

Introduction to AI and its medical applications: Crash Course for an audience with diverse scientific backgrounds



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Motivation

Organize a 3-hour course on AI

Submit your
voucher
today!



AI consultancy voucher



Easy application platform

SIGN IN USING



Voucher requested:

- 3-hour course on AI
- In-person at TranslaTUM

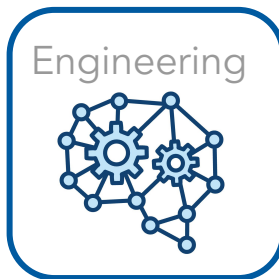
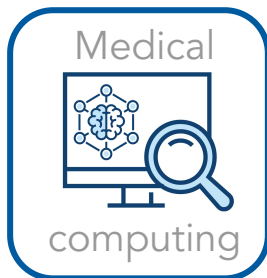


First question: who are we teaching to?

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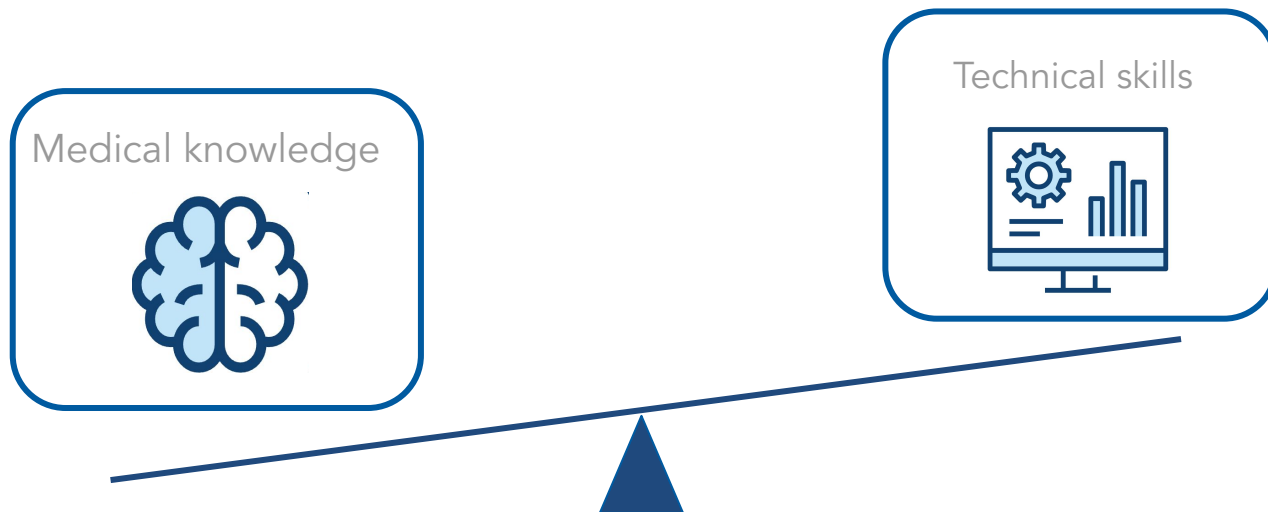
Target group: 20-80 university students from scientific domains



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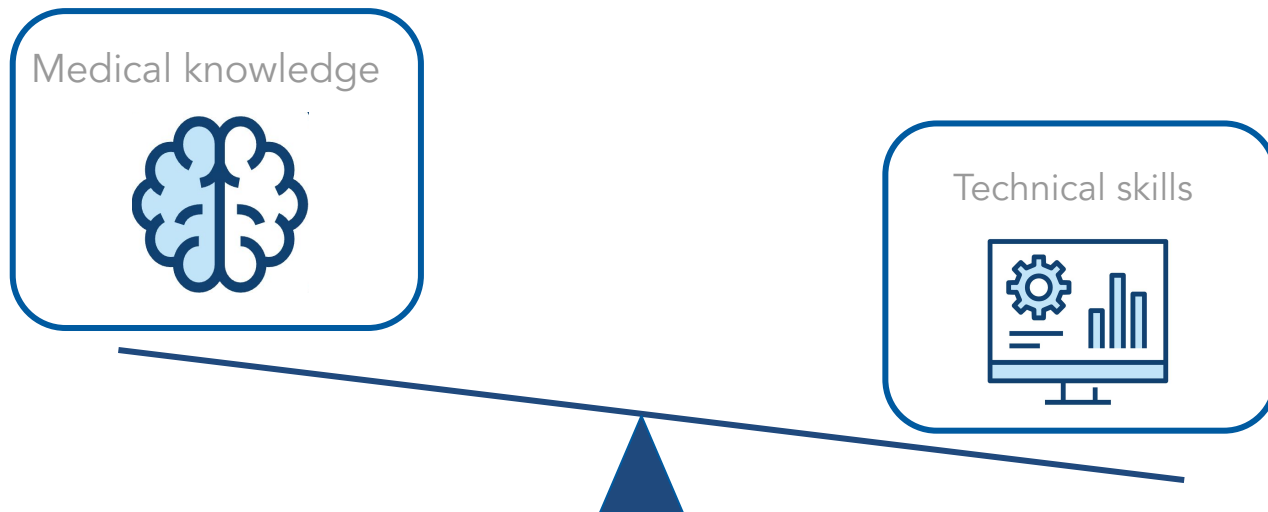


Challenge: find the balance

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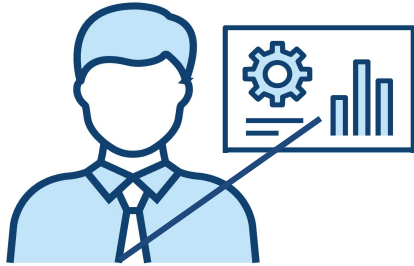


Challenge: find the balance

Our solution

How to keep every student interested?

- Alternate frontal lessons and hands-on sessions



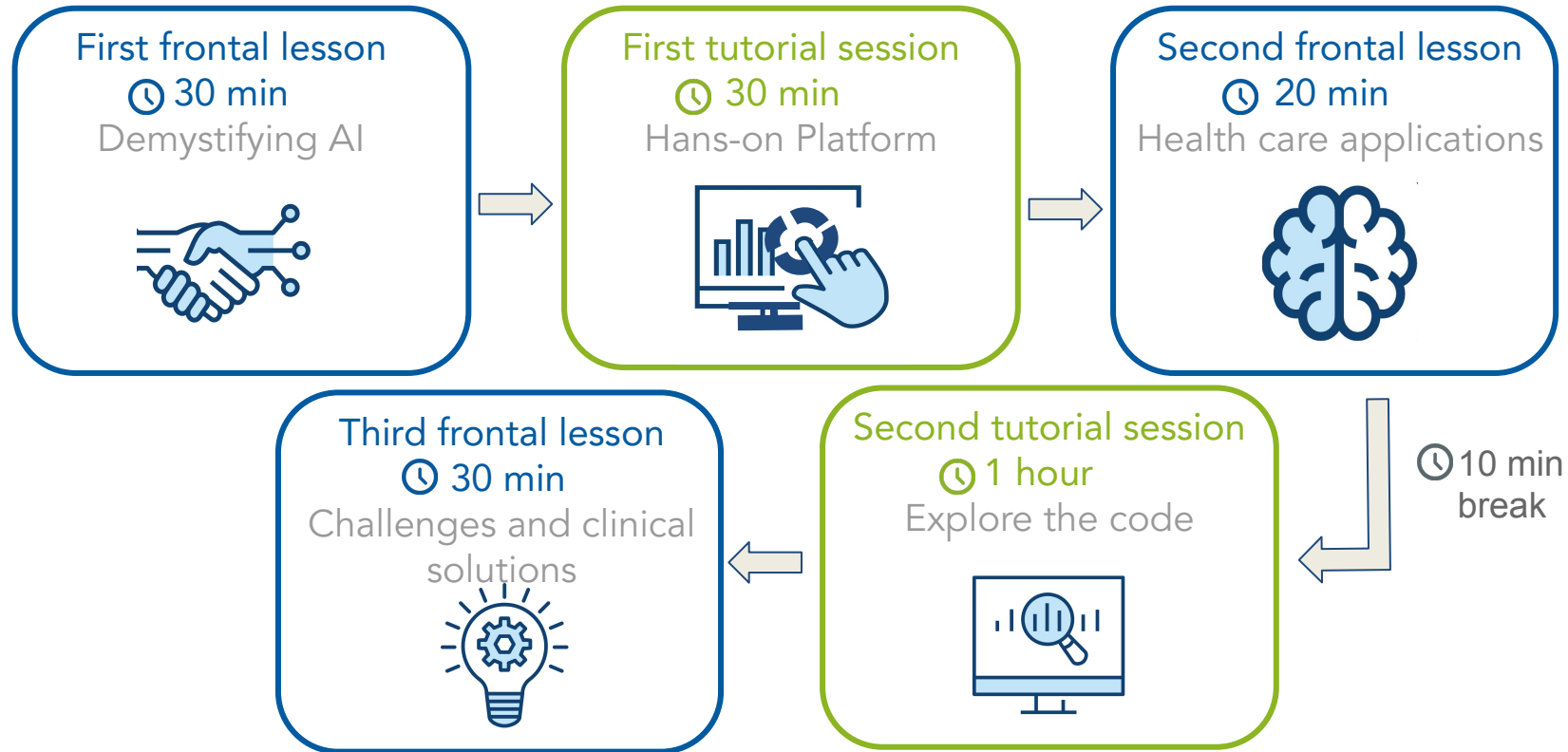
"We are all visual learners, and we are all auditory learners, not just some of us. Laboratory studies reveal that we all learn when the inputs we experience are multi-modal or conveyed through different media"
(Hattie & Yates, *Visible Learning and the Science of How We Learn*, 2014).

- Material for different level of skills
- Interesting datasets
- Engage discussion → Eliminate barriers

Course structure

How to keep every student interested?

Find the
slides on
Zenodo!

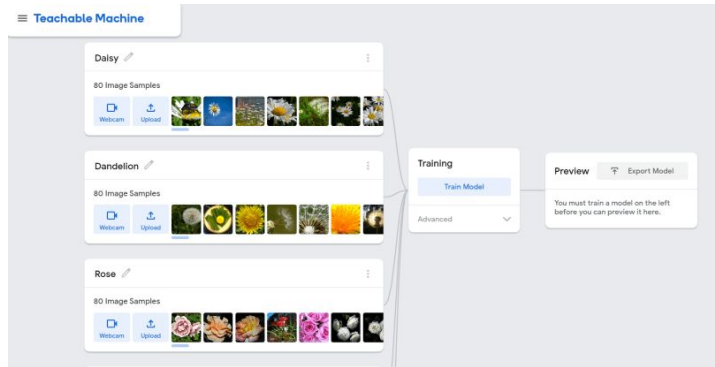


First tutorial session

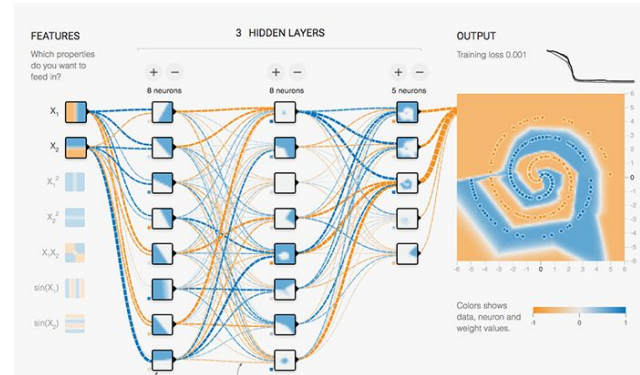
How to keep every student interested?

- Tutorials for different levels of technical skills

Teachable Machine



TensorFlow Playground



Second tutorial session

How to keep every student interested?

- Tutorials with relevant and authentic data sets and tasks



Image classification with Deep Learning

With the term **Machine Learning** (ML) we define a set of algorithms and methods that provide a machine with the ability to learn automatically and improve from experience without being explicitly programmed. When we have labeled data, we can use the label to guide the learning process, and this is called **Supervised learning**. If data are not labeled, it means that we don't have a guide or supervision, and this is called **Unsupervised learning**. Within Supervised learning, we can deal with two different kinds of problems:

- Regression problem:** the task of predicting a continuous quantity
- Classification problem:** the task of predicting a discrete quantity

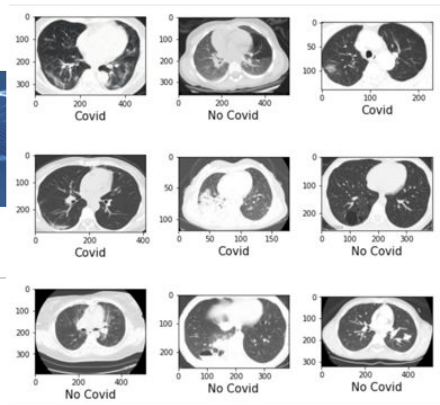
Loss per epoch

Another interesting way to see if the model is converging is to look at the loss per epoch. A NN works trying to minimize the difference between the prediction and the label, this is usually called **loss**. If the loss is decreasing over time, it means that the network is learning.

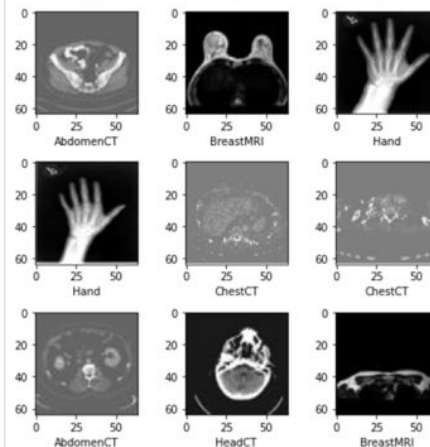
What is the difference between the training and the testing phase? Discuss it with your team and think about possible changes that could improve the model performance. Run the next cell to check whether your answer is correct.

```
# Run this cell to have the answer to the previous question
check_task_tm_2_1()
```

Automatic
feedback



Covid - CT lungs
dataset



MedNIST dataset

Survey & feedback analysis

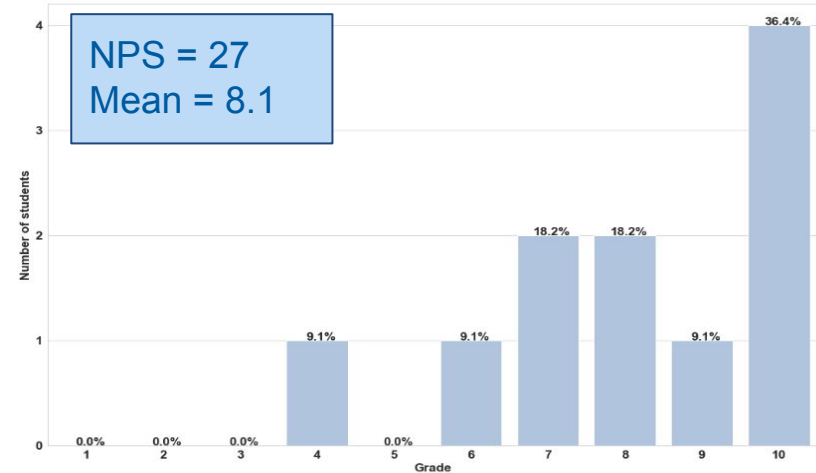
Positive and negative aspects

"Good practical tutorials for hands on. Not stupid coding, visualization made things easier to understand! Best introduction to AI I received so far!"

"Good insight of deep learning techniques on medical applications".

"The class was really clear, i already had some knowledge on the topic, but the workshop help me to understand somethings better".

How likely are you to recommend this course to a friend or a colleague?



Net Promoter Score (NPS) = % promoters - % detractors

Actions:

- Introduce ice-breaker activity
- Have more mentors
- Re-shape material according to time-frame
- Ask for feedback during the lecture

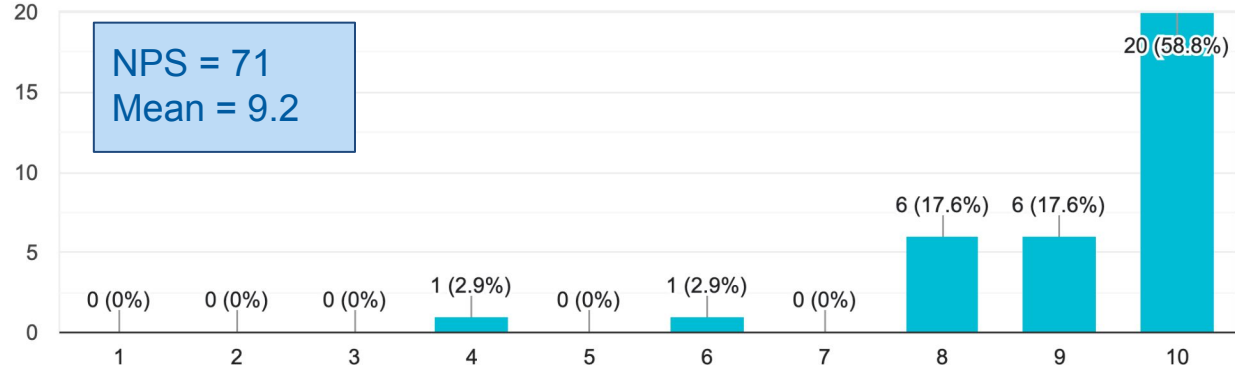
Survey & feedback analysis

Feedback culture to improve performance

Interpretable Machine Learning Course

- ~50 students
- 10 mentors
- 4-hours online course

How likely are you to recommend this course to a friend or a colleague?



Conclusion

First experience: summary & takeaway

- In-person → once a year
- 45 students, 2 tutors → more tutors
- Feedback culture: set KPI → improve NPS
- **Modularity** → adjust according to time frame

Try it out and adjust it to your needs!



<https://github.com/HelmholtzAI-Consultants-Munich/DL-lecture-tutorials>