Python Tsunami

– April 21st-23rd –

UCPH HeaDS

Center for Health Data Science (HeaDS)

https://heads.ku.dk

- **The Data Science lab:**
  - Provides data science support for all research groups at SUND
  - Organizes courses
- **Research units:**
  - work on different areas and topics within the field of health data science

The Team

1. Alberto Santos (HeaDS)
2. Annelaura Bach Nielsen (NNF CPR)
3. Davide Placido (NNF CPR)
4. Henry Webel (NNF CPR)
5. Marilena Hohmann (HeaDS)
6. Philip Charles (DBI (Oxford, UK))
7. Rita Colaço (PRI)
8. Roc Reguant (NNF CPR)
9. Thilde Terkelsen (HeaDS)

Other Members of the Team

1. Dhouha Grissa (NNF CPR)
2. Grzegorz Jerzy Maciag (BRIC)
3. Jose Alejandro Romero Herrera (HeaDS)
4. Katerina Nastou (NNF CPR)
5. Kübra Altinel (BRIC)
6. Marta Matos (GENOME Center)
7. Nicholas Luke Cowie (DTU)

Practical Things about the Course

- Program
- Coffee and Q&A
- Teams
- Breakout rooms
- Datathon

Practical Things about the Course

-- Program --

	Wednesday 21st April	Thursday 22nd April	Friday 23rd Friday
8:45-9:00		Coffee and the day before (optional)	
9:00-09:45	Introduction and motivation	Conditions	Visualization I
9:45-10:00	Coffee break		
10:00-11:00	Installation and tools	Loops	Visualization II
11:00-12:00		Functions	Introduction Datathon
12:00-13:00	Lunch break		
13:00-14:00	Variables and data types	Libraries	Datathon
14:00-14:45	Numbers and operators	Scientific python	
14:45-15:15	Coffee break		
15:15-16:00	Data structures	Pandas	Datathon
16:00-17:00			Presentations
17:00-17:30	Q&A		What else is there?

Practical Things about the Course

-- Teams --

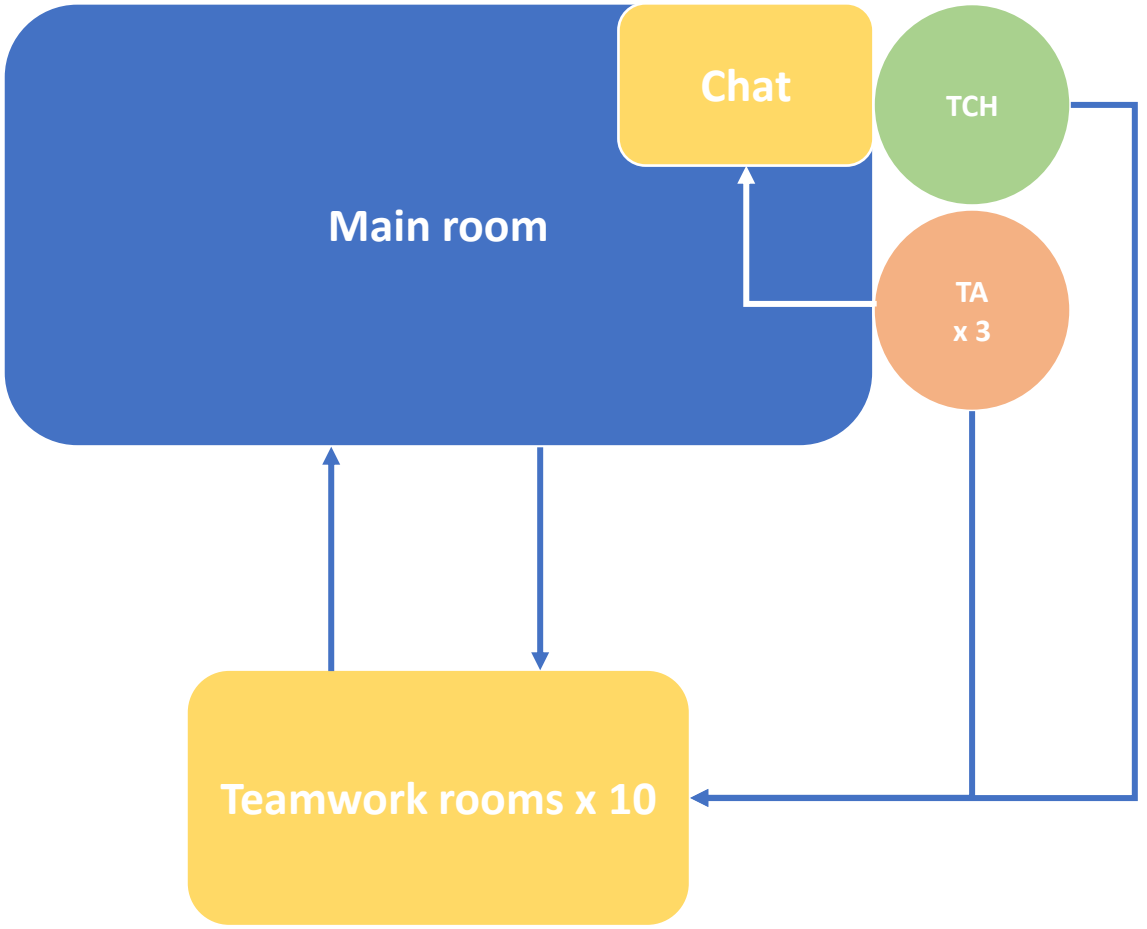
49 participants divided into **10 fixed teams**

2 working **modes**:

- **Individual**: exercises
- **Teamwork:** discussions, practice and the Datathon

Practical Things about the Course

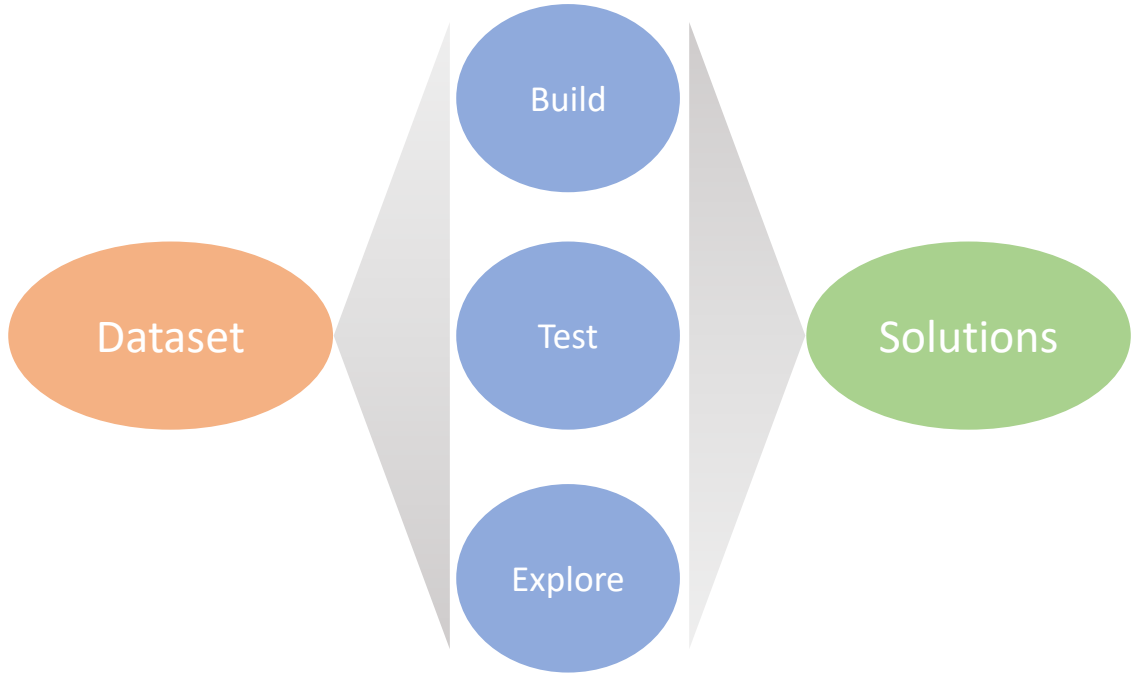
-- Breakout Rooms --



Practical Things about the Course

-- Datathon --

A **Datathon** is a **data-focused competition** — given a **dataset** and a limited amount of time, participants are challenged to use their **creativity** and **data science skills** to:



Practical Things about the Course

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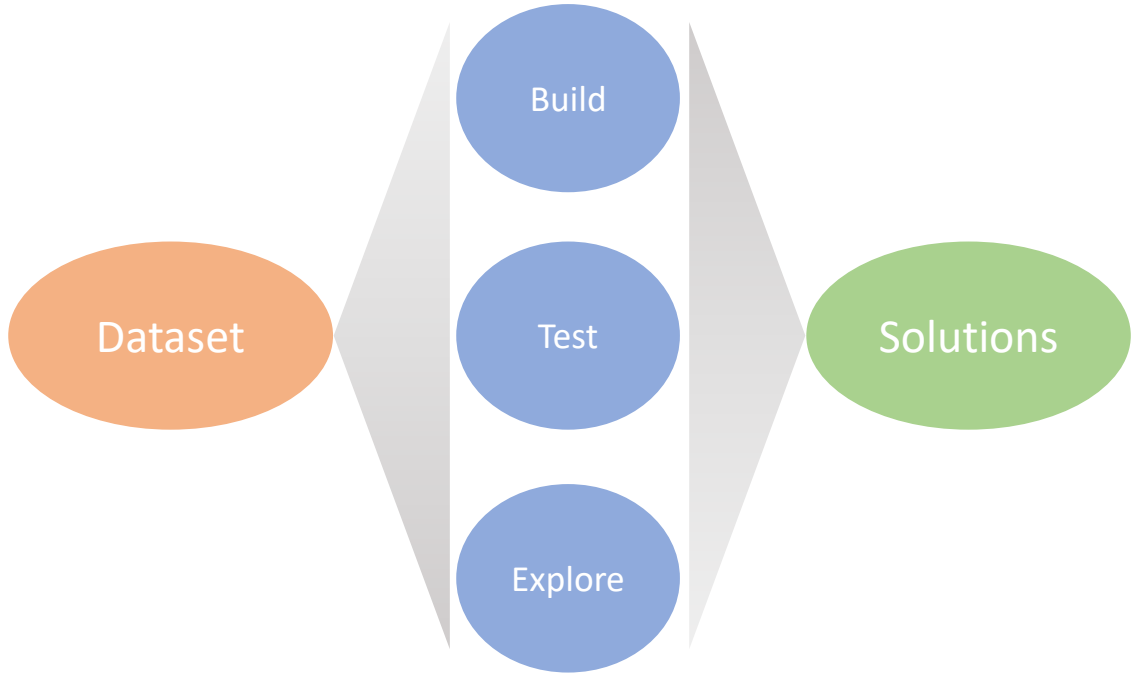


What will you learn in this course?

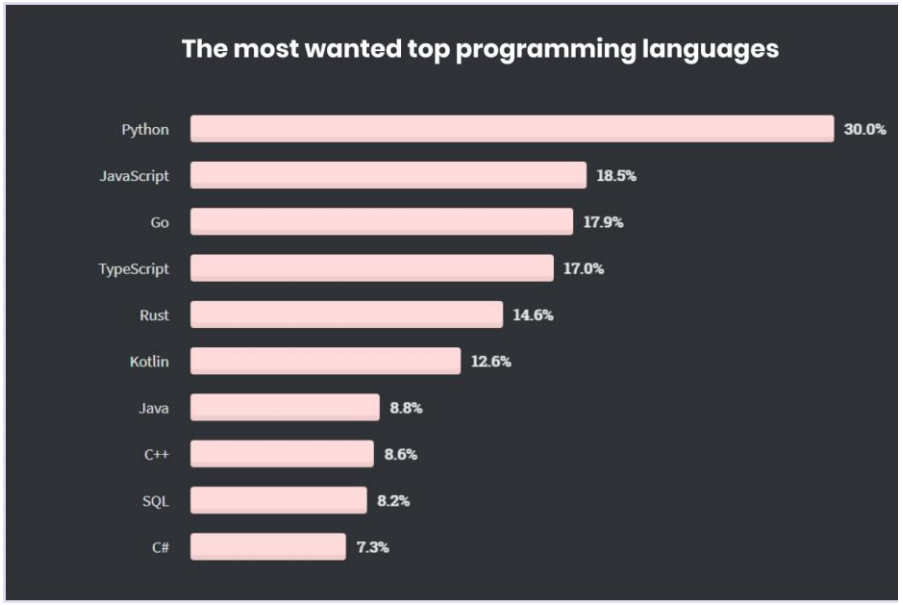
- Tools to work with Python
- The basics of Python
- Some of the most relevant scientific libraries
- Visualization
- Good practice

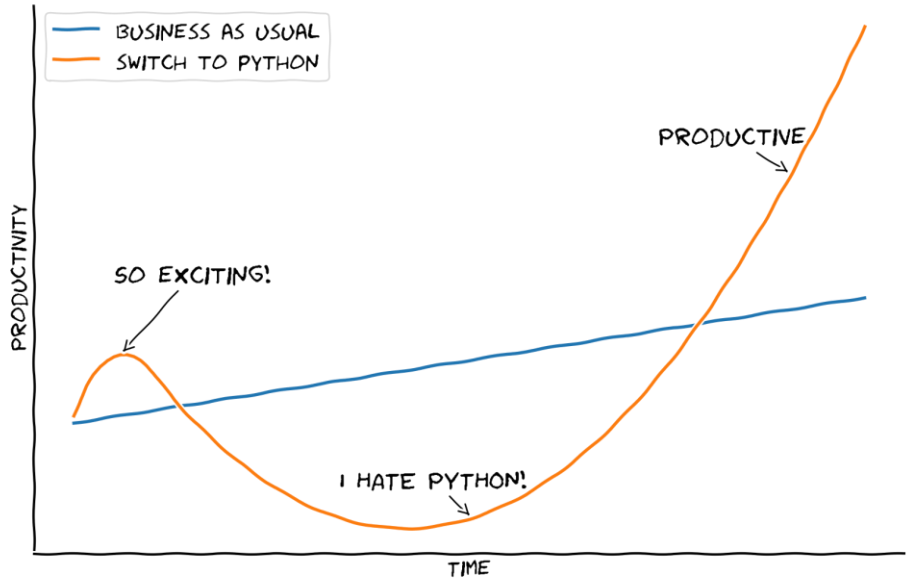
Motivation

Why will programming help you?
Programming is yet another **laboratory technique**
It helps you **automate processes** that you need to repeat again and again
It will **save you time**
It gives you **freedom** to process, analyze and plot your data as you want
It will help you **demystify** bioinformatics
It will facilitate **communication** with bioinformaticians
It will **improve** your **CV**

Why Python?

- Python is **easy to use**, **powerful**, and **versatile**
- A great choice for **beginners** and **experts** alike
- Python's readability makes it a great **first programming language**
- It has a **huge community behind** developing useful libraries in many different fields (i.e biology, imaging, etc.)





Basic concepts

- What's programming?
- Variables, Functions
- How do you approach a problem?
- Car example
- Class, Object, attribute, functions

What’s programming

- Programming is a way of **communicating** with a device: computer, cellphone, …, machine of any kind
- This communication is possible if you speak a **language** that the machine understands
- Programming is **not difficult**, mastering it might be a bit more **challenging**

Variables

variable_name = value

Variable is a way of **storing values** that you want to use later

- To define variables, we use **name** of variable and **‘=‘** to assign values:

my_first_variable = 3

- Variables can have **different types**:

my_first_variable = 3 # integer

my_second_variable = “This is my second variable” # string

my_third_variable = 3.0 # float

Functions

def function_name (parameters)

Function is the way to **define actions**, i.e sum, print on the screen.

To define functions, we use the **reserved word def**:

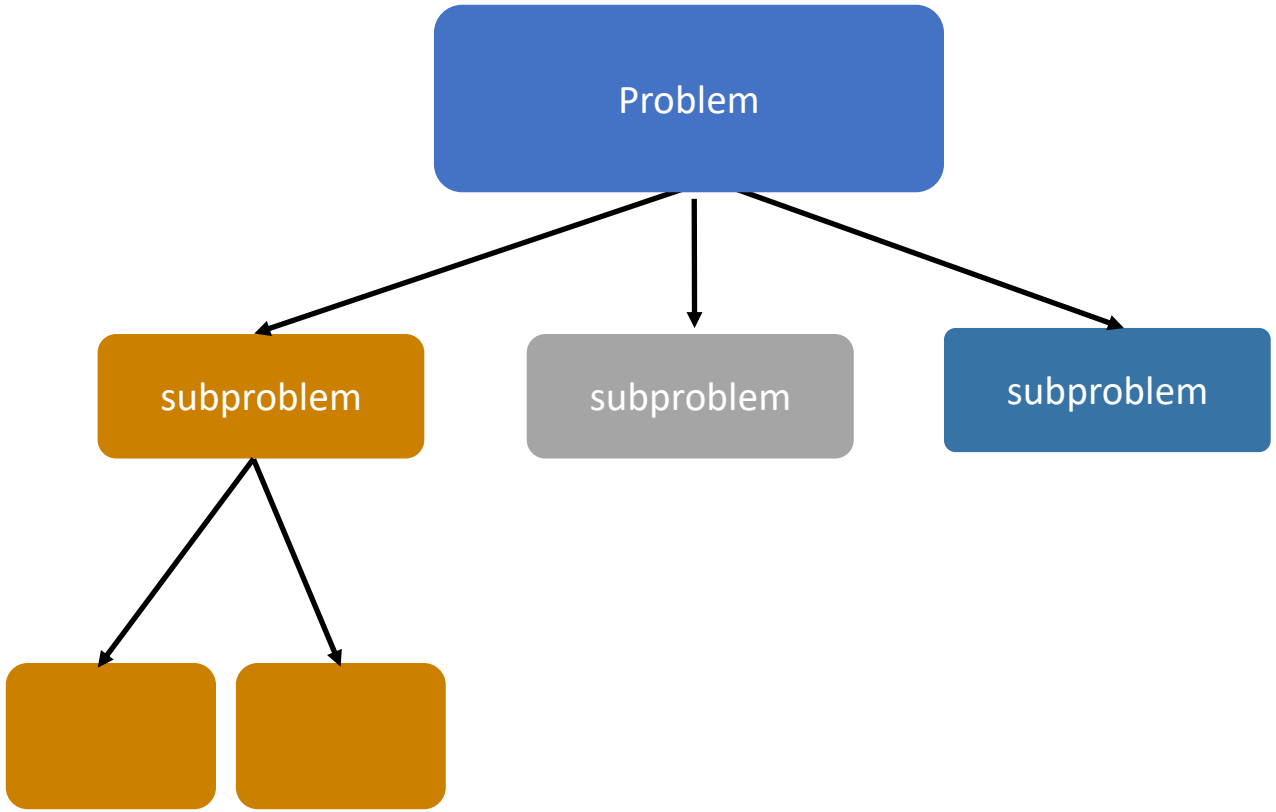
```
def sum_two_numbers(a, b):
        return a + b
def say_hi():
        print("Hi")
```

Functions can be **called** by their **name** and specifying the **parameters**:

```
sum_two_numbers(a=7, b=5)
> 12
say_hi()
> Hi
```

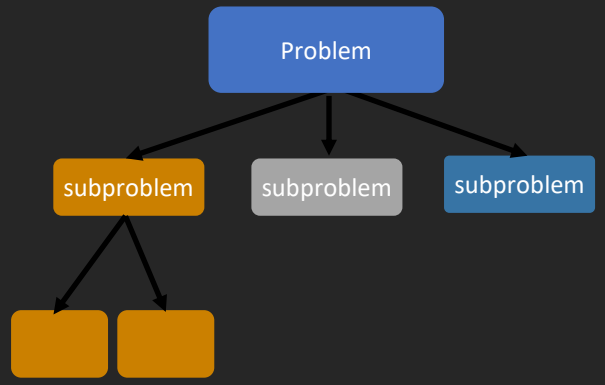
Strategy for Programming

Divide and conquer



The Car Problem

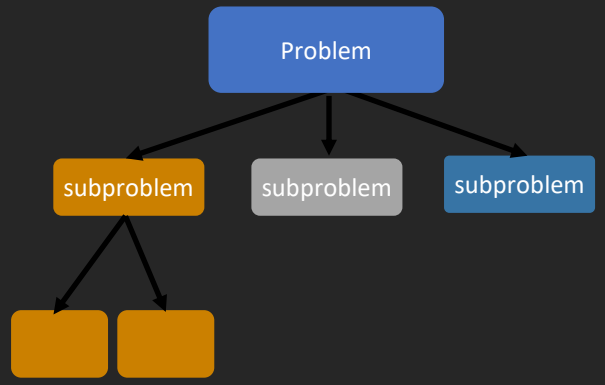
Describe a car



- Describe this **object**:
  - **Parts**: wheels, a stirring wheel, a frame, etc.
  - **Actions**: moves, breaks, etc.

The Car Problem

Describe a car



- Describe this **object → Class**:
  - **Parts**: wheels, a stirring wheel, a frame, etc. → **variables or attributes**
  - **Actions**: start, change gear, etc. → **functions**

Variables:

color = “blue”
number_of_wheels = 4
motor = True
power = “gas”
gear = None

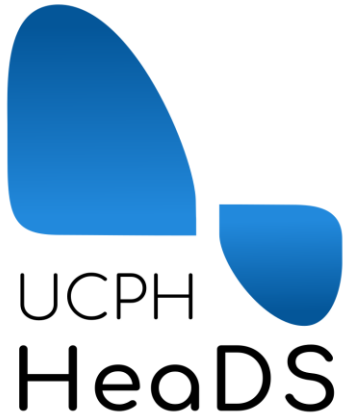
Functions:

def start_engine():
. . .
def change_gear(gear):
. . .

Coffee with your team

- **Introduce** yourself and **what you do**
- Explain your **motivation** to take the course
- Discuss what **data** could be relevant for you


BIG DATA
INSTITUTE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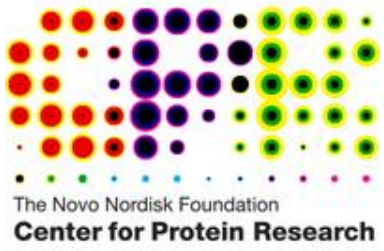
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