lesson 10

Linear Regression

Python for Financial Analysis

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elvtr

Syllabus Review

1. Introduction to Python: Python in Finance
2. Python Basic Syntax: Importing Libraries
3. Working with Pandas
4. Pandas Underneath the Hood: Working with NumPy
5. Data Wrangling and Visualization
6. Extracting Financial Insights from Charts and Graphs
7. Financial Calculations with Python: Part 1
8. Financial Calculations with Python: Part 2
9. CAPM and Portfolio Management
10. **Linear Regression**
11. Time Series Analysis
12. Algorithmic Trading

Bonus Class: Cryptocurrency Beyond the Basics with a Fintech Guest Speaker

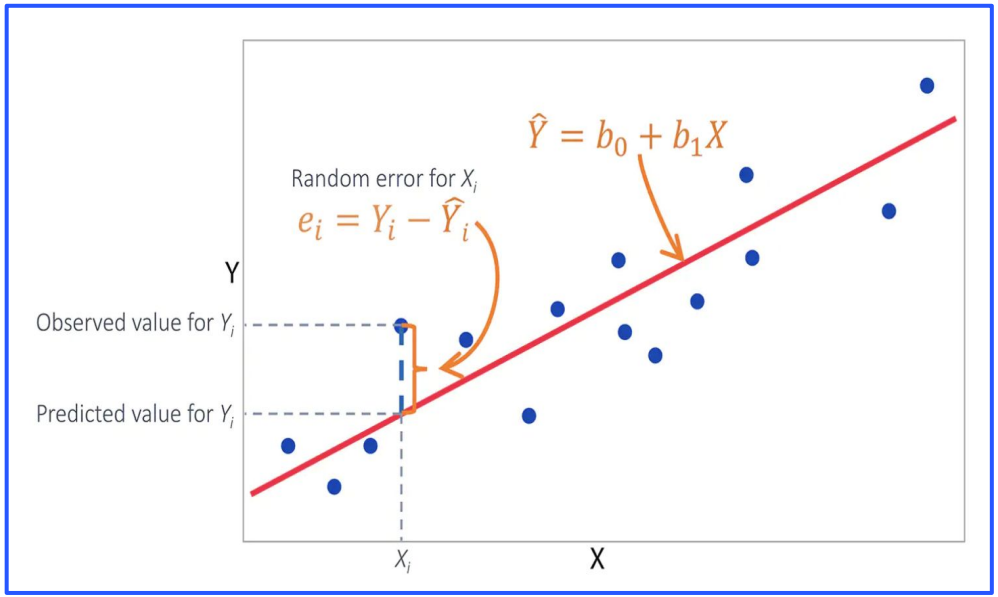
Class agenda

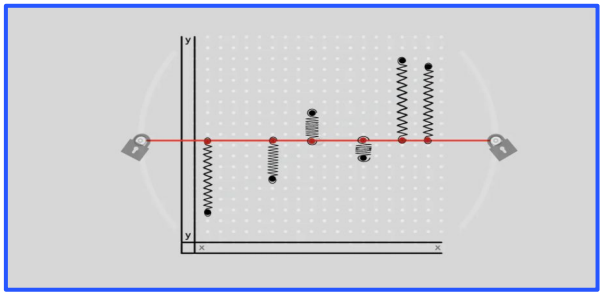
- The Ordinary Least Squares (OLS) model
- Linear regression with NumPy and Scikit learn
- Use of linear regression for financial analysis
- Pythonic: Writing results to a file

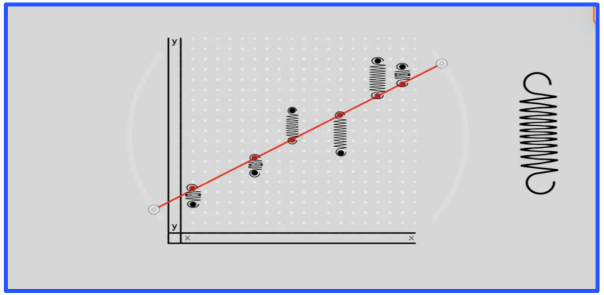
Ordinary Least Squares (OLS) model

- Also Known As Linear Regression
- Big concept: find a line whose slope and intercept best fit the data
    a. Definition of best: the Least Squares of the predicted error
- Next slide won't go too deeply into the math

OLS, residuals and springs







Source: jmp.com

Linear regression with NumPy and Scikit learn

- We’re going to let Python libraries do the heavy lifting for us
    a. Old friend: NumPy
    b. New friend: Scikit learn
- Whichever you feel comfortable with

Use of linear regression for financial analysis

- Stock returns
- Can find α and β with just a little bit of work: they are our intercept and slope

Pythonic: Writing results to a file

- Pandas to write to Excel or a CSV
- Python to write lines to a text file

Assignment #10

For the first part, you'll regress (and plot) an OLS of the US inflation rate. For the second part, you'll build on assignment #8 and use the linear regression package of your choice to calculate the alpha and beta coefficients of your three stocks.

Go Deeper: Write a .csv file and Excel spreadsheet. Write and append to a text file.

Resources

- Linear Regression

  Physical analogy with springs:
  https://www.jmp.com/en_us/statistics-knowledge-portal/what-is-regression/the-method-of-least-squares.html

  Math, by the equation:
  https://stattrek.com/regression/regression-example.aspx

- Writing Excel spreadsheets and CSV files

  Excel:
  https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.to_excel.html

  CSV:
  https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.to_csv.html

- Writing and reading text files

  https://www.guru99.com/reading-and-writing-files-in-python.html
  (old school)

  Better: https://realpython.com/read-write-files-python/

Q&A