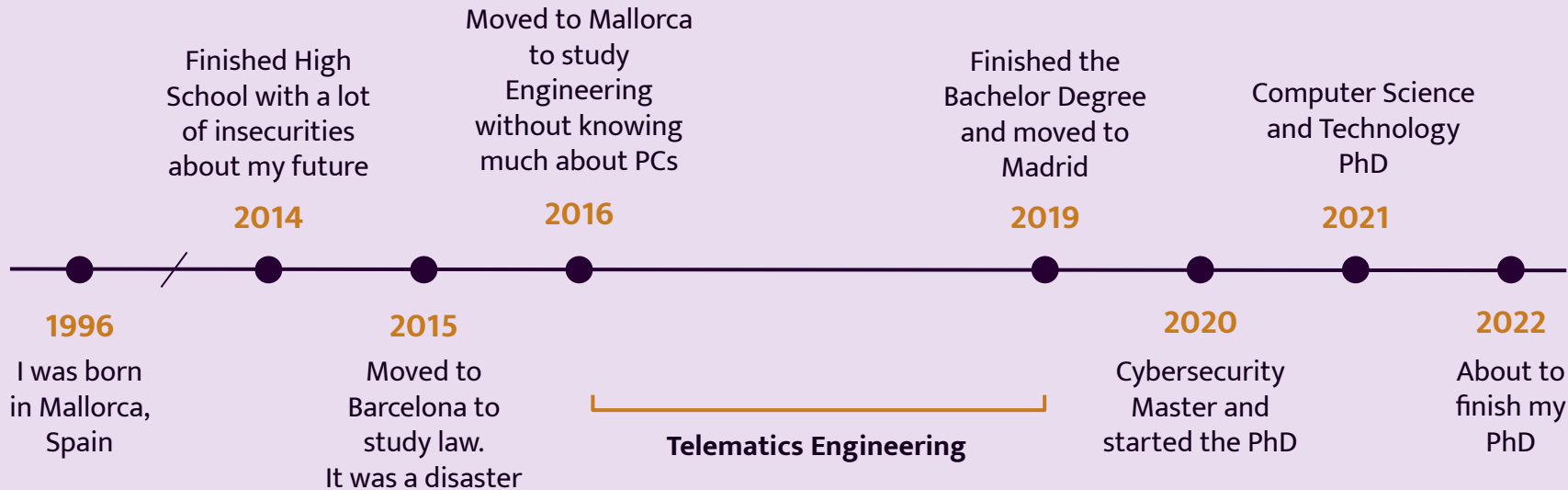


Skype A Scientist

Caterina Fuster Barceló

Who am I?



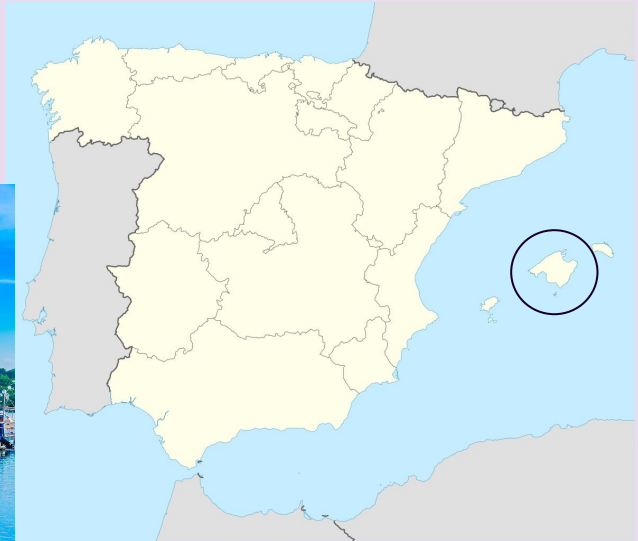


1996
I was born
in Mallorca,
Spain

Finished
School with
of insect
about my

201

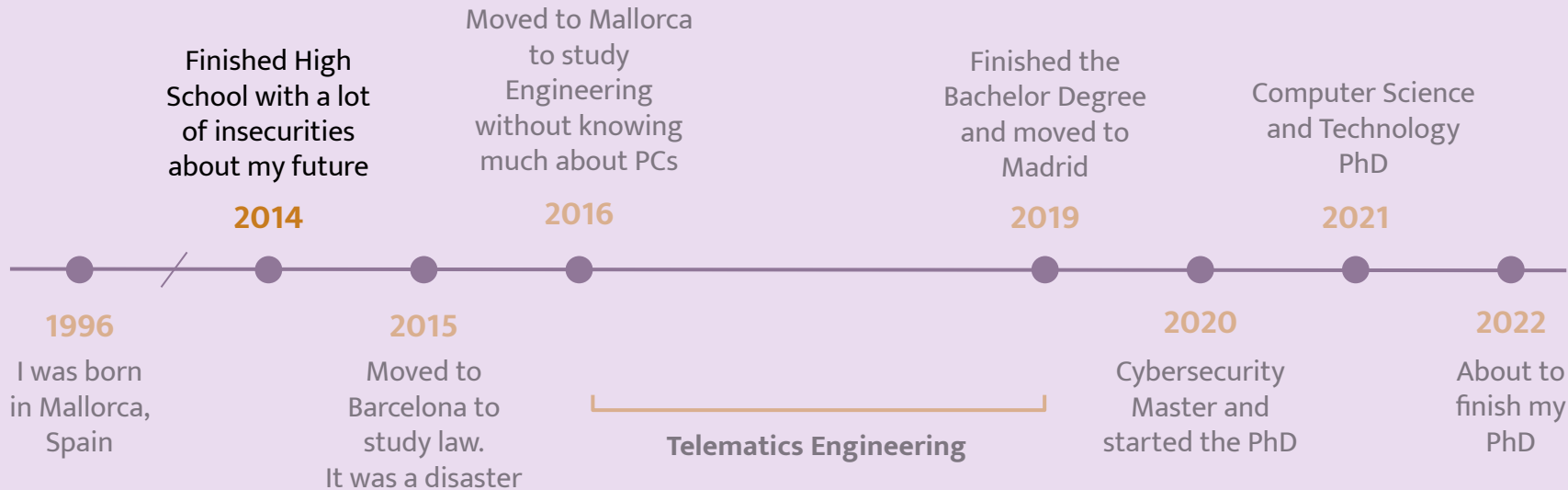
Moved to Mallorca

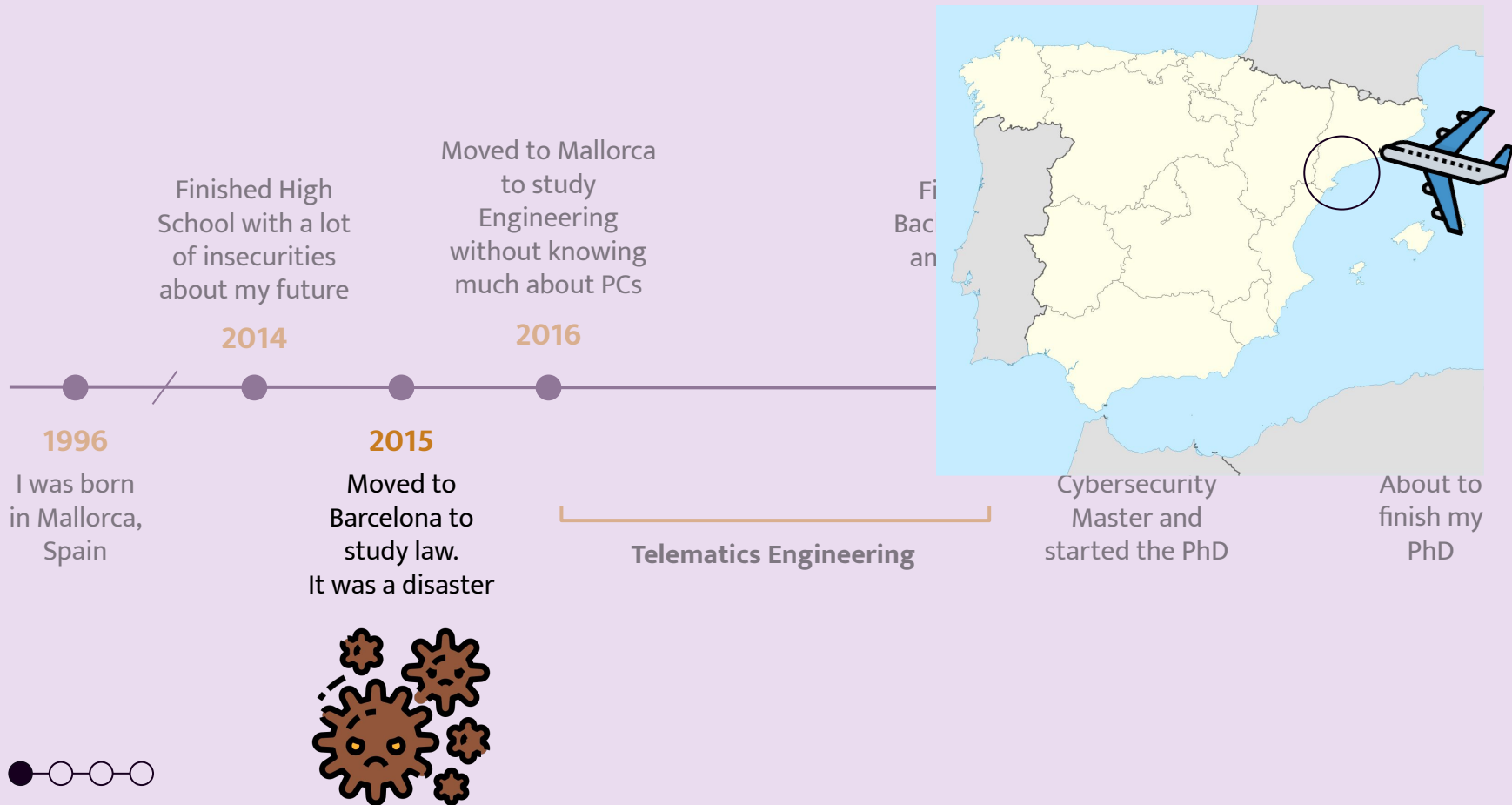


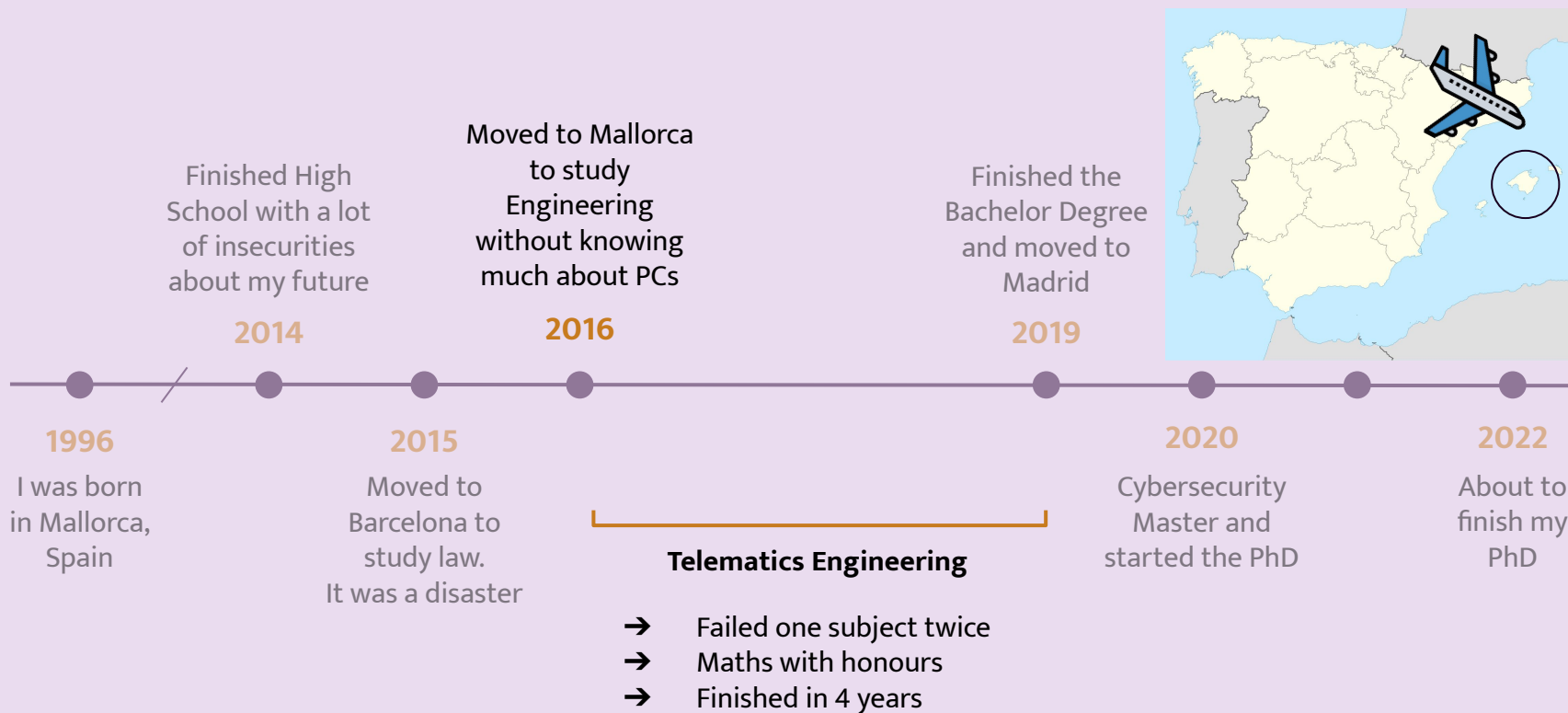
Cybersecurity
Master and
started the PhD

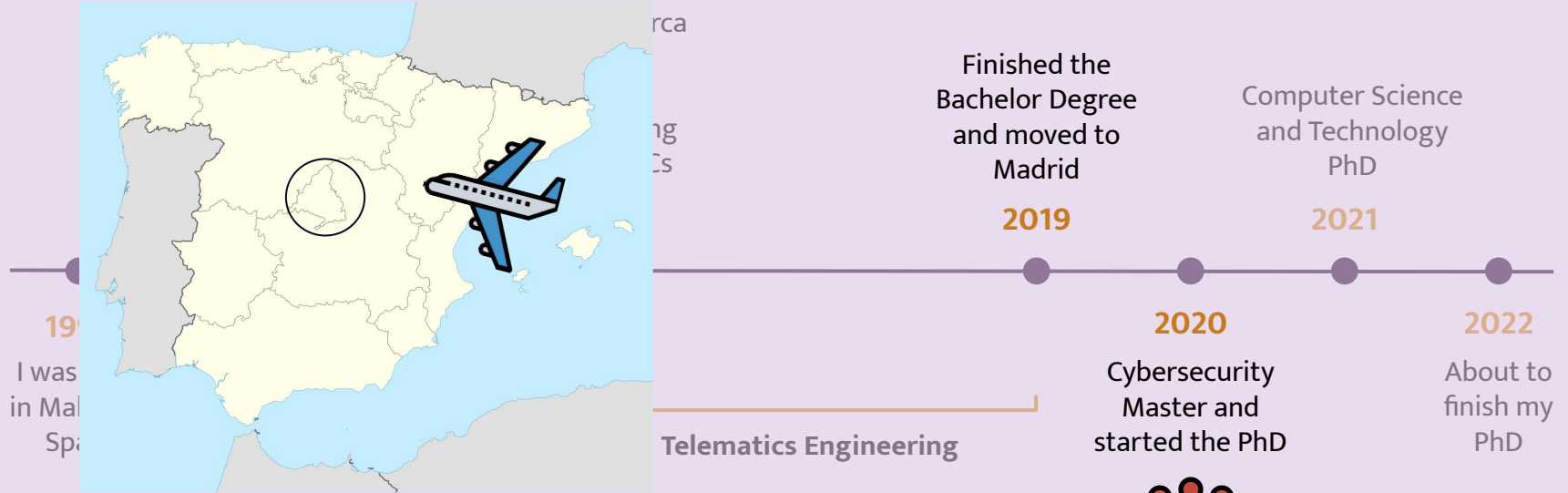
About to
finish my
PhD

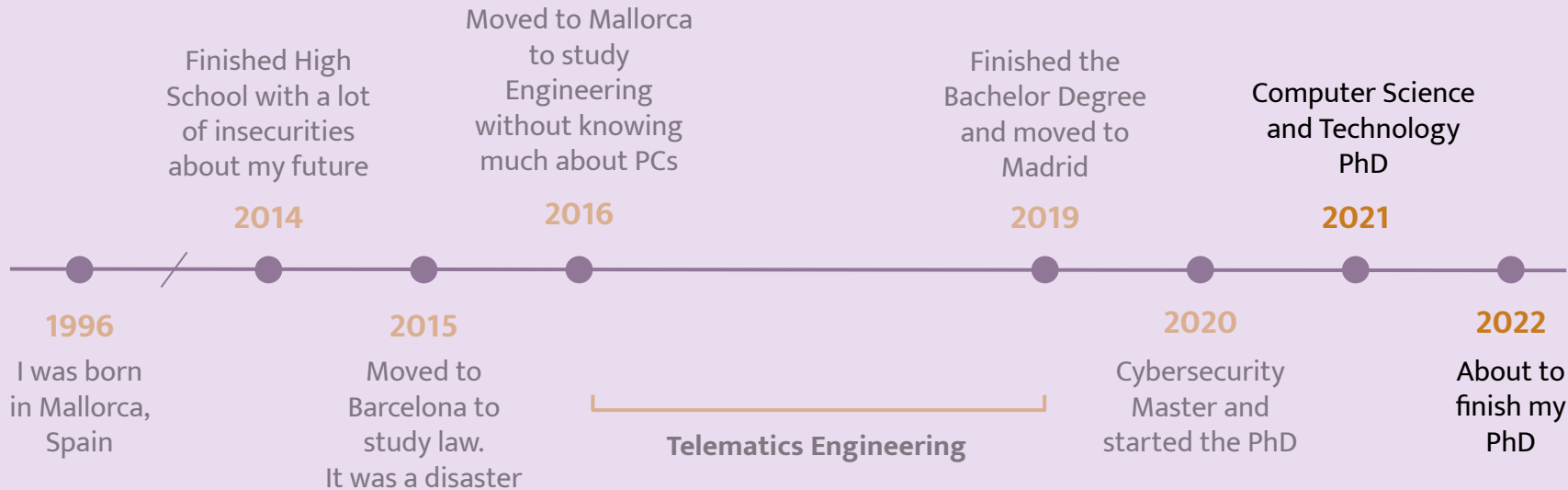








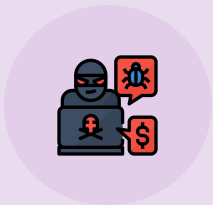
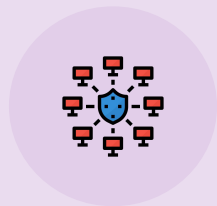




What do I do now?



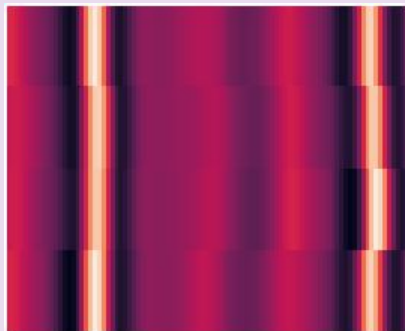




Cybersecurity



Electrocardiogram
(ECG)



Electrocardiomatrix
(ECM)



IA

User
Classification



Advantages of an EKG



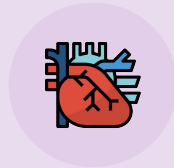
Non-invasive



Liveliness

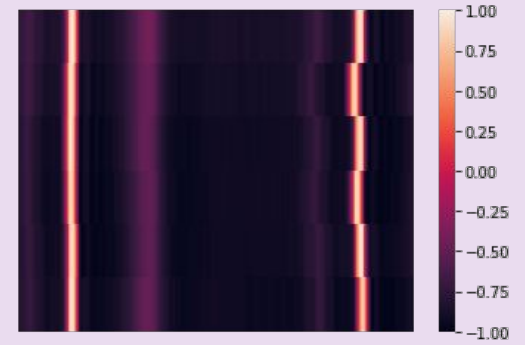
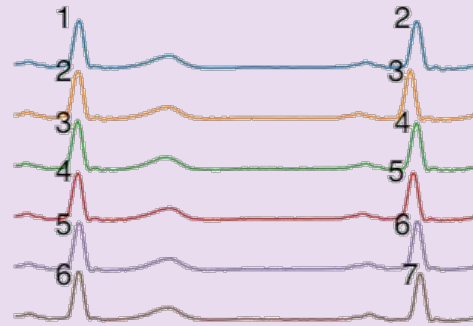
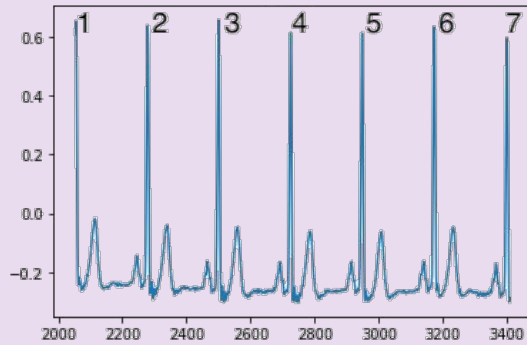


Inclusivity

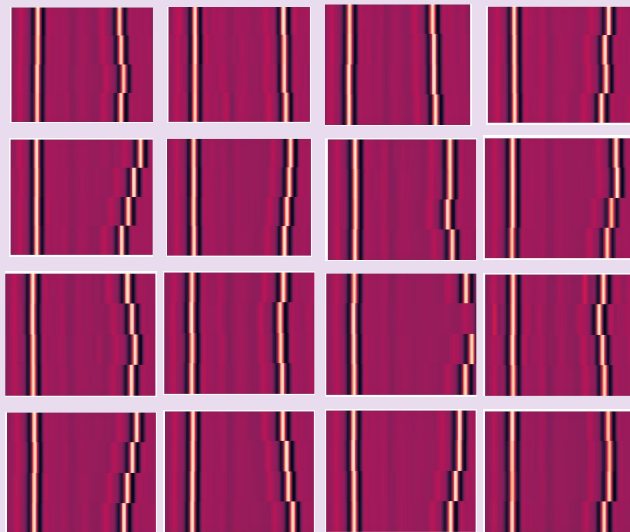


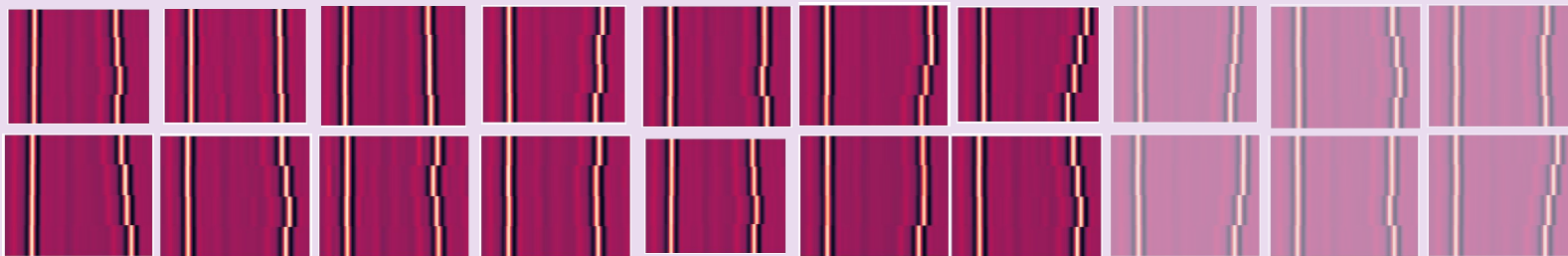
Diagnosis

From an ECG to an ECM



Construct EKM datasets for each user

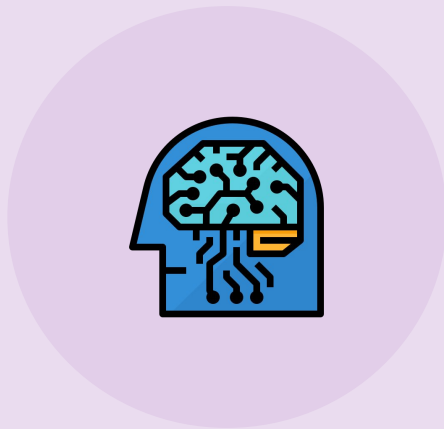


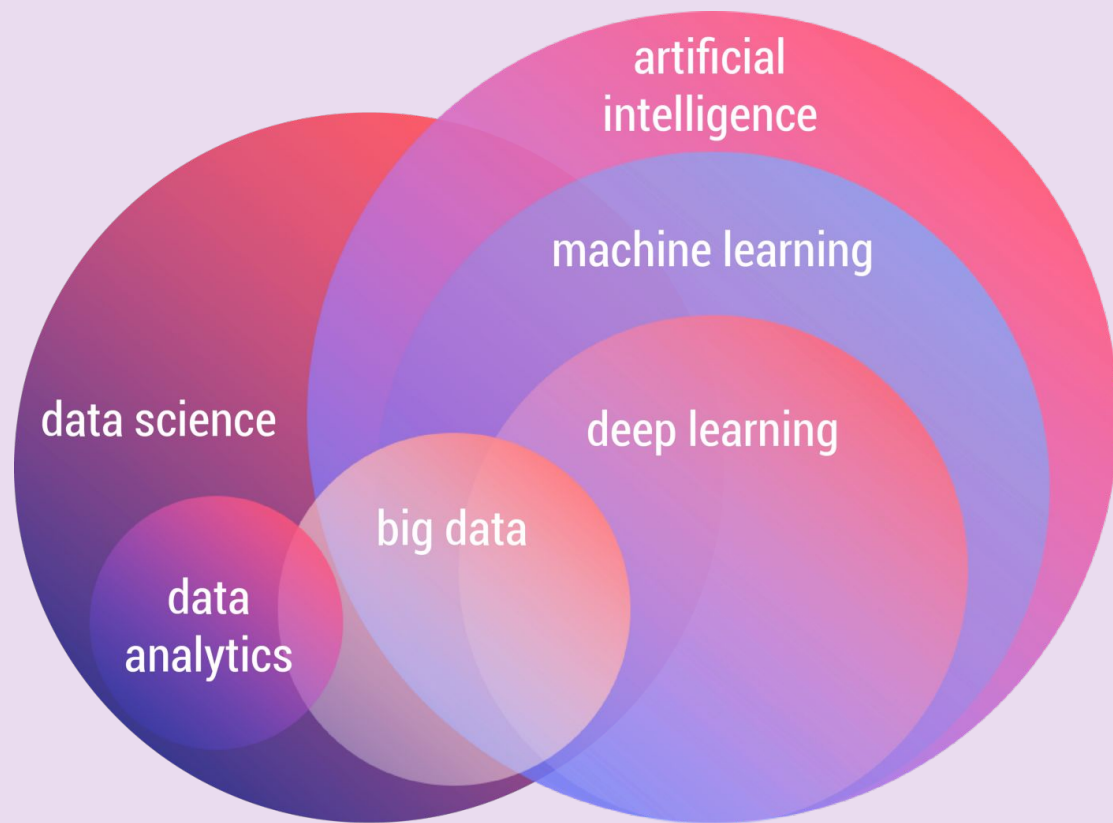


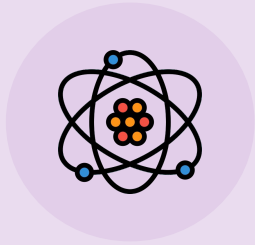
Train

Test









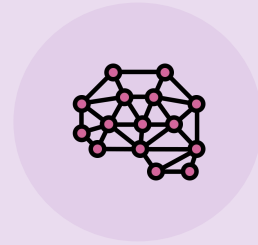
Data Science

- Based on strict **analytical** evidence
- Deals with **structured** and **unstructured** data
- Includes various data operations
- Very common in business applications for decision-making



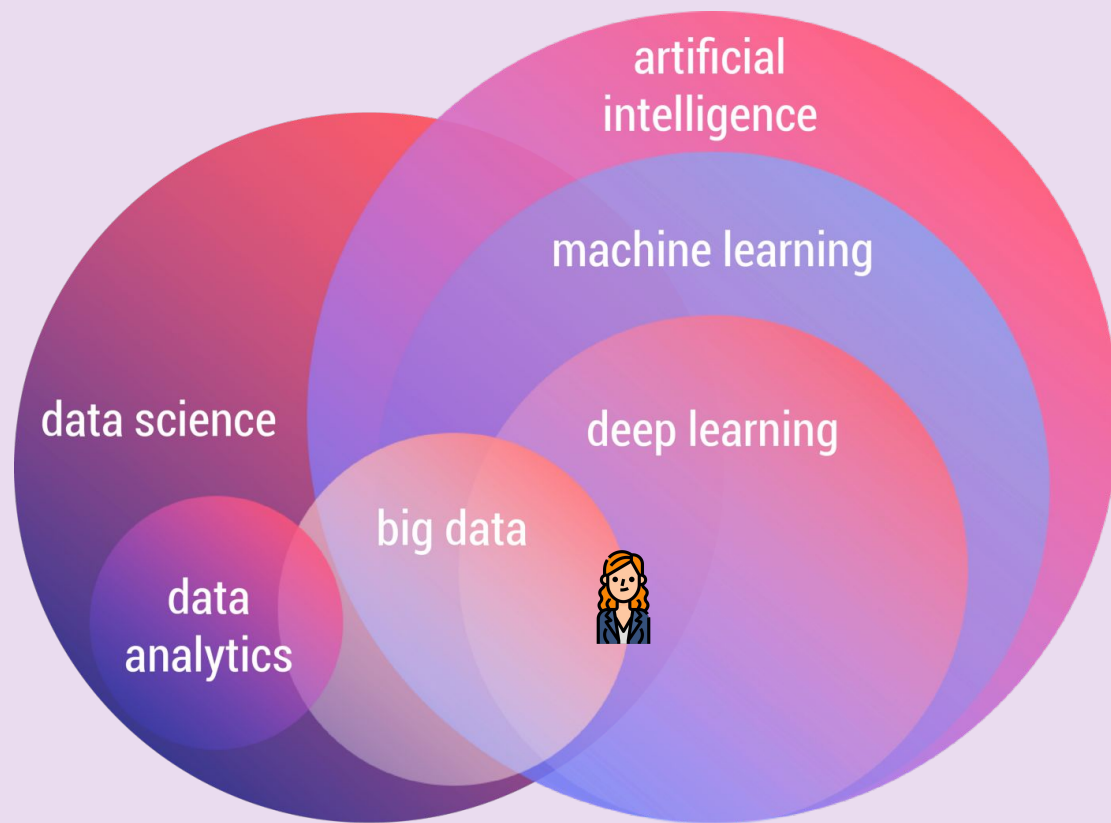
Artificial Intelligence

- Imparts **human intellect** to machines
- Uses **logic** and decisions trees
- Includes **Machine** and **Deep Learning**
- Sounds fancy
- Not only robots



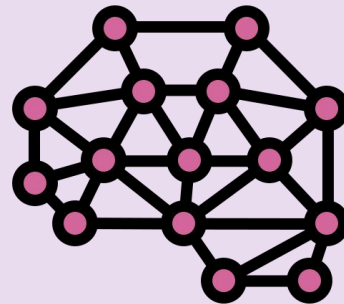
Machine Learning

- Subset of AI
- Uses **statistical** models and **algorithms**
- Machines improve with experience/**training**
- Includes Deep Learning
- Research

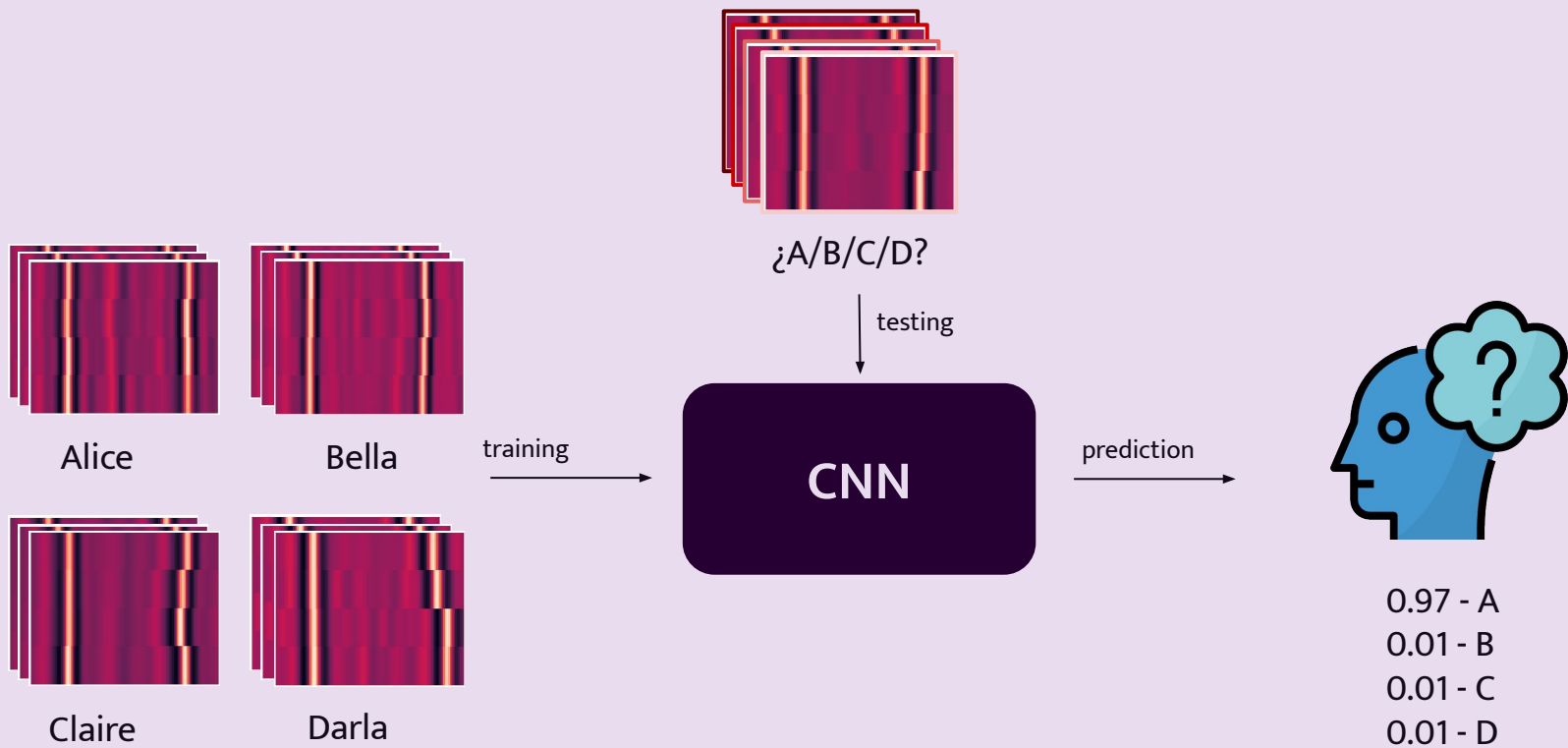


Convolutional Neural Networks

In Neural Networks, CNN is one of the main categories for image **recognition** and **classification**. It takes an **input image**, process it and classify it into certain categories. CNN models perform **training** and **testing** with certain data over certain **algorithm**.







ECG Databases



**Normal Sinus Rhythm
Database**
(NSRDB)
18 subjects



**MIT-BIH Arrhythmia
Database**
(MIT-BIHDB)
47 subjects



**Physikalisch-Technische
Bundesanstalt Database**
(PTBDB)
290 subjects



**Glasgow University
Database**
(GUDB)
25 subjects

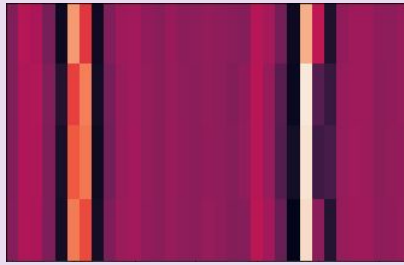
NSRDB

Can we identify control users with the ECM?



3bpf

99.69%



5bpf

99.82%

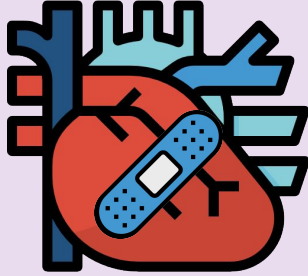


7bpf

99.84%

MIT-BIHDB y PTBDB

How does Cardiovascular Diseases (CVD) affect to user identification?



97.89%

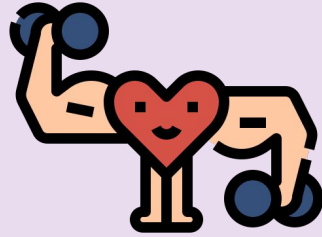
Healthy users and users with CVD

97.09%

Users with CVD

GUDB

How does cardiovascular effort affect to user identification?



99.19%

Sitting

98.59%

Walking on a treadmill

95.51%

Using a hand bike

94.00%

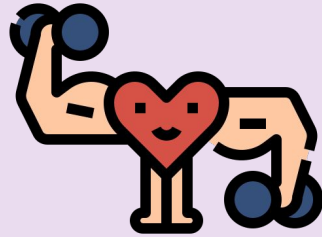
Doing a maths exam

82.63%

Running on a treadmill

GUDB

How does cardiovascular effort affect to user identification?



97.74%

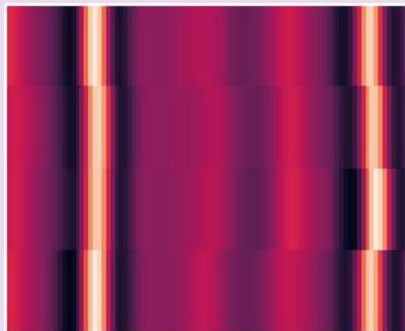
Low Cardiovascular Effort
Sitting and walking

85.71%

High Cardiovascular Effort
Biking and running



Electrocardiogram
(ECG)



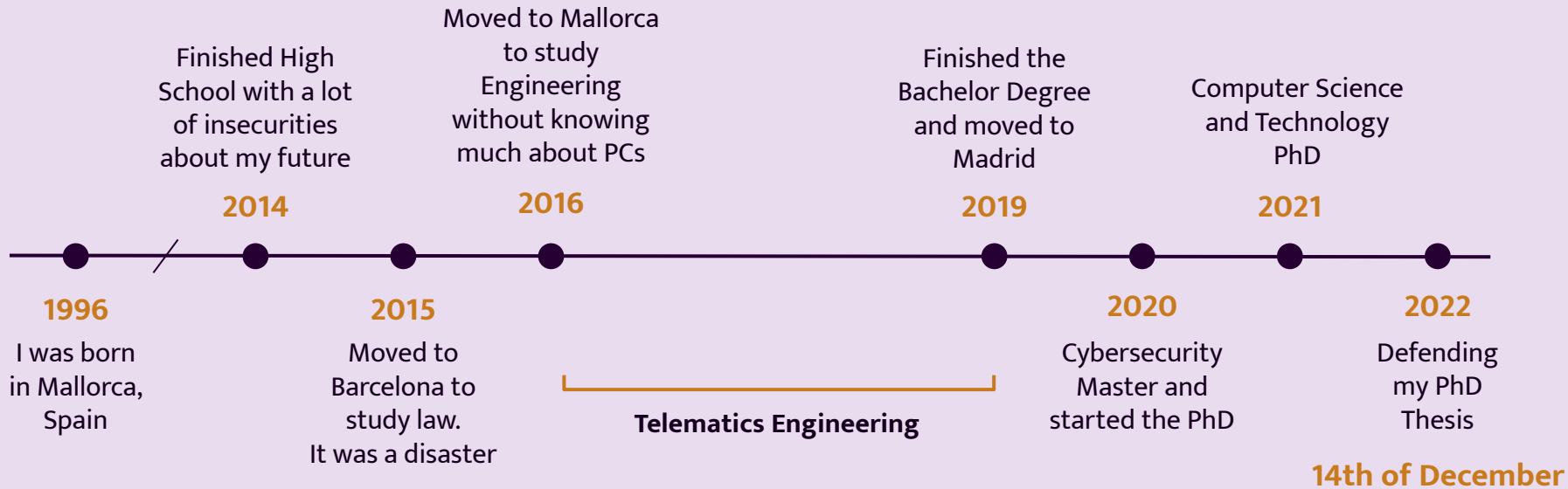
Electrocardiomatrix
(ECM)



IA

User
Classification





Which could be your timeline?





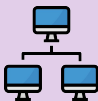
Chemical

Biomolecular,
Materials,
Molecular,
Process,
Corrosion,
Nuclear,
Metallurgic,
Textile, Paper
...



Civil

Environmental,
Geotechnical,
Structural,
Transport,
Utility, Water
resources,
Petroleum,
Sanitary,
Mining, Wind,
Architectural,
Ocean,
Hydraulic
...



Electrical

Electronic,
Computer,
Telecommunica
tions, Software,
Network,
Power, Optical,
Systems,
Hardware,
Cybersecurity
...



Mechanical

Acoustical,
Manufacturing,
Optomechanica
l, Thermal,
Sports, Naval,
aerospace,
marine, power
plant, industrial,
energy
...



Bio

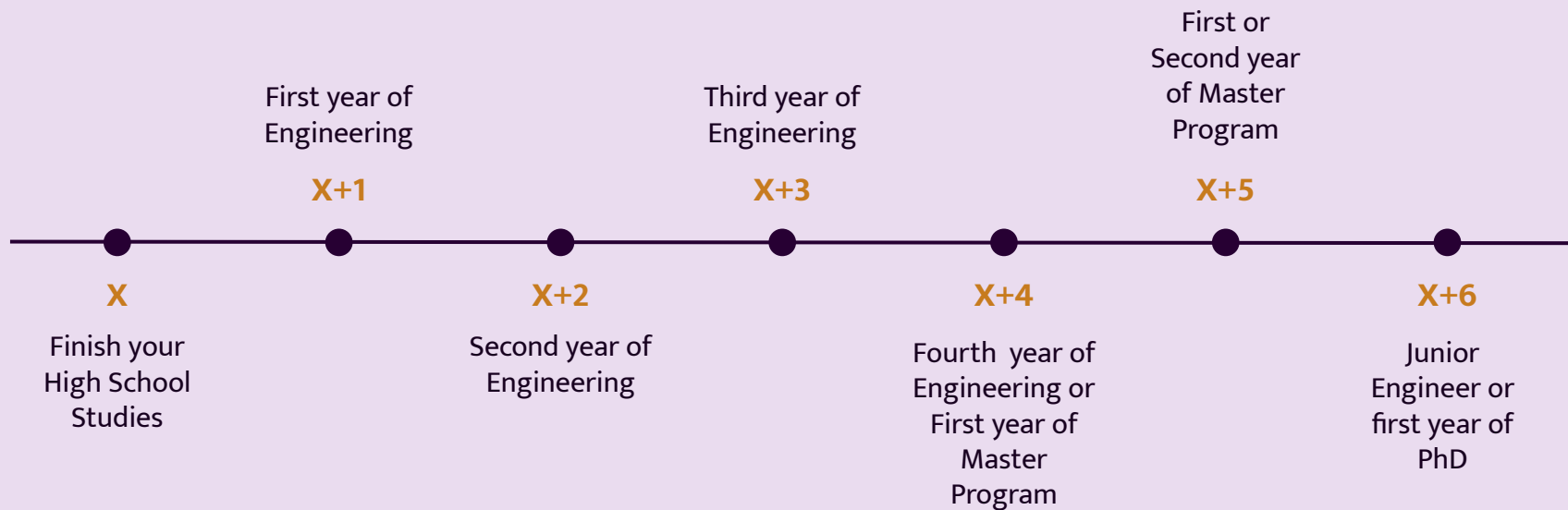
Agricultural,
Biosystems,
Biomechanical,
Bioresource,
Ecological,,
Bioinformatics,
Biomechanics,
Biotechnology,
Clinical,
Medical,
Pharmaceutical
...

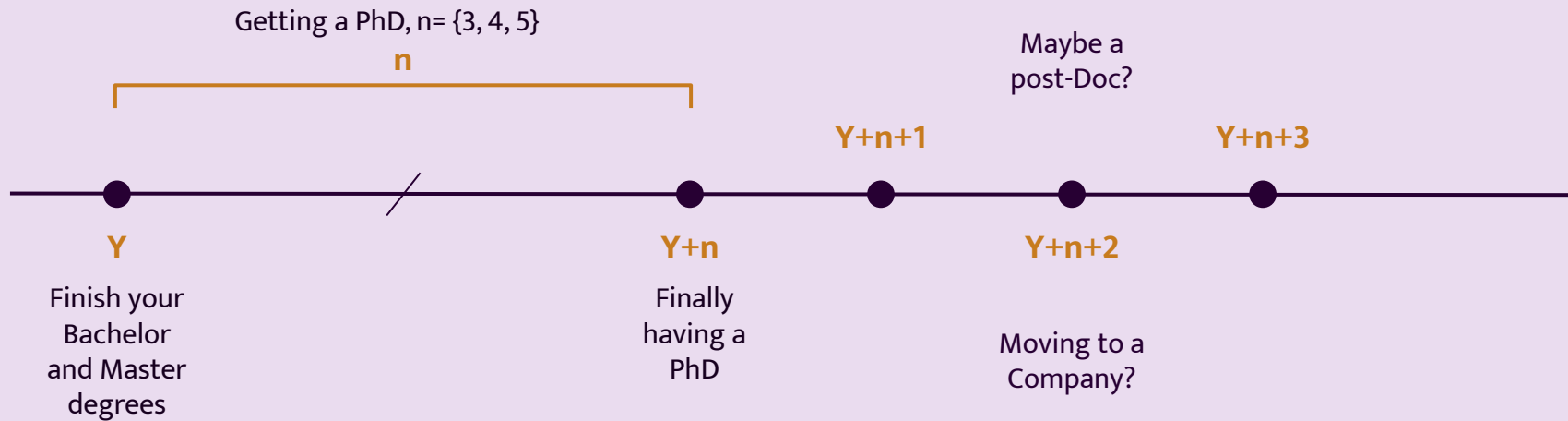


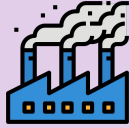
Data

Machine
Learning, Data
Science,
Artificial
Intelligence,
Signal
Processing,
Image
Processing,
Computer
vision,
Bioinformatics
...









Industry

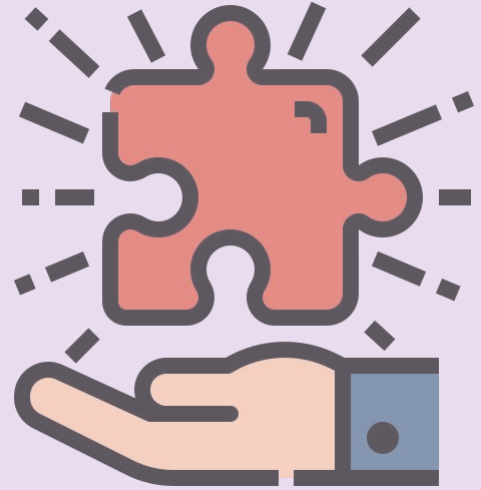


Academia



Some tips...

- If you can afford it, **take your time**
- Do your own research on **different subjects**
- **Embrace** your natural capabilities
- It is okay to **change** your mind
- Ask for **help** if you need it
- It is okay to **fail**, no one is going to care, just you
- You almost never end **working** on what you studied
- Set **achievable** goals
- What you are doing might be important but **it can wait** one or two days



Questions?



Questions

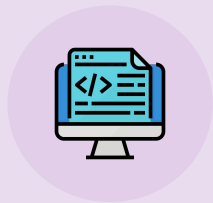
How do you, as a cybersecurity expert, keep your (online) data safe?

- Use long passwords including many different characters (**1337/leet**)
- Do **not store your passwords** in a word document or post-it note
- Use **password manager** (one ring to rule them all)
- Do **not reuse** passwords
- Use **cloud** services as a **backup** for your data
- Do not store **credit card** information
- Use **2FA**



Questions

Do you think that software gets more secure if it's open source?



Open Source

- Is available for **everyone** to use and edit
- Facilitates **collaborative** innovation and development of new technologies
- It is **community** maintained



Proprietary

- Is **closed source** must be used under a more restrictive **license**
- **Security-by-obscurity** is never the best option
- Always keep it **up to date!**

Questions

What are risks of AI? What can you as an AI-researcher do to minimize those risks?

Delphi speculates:

Delphi's responses are automatically extrapolated from a survey of US crowd workers and may contain inappropriate or offensive results.

“Prostitution”

- ***It's okay***

Delphi speculates:

Delphi's responses are automatically extrapolated from a survey of US crowd workers and may contain inappropriate or offensive results.

“Helping a friend to bury a body”

- ***It's okay***

Delphi speculates:

**This statement may contain unintended offensive content. Reader discretion is strongly advised.
Please be mindful before sharing.**

“Killing an unborn baby”

- ***It's wrong***

v1.0.4

Delphi speculates:

**This statement may contain unintended offensive content. Reader discretion is strongly advised.
Please be mindful before sharing.**

“Having an abortion”

- ***It's okay***

v1.0.4

<https://delphi.allenai.org>



Questions

What are risks of AI? What can you as an AI-researcher do to minimize those risks?

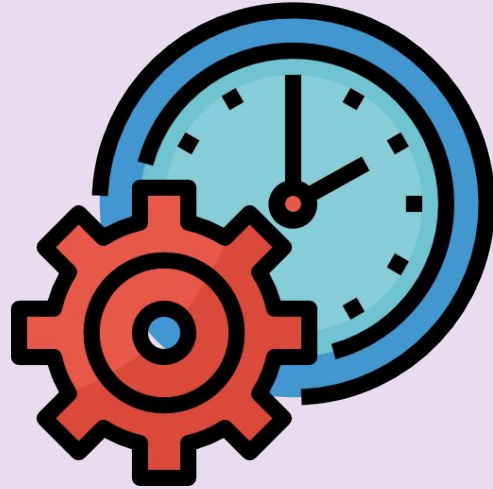


<https://www.theverge.com/2016/3/24/11297050/tay-microsoft-chatbot-racist>



Questions

How often do you have successes in research?



Questions

What is it like working in a male dominated industry?

- Bachelor degree, master program and laboratory = **all men**
- People **expect more** from you
- **Questioning** why are you here
- Feeling displaced
- Having **impostor syndrome**



Questions


What is it like working in a male dominated industry?


- Do **not compare** to others
- We have to **help each other** between us
- **Be sure** of what and why you are doing it
- Look for comfort and friends in **associations**
- **Self-care** is very important
- Let your colleagues and **allies** help you being involved



the end

now, any more question is welcome

 @cfusterbarcelo

 cfusterbarcelo.github.io