Python for Econometrics and Operations Research

A crash course

Team

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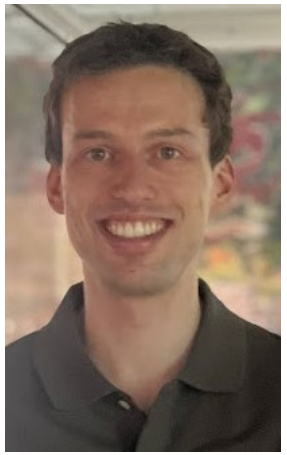

Dr.mr. Sven Polak

About Python

Popular programming language for **data science tasks**

- Plotting, finding roots/minima/maxima, and integration of mathematical high-dimensional functions.
- Mathematical analysis of large-scale data sets (think of Machine Learning).

Developed by **Guido van Rossum** (initiated at CWI, Amsterdam).

- Name comes from **Monty Python**'s Flying Circus
- British surreal sketch comedy series

Graphing calculator vs. Python

Graphing calculator (high school)
For a function like $\mathrm{f(x)} = x^2 + 2x\ - 1$:

- Plot
- Integrate
- Compute roots
- Compute minimum/maximum

Python
Higher-dimensional problems, e.g., the above tasks for the two-dimensional function

$$\mathrm{f(x, y)} = x^2y + 2xy^2 - x - 1$$

Why Python?

Free, open-source and most popular programming language for data science!

Many companies program in Python …

- … including master thesis students who do company internships.

Good skill to have on your CV!

Python in EOR curriculum

Used in many courses, such as

- Linear Algebra (Lecture 2 of crash course)
- Linear Optimization (Q2)
- Computer Programming for EOR (Year 2)
- Computational Aspects in Econometrics (elective, Year 3)
- Probability theory, Introduction Finance and Actuarial Sciences, Quantitative Finance

Other programming languages in curriculum

- You will also see programming languages such as Matlab and R:

  - Can perform similar tasks as Python (although “syntax” is different).
- AI-tools like ChatGPT can also program! Not always allowed, though.

Plan for Lecture 1

Go over some basic programming principles.

Materials at https://pskleer.github.io/eor-python-crash-course-2025/

- Lecture 1 covers Chapter 3
- Website contains exercise sheet and these slides