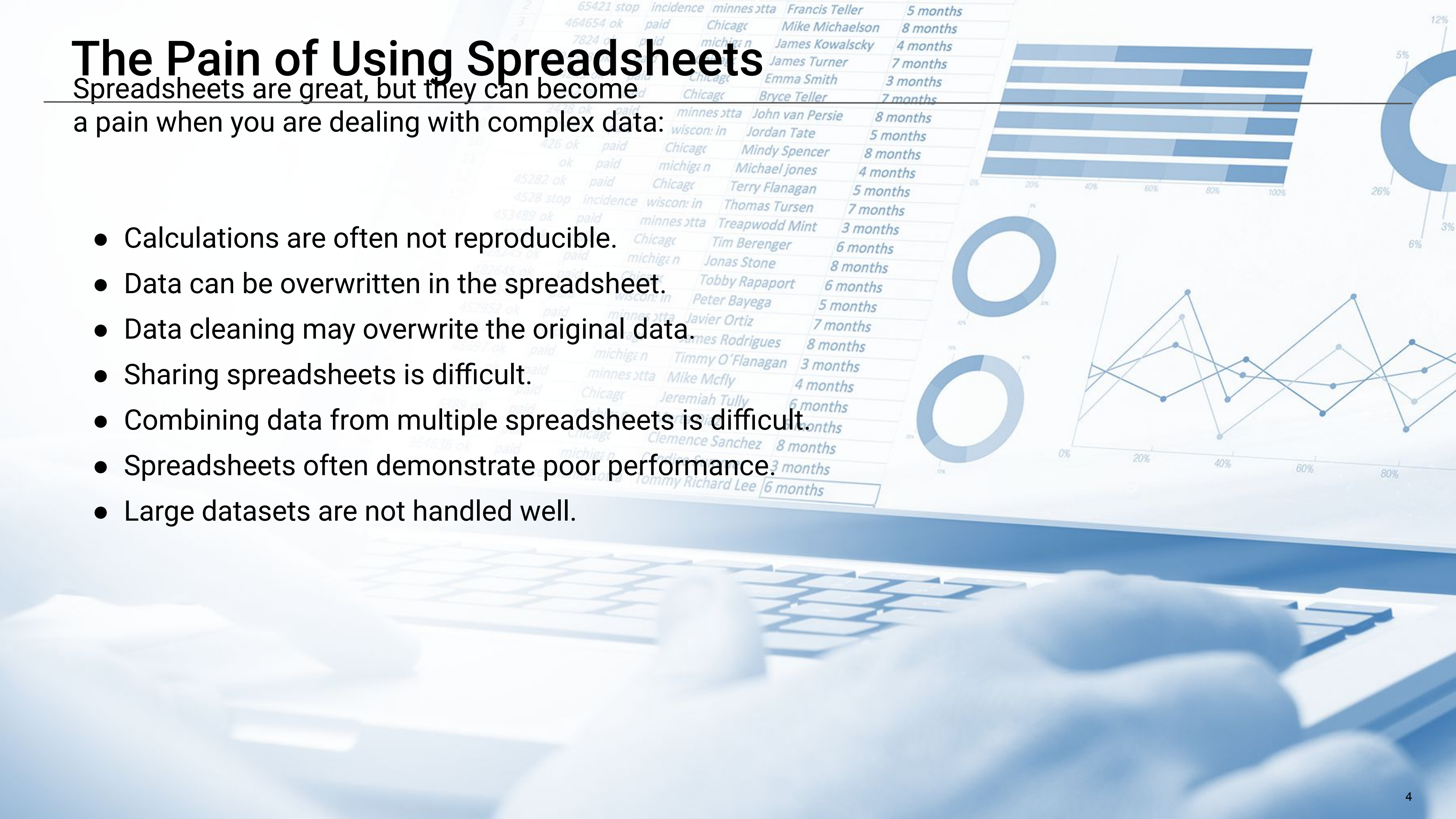
Objectives

- Describe the benefits of Pandas over spreadsheets to manipulate data on financial use cases.
- Explain what a DataFrame is and how it differs from a series.
- Create DataFrames from CSV files and use basic commands to manipulate them.
- Clean data using built-in commands of DataFrames.
- Manipulate data using DataFrame
- Some Pandas functions
- Create basic data visualizations with Pandas’ built-in plotting functions.

Why Pandas?

The Pain of Using Spreadsheets

Spreadsheets are great, but they can become a pain when you are dealing with complex data:



- Calculations are often not reproducible.
- Data can be overwritten in the spreadsheet.
- Data cleaning may overwrite the original data.
- Sharing spreadsheets is difficult.
- Combining data from multiple spreadsheets is difficult.
- Spreadsheets often demonstrate poor performance.
- Large datasets are not handled well.

The Origins of Pandas

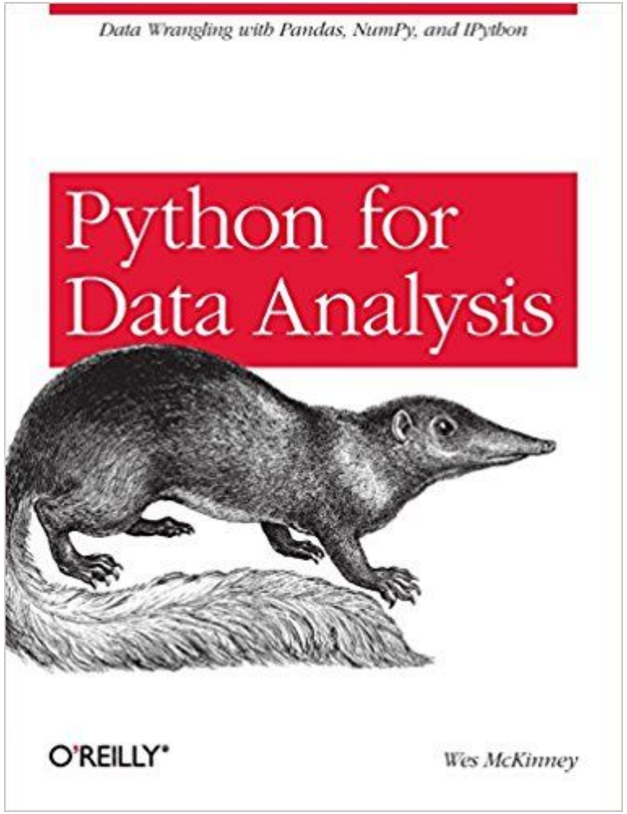
- Pandas is one of the most powerful open source libraries in Python for analyzing and manipulating data.
- This library was born on 2008 at AQR Capital when Wes McKinney was looking for a solution to offer a high-performance and flexible tool to perform quantitative analysis on financial data.
- Etymology: panel data structures

Why Pandas is Great

- Python + Pandas = the perfect combination for small experiments or for implementing large-scale production systems to analyze data and make smarter decisions.
- High-performance data structures:
  - Series (1D labeled vectors)
  - DataFrame
    (2D structures similar
    to spreadsheets)
- Built-in time series functionality, which is a must for financial and quants analysis

Resources for Learning More About Pandas

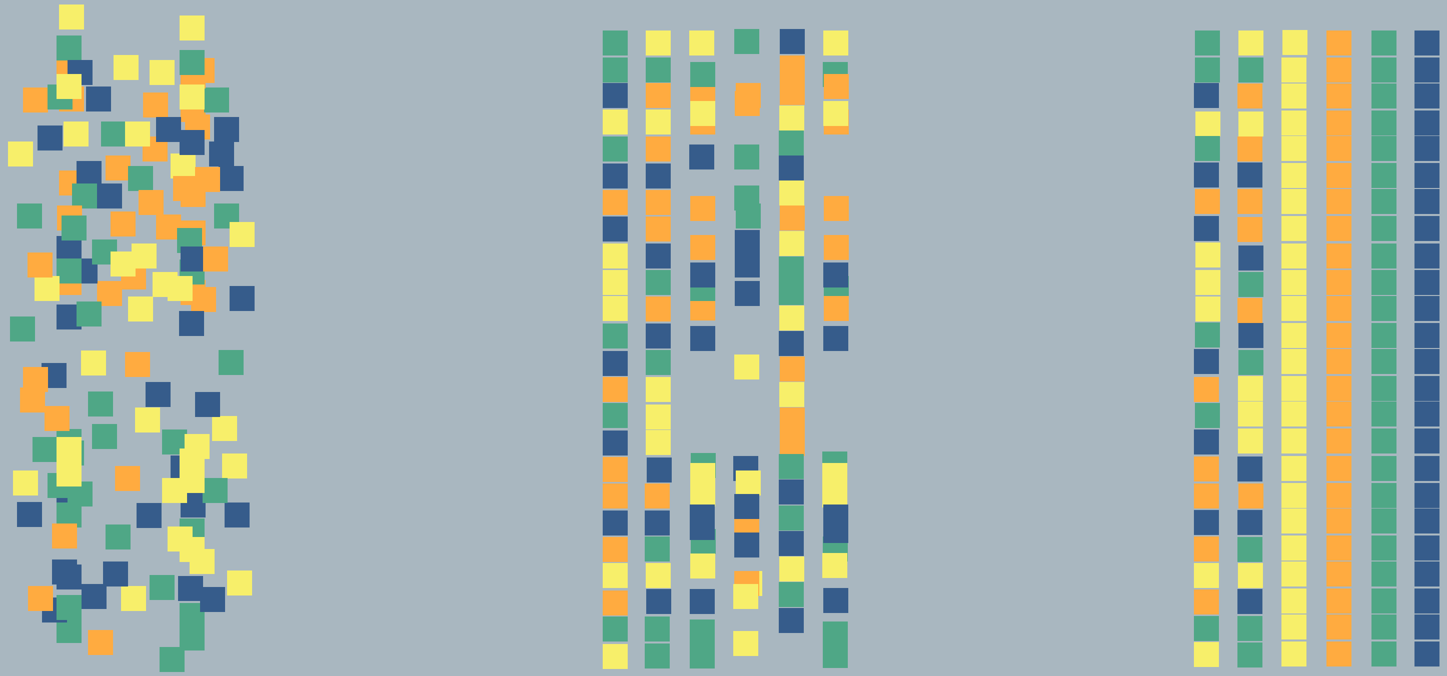
- Official website: https://pandas.pydata.org/
- Pandas on GitHub: http://github.com/pydata/pandas
- *Python for Data Analysis* by Wes McKinney



Python for Data Analysis
by Wes McKinney
(O'Reilly Media, 2017)

Sorting

Data is not always organized in the best way for analysis. Sometimes, data needs to be cleaned and sorted.



Sorting

The `sort_values` function in Pandas can be used to sort a DataFrame. Sorting data helps improve visual representation of data.

Data can be sorted in either ascending or descending order.

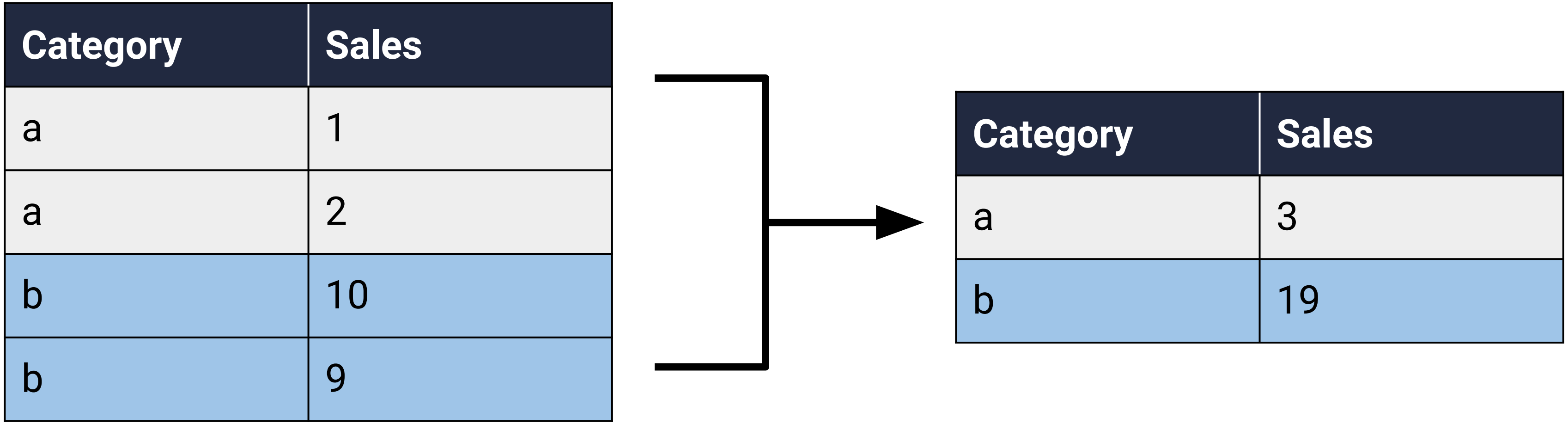
```
sort_values(ascending=True)
```

Consider dates: would you rather see dates sorted or randomly listed?

Grouping

A key component of data analysis is grouping data. **Grouping** allows for similar data to be aggregated or manipulated as groups.

Example aggregations that can be done on groups are adding, summing, determining min and max, etc.



Category	Sales
a	1
a	2
b	10
b	9

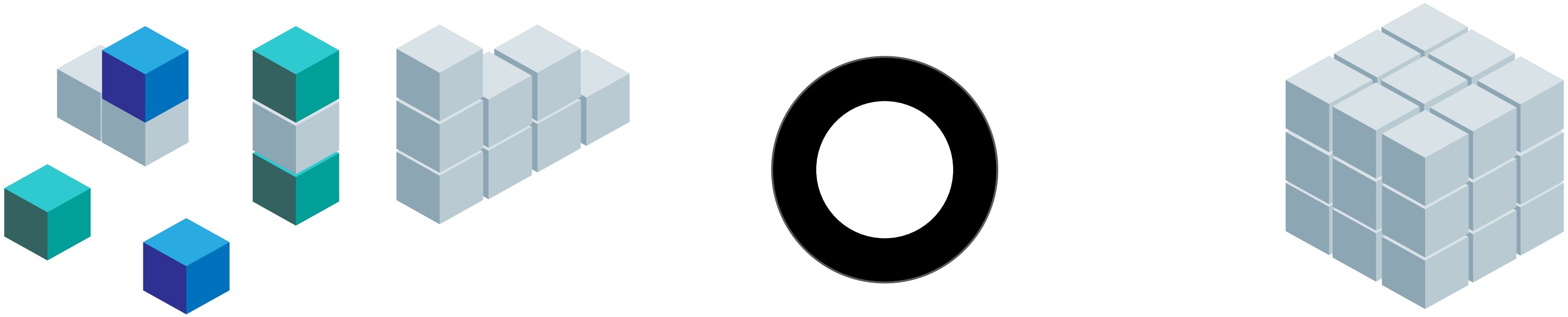
Category	Sales
a	3
b	19

Grouping

Behind the scenes, the Pandas `groupby` function does the following:

Splits the data into groups based on certain criteria.

Applies a function to each group independently.



Returns Over Time

Returns over time can be calculated using the `pct_change()` function.

Concatenation

Pandas has a `concat` function that can be used to combine DataFrames.

DataFrames can be concatenated so that the records from two DataFrames are combined.

DataFrames can be combined by column so that the columns from one DataFrame are placed adjacent to columns from another DataFrame.

The End