Python for everyone
DNDS5027

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1. Introduction

This course

Learn to program with Python.

How? **Practice.**

Outcomes
- Solve simple problems with coding.
- Be ready to take more advanced courses.
- (Be able to use AI for coding.)

Useful information

How we learn
- First few classes: slides + exercises on a website
- Then: we code together + exercises
- Practice outside of class

Grading
- 1/3: Class participation
- 1/3: Home work
- 1/3: Test (on paper)

Office hours
- At request
- In person: Wednesdays, Zoom: anytime

AI policy

No.

AI policy

No.

- Programming is a skill that you learn by doing.
- Generating code and reading it can give you the illusion that you can code.
- Using AI to translate German doesn't mean you speak German.
- If you know how to code → easier to use AI.
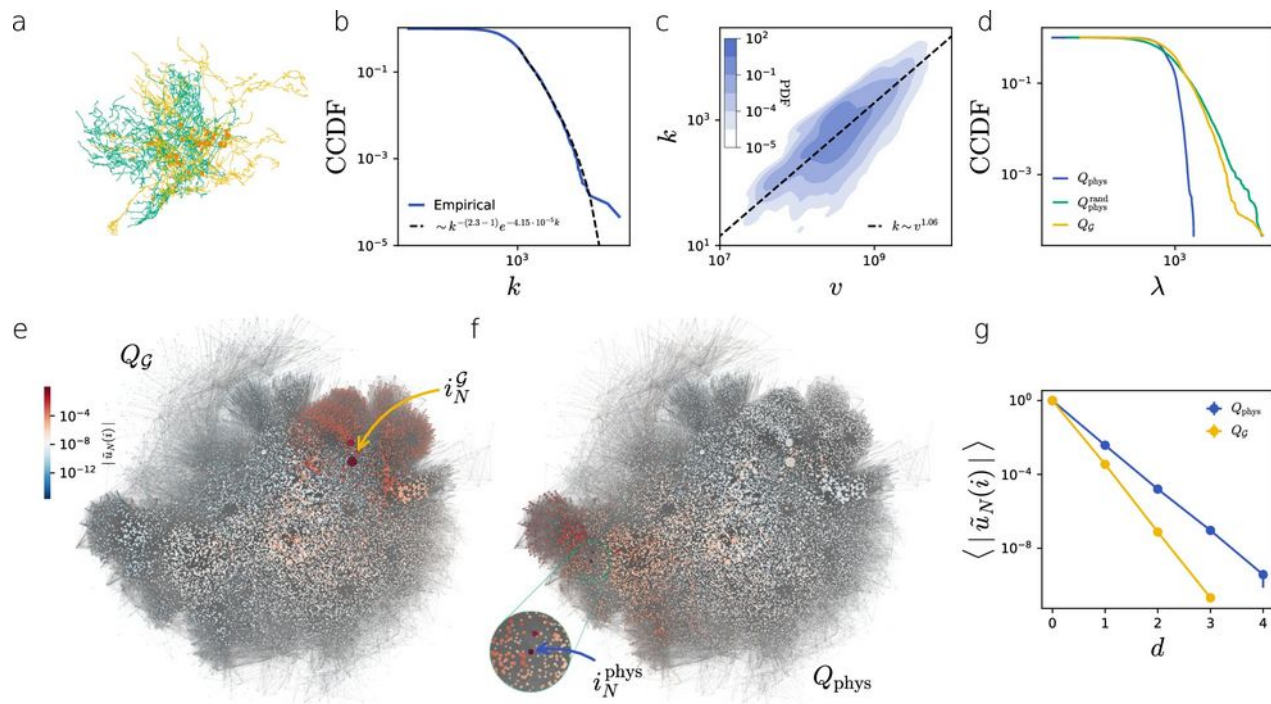- Take responsibility of your work.

OK uses
- Search information (find a new tool/library)
- Debugging: help correct your own code

Do not generate code for the class.

Why code?

Personal example 1: work

Why code?

Personal example 2: Moving photo albums

Alaska State Fair, 2011 August

Marci és egy kapitális tök.

Why code?

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Why code?

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Marci és egy kapitális tök.

Create albums

```python
In [152]: album_flickr_to_google = {}
for album in albums:
    print(album['title'])
    response = authed_session.post(
        'https://photoslibrary.googleapis.com/v1/albums',
        headers = { 'content-type': 'application/json' },
        json={
            "album": {
                "title": album['title'],
            }
        }
    )
    album_flickr_to_google[album['id']]=response.json()['id']
```

```
201709 - Canadian Rockies
201708 - Ano Nuevo SP, Sequoia and Kings Canyon NP
20170716 - Lyons Creek, Desolation Wilderness
201707 - Trinity Alps
201703 - Yosemite National Park
Madarak
201608 - Alaszka - Valdez
201608 - Alaszka - Wrangell-St. Elias National Park
```

Why code?

Personal example 3

```python
#! /usr/bin/env python
import time
import os
import random
import sys

random.seed()

megszolitas = list(open("megszolitas.txt"))
fokozo = list(open("fokozo.txt"))
ige = list(open("ige.txt"))
targy = list(open("targy.txt"))

while(1):
    valodiszerelem ="\"" + random.choice(megszolitas).rstrip() + " " + random.choice(fokozo).rstrip() + " "
+ random.choice(ige).rstrip() + " " + random.choice(targy).rstrip() + "\""
    os.system("export EMAIL=\"posfaim@gmail.com\" && echo " +valodiszerelem + " | mutt -s \"#zsofi\"
trigger@ifttt.com")
    print(valodiszerelem)
    sleeptime = random.randint(15, 60)
    print("Next message in " + str(sleeptime) + " minutes.")
    os.system("export EMAIL=\"posfaim@gmail.com\" && echo -e " +valodiszerelem + " \"\nNext message in " +
str(sleeptime) + " minutes.\" | mutt -s \"#zsofi\" posfaim@gmail.com")
    random.jumpahead(10)
    time.sleep(sleeptime*60)
```

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```

Why not Excel?

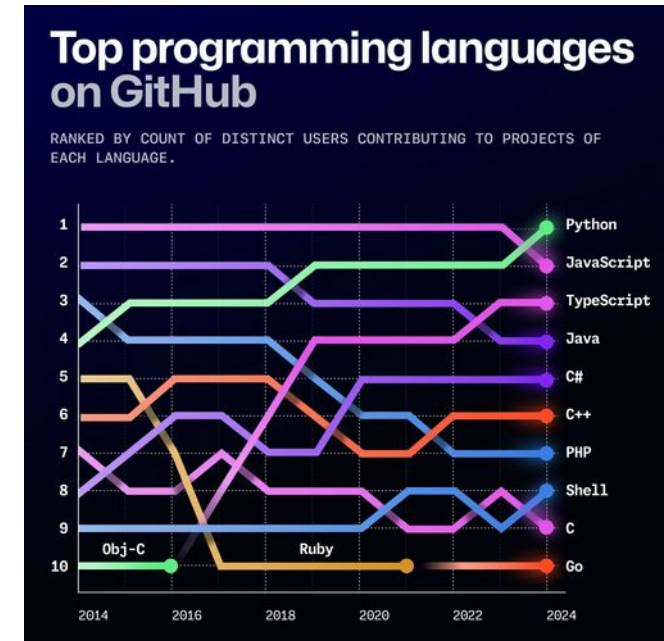|	A	B	C
1	Name	Program	Grade
2	Genghis Khan	Network Science	4
3	Papa Smurf	Political Science	5
4	Vilma Dinkley	Network Science	5
5	Kraang	Network Science	3
6	Sisi	Political Science	4

Advantages:
- Familiarity.
- Quick, little overhead.
- Simple tasks: calculate averages, filter out data

Shortcomings:
- Does not scale well.
- Reproducability?
- Automation

Why Python?

- Easy to start.

- Versatile.

- Popular.

- Data science courses at CEU use Python.

Is programming hard?

It can seem so at the beginning.

Is it math? No, but computer uses numbers.

Coding is a skill → **Practice + curiosity.**

Get the most out of the class:
- Follow along, try out everything, experiment.
- Try to solve exercises alone first.
- Ask questions, help others.
- No AI. (Or very last last resort.)

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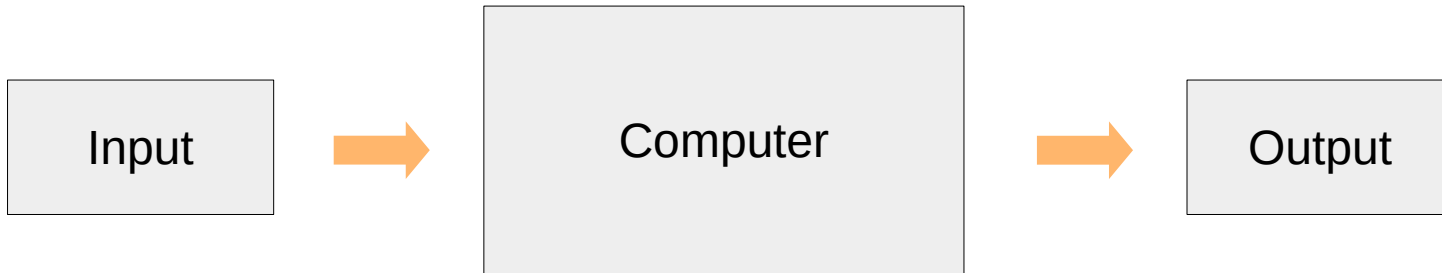Coding is a skill → **Practice + curiosity.**

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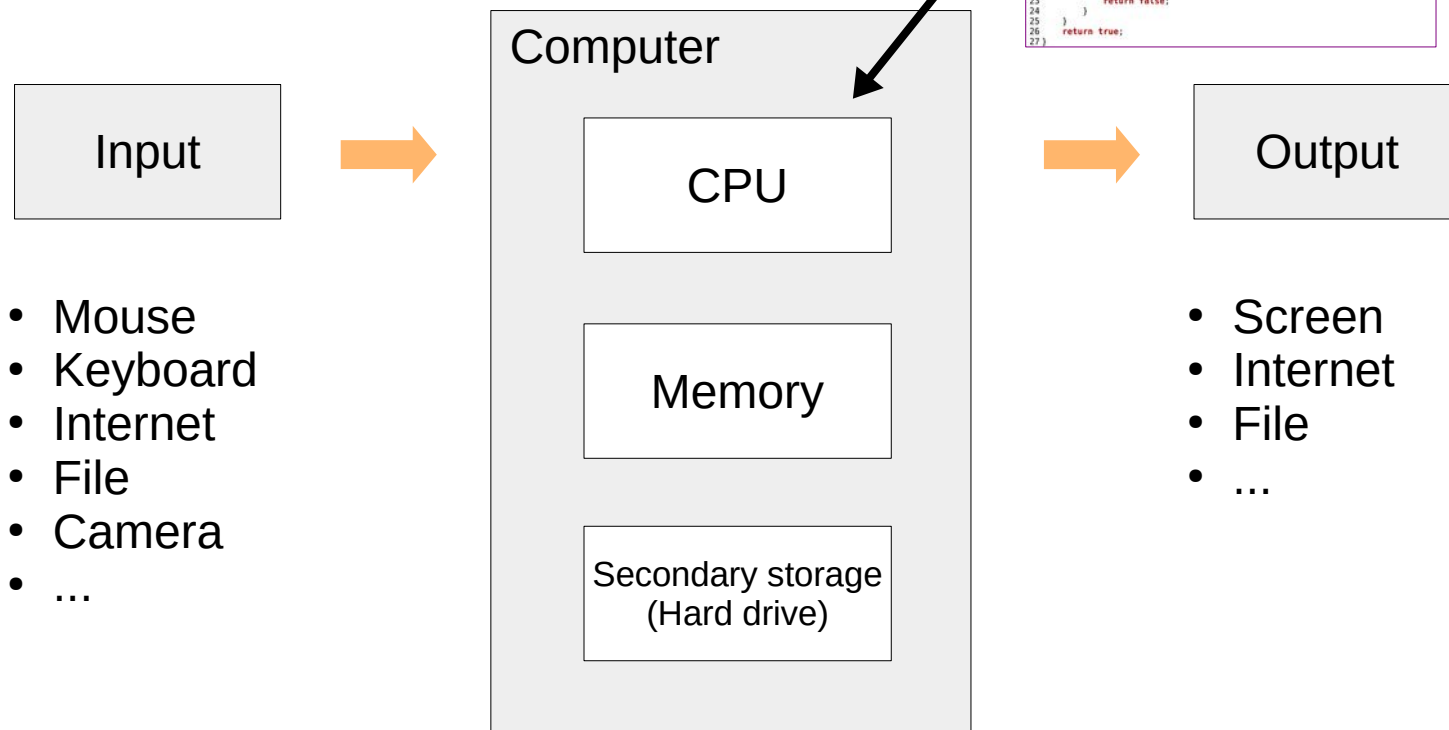- No AI. (Or very last last resort.)

What is a computer program?

Series of instructions:

```cpp
1 #define PY_SSIZE_T_CLEAN
2 #include <Python.h>
3
4 #include <boost/geometry.hpp>
5 #include <iostream>
6 #include <chrono>
7 #include <random>
8
9 namespace bg = boost::geometry;
10 using PT = bg::model::point<double, 3, bg::cs::cartesian>;
11 using SEG= bg::model::referring_segment<PT>;
12
13 // construct a trivial random generator engine from a time-based seed:
14 unsigned seed = std::chrono::system_clock::now().time_since_epoch().count();
15 std::default_random_engine generator(42);
16
17
18 template <class GEOM1, class GEOM2>
19 bool DistTest(double comp_dist, GEOM1& geom, std::vector<GEOM2> &geoms) {
20     for (GEOM2 geom2: geoms){
21         double cd = bg::comparable_distance(geom, geom2);
22         if ((cd!=0.) & (cd<comp_dist)){ // questionable practice
23             return false;
24         }
25     }
26     return true;
27 }
```

Input	→	Computer	→	Output

What is a computer program?

Input

- Mouse
- Keyboard
- Internet
- File
- Camera
- ...

Computer

CPU

Memory

Secondary storage
(Hard drive)

Output

- Screen
- Internet
- File
- ...

Let's get started!

Follow the link on moodle to open the new material.