

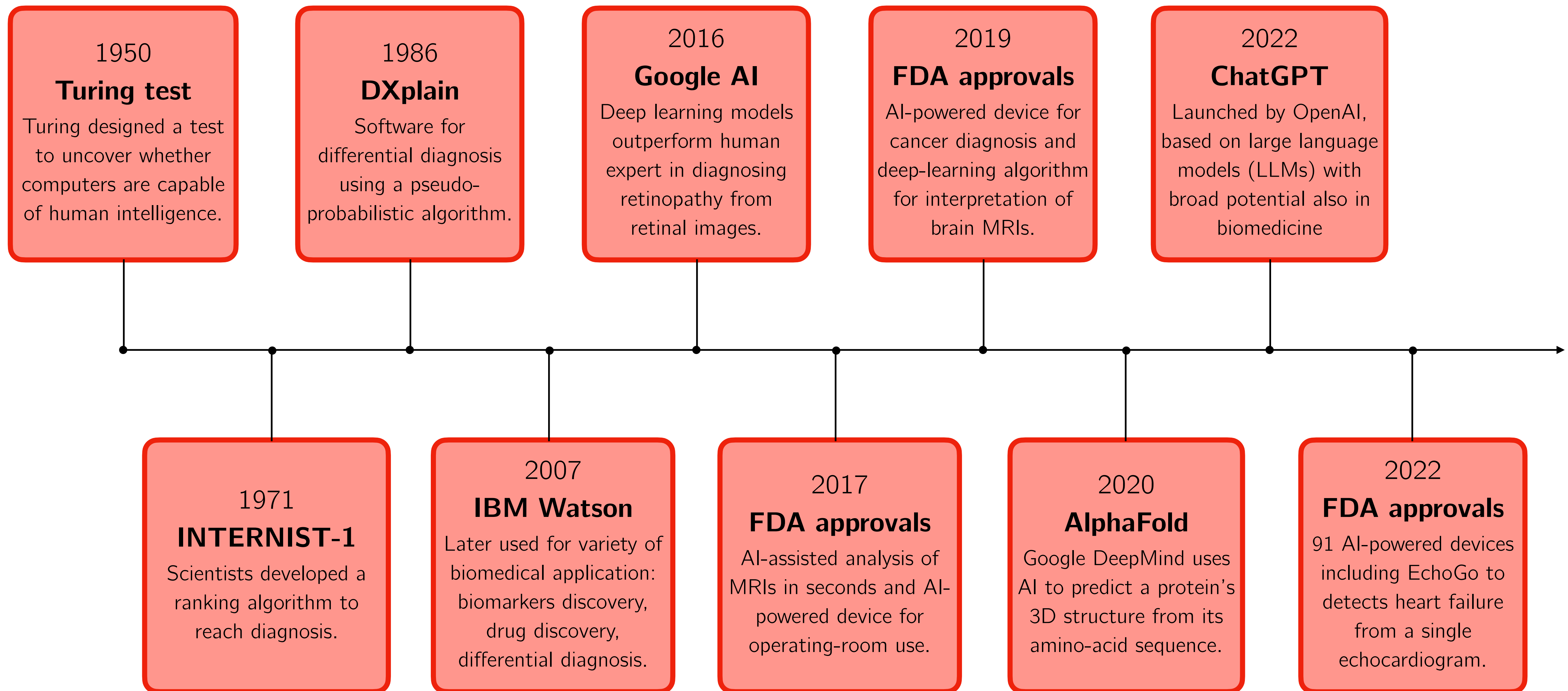
Introduction to machine learning

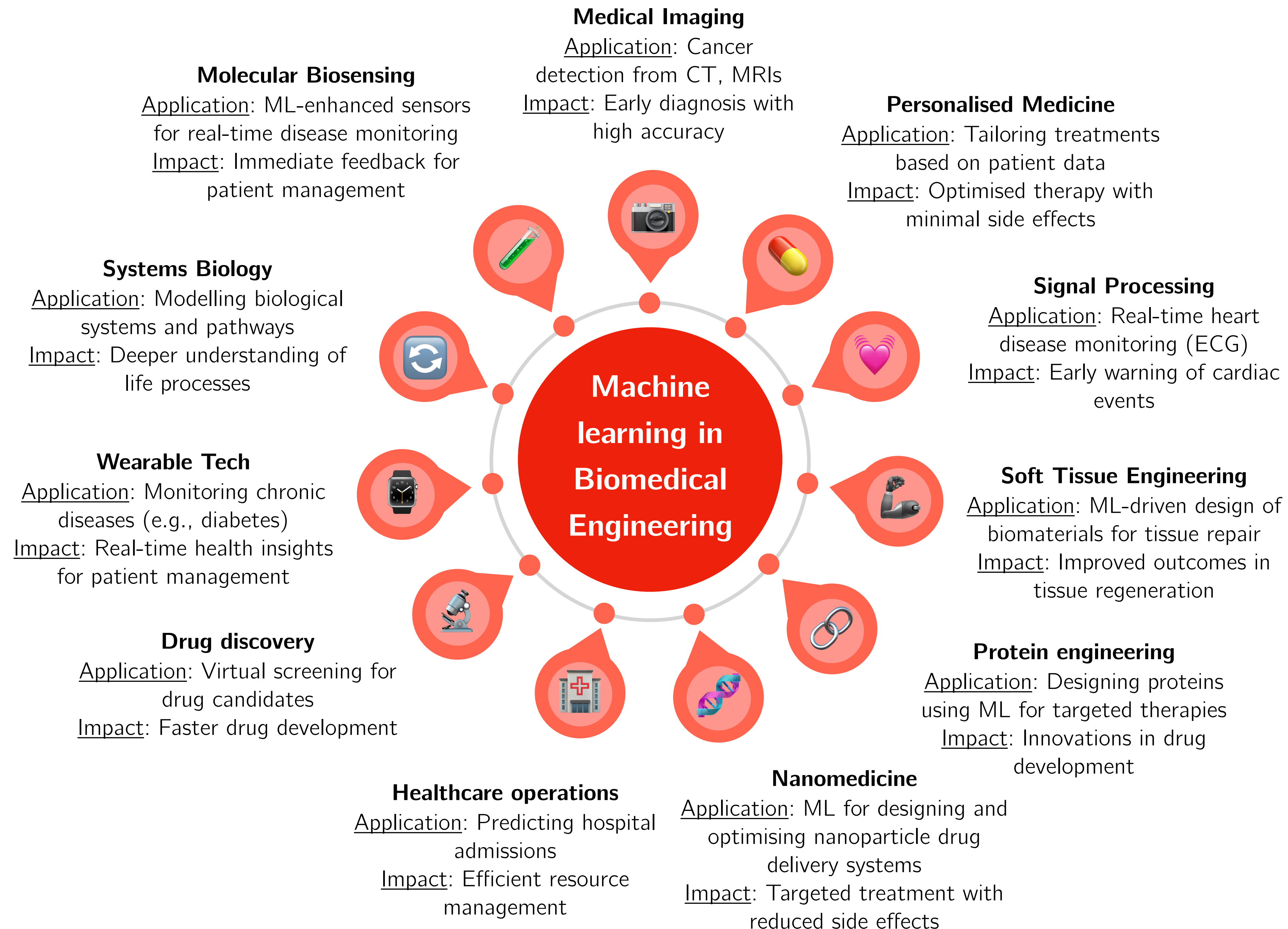
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2024

Timeline of AI ascendance in biomedicine





Topics covered in this course

Week	Lecture	Practical
1	Machine learning fundamentals	Project 0: Introduction
2	Linear and logistic regression	Project 1.1: Linear and logistic regression
3	Regularization for linear models	Project 1.2: Regularization for linear models
4	Methods for classification	Project 1.3: Application of linear models to a case study
5	Neural networks, part 1	Project 2.1: Neural networks, part 1
6	Neural networks, part 2	Project 2.2: Neural networks, part 2
7	Unsupervised learning	Project 2.3: Application of neural networks to a case study

Week 1-7 lectures and practicals (all on Wednesday). Week 8 (the week before the exam) has no lecture nor practical.

The course in a nutshell

- ▶ Assessment
 - ▶ 70% written exam
 - ▶ 30% practicals

All topics from the lectures are covered in the written exam. Some of the topics (linear models and neural networks) are also covered in the practicals.

- ▶ GitHub repository is used for material dissemination
- ▶ Canvas is used for communication and submission/grading
- ▶ Lecture schedule is in My Timetable and on GitHub (note that the room for the first practical has been changed, both My Timetable and GitHub are already updated).

Study material

- ▶ Main guidance: lecture slides and practicals
- ▶ Book: “An introduction to statistical learning with applications in python:”, G. James, D. Witten, T. Hastie, R. Tibshirani, J. Taylor



Lecture slides and practicals in Github

#	Date	Location	Title	Slides
1	04/Sep	Aud.15	Machine learning fundamentals	intro , lectures
2	11/Sep	Aud.15	Linear and logistic regression	
3	18/Sep	Aud.15	Regularization for linear models	
4	25/Sep	Aud.15	Methods for classification	
5	02/Oct	Aud.15	Neural networks, part 1	
6	09/Oct	Aud.15	Neural networks, part 2	
7	16/Oct	Aud.15	Unsupervised learning	
8	23/Oct	-	<i>No lecture</i>	-
▲	31/Oct	<i>Exam</i>		

Practical assignments

#	Date	Location	Title	Exercises
1	04/Sep	~~ Luna 1.050 ~~ Gem-Z 3A.05 *	Project 0: Introduction	practicals
2	11/Sep	Aud. 07	Project 1.1: Linear and logistic regression	
3	18/Sep	He. 0.01	Project 1.2: Regularization for linear models	
4	25/Sep	Aud. 07	Project 1.3: Application of linear models to a case study	
5	02/Oct	Aud. 07	Project 2.1: Neural networks, part 1	
6	09/Oct	Aud. 07	Project 2.1: Neural networks, part 2	
7	16/Oct	Aud. 07	Project 2.1: Application of neural networks to a case study	
8	23/Oct	-	<i>No practical</i>	-

Submission in Canvas

▾ Assignments			30% of total	+	⋮
⋮		Project 1.3: Application of linear models to a case study Due 2 Oct at 12:00 10 Pts	✓		⋮
⋮		Project 2.3: Application of neural networks to a case study Due 23 Oct at 12:00 10 Pts	✓		⋮

Practicals

- ▶ Work in group of up to 5 students
- ▶ Distributed as Python notebooks
- ▶ Divided in 3 projects
 - ▶ Project 0: Introduction (week 1)
 - ▶ Project 1: Linear models (weeks 2-4)
 - ▶ Project 1.2: Linear and logistic regression
 - ▶ Project 1.2: Regularisation for linear models
 - ▶ **Project 1.3: Application of linear models to a case study**
 - ▶ Project 2: Neural networks (weeks 5-7)
 - ▶ Project 2.1: Neural networks, part 1
 - ▶ Project 2.2: Neural networks, part 2
 - ▶ **Project 2.3: Application of neural networks to a case study**

Project 1.3 and Project 2.3 will be graded

Practicals

- ▶ Deliverables, a zip file with :
 - ▶ A single Python notebook that contains the experiments, visualisation of results and answer to the questions
 - ▶ Python functions and/or classes (.py files) that you have developed to implement the basic functions, if used in the Python notebook.
- ▶ The assessment rubric for the practicals can be found in GitHub
- ▶ 5 teaching assistants will be present during the practicals
- ▶ You are encouraged to use Canvas Discussion to ask general questions

Feedback

Any type of (constructive) feedback you might have during or after the course is very welcome!