ELMED219

Thursday Jan. 6th, 2022

Lab 0: Introduction to some theory and tools of machine learning

Alexander S. Lundervold (HVL)

Høgskulen på Vestlandet

MMIV

How can a machine learn?

Iris Virginica

Iris Setosa

Iris Virginica

Iris Setosa

Iris Versicolor

Iris Setosa

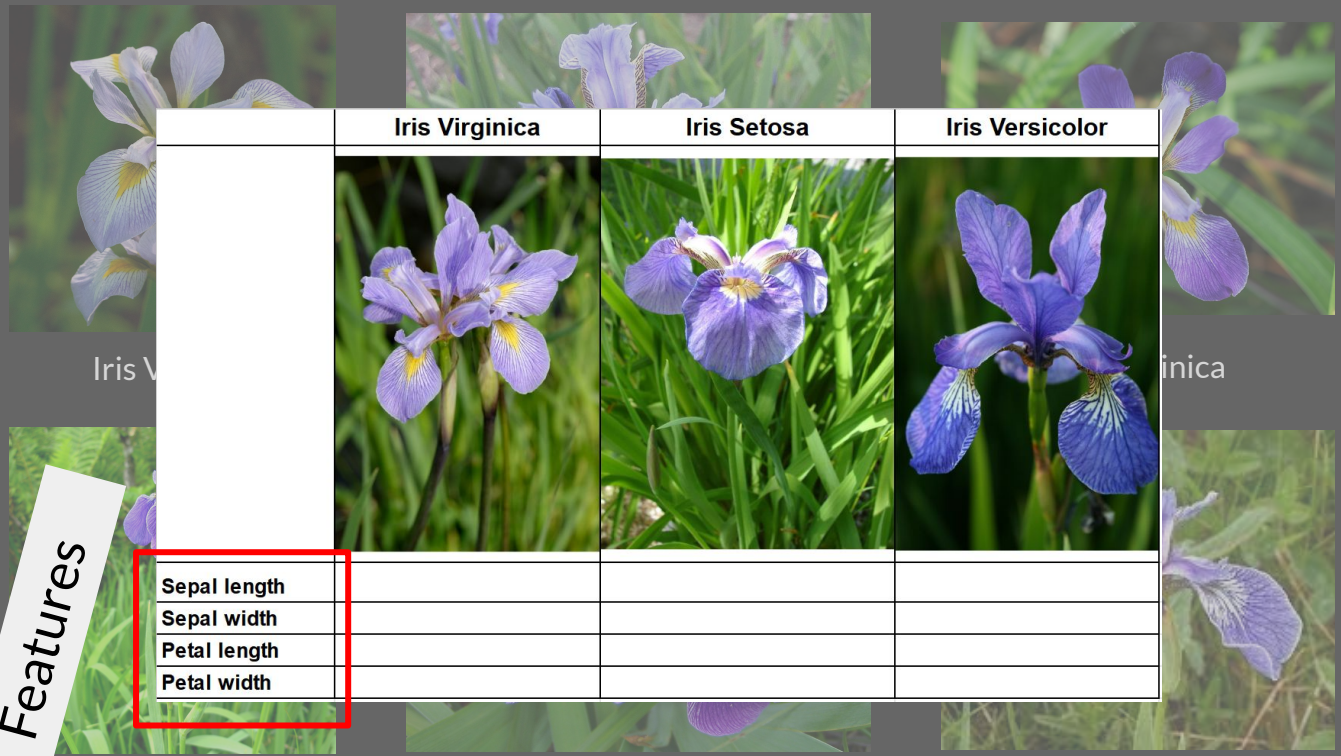
Iris Virginica

Iris Versicolor

Iris Virginica

Iris Setosa

Iris Setosa



	Iris Virginica	Iris Setosa	Iris Versicolor
Sepal length			
Sepal width			
Petal length			
Petal width			

Features

Iris V

inica

Iris Setosa

Iris Versicolor

Iris Setosa

ginica

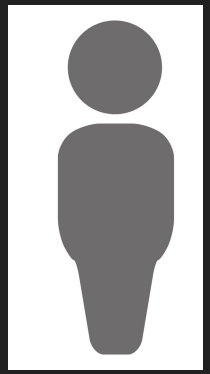
Iris Versicolor

Iris Virginica

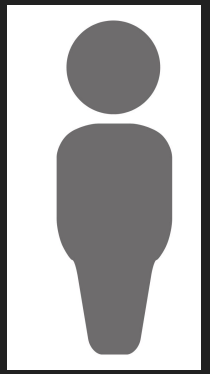
Iris Setosa

Iris Versicolor

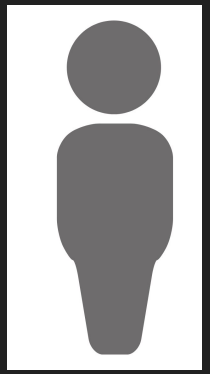
Iris Setosa



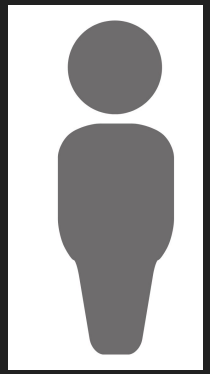
Diabetes



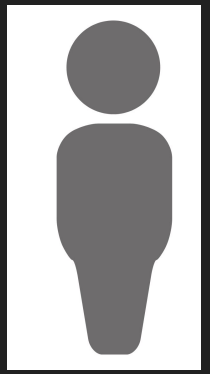
No diabetes



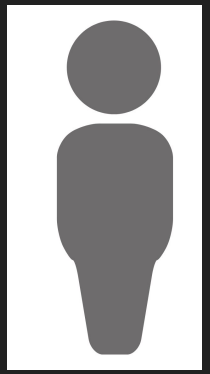
No diabetes



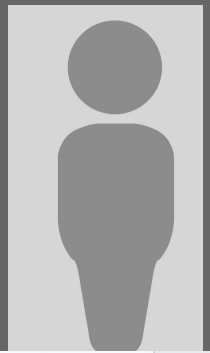
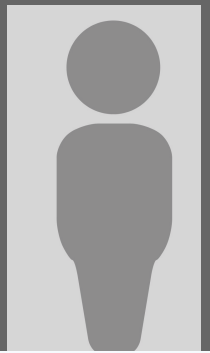
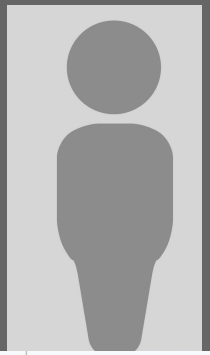
No diabetes



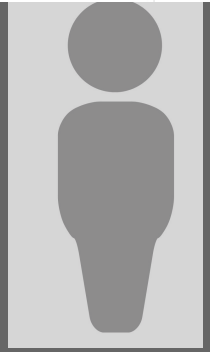
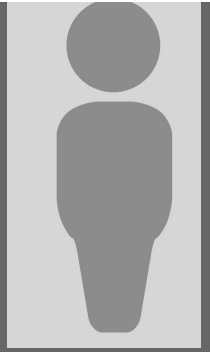
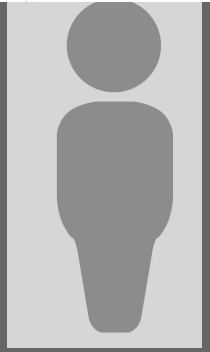
No diabetes



Diabetes

Patient ID	Age	BMI	Plasma glucose	Diastolic blood pressure	Insulin	...
1	50	33.6	148	72	0	...
2	31	26.6	85	66	0	...
3	21	28.1	89	66	94	...
4	...	...	...	...	...	...

No diabetes

No diabetes

Diabetes

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4		...	...	...	...	...	...

ML models learn from *features* / *representations* of data

No diabetes

No diabetes

Diabetes

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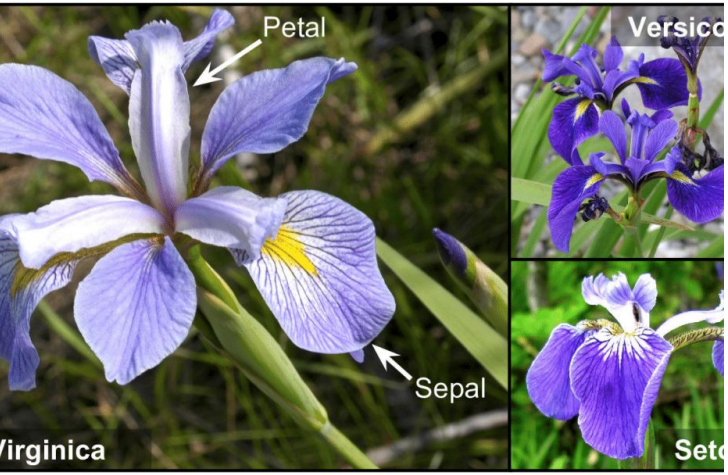
ML models learn from *features* / *representations* of data

No diabetes

No diabetes

Diabetes



1-22. Flowers of three iris plant species[16]

Machine learning

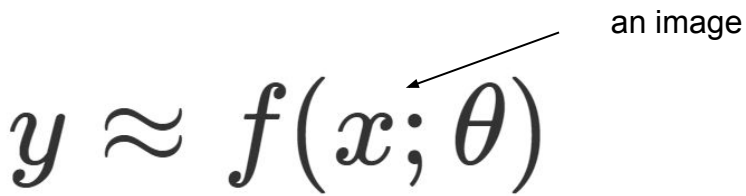
Two (very) simple examples

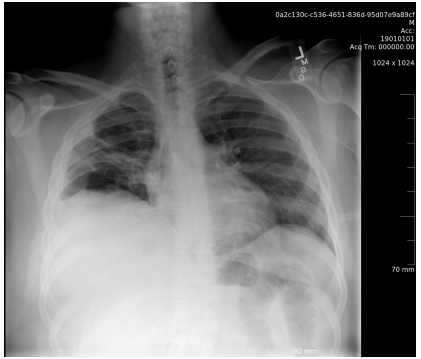
What is machine learning?

Function approximation

$$y \approx f(x; \theta)$$

Function approximation

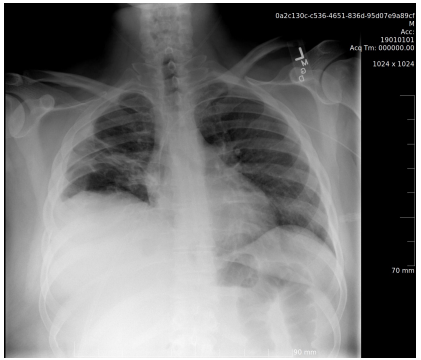




Function approximation

an image

$$y \approx f(x; \theta)$$



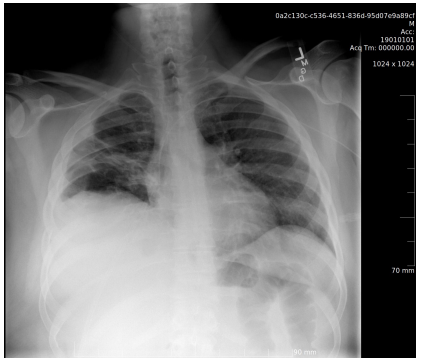
Function approximation

an image

$$y \approx f(x; \theta)$$

what's in the image

Opacity



Function approximation

an image

$$y \approx f(x;\theta)$$

what's in the image

Function approximation

features of a patient

$$y \approx f(x; \theta)$$

healthy or not healthy

Some ingredients

Data	Labels / annotations	Training data
Trained model	Measure of success	Purpose...

Some ingredients

Data Feature vectors (think of the flowers) Images Speech	**Labels / annotations** {cat, dog, horse} {cancer, not-cancer} {coalfish, pollock} {diabetes, no diabetes}	**Training data** Pairs {(data, label)} Input to ML model
Trained model A function sample → label	**Measure of success** Is it doing a good job? Accuracy, loss, … Used as a *feedback signal*	**Purpose…** What's the model *for*? Broader context *"Business impact"*

How do you *do* machine learning these days?

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Machine learning

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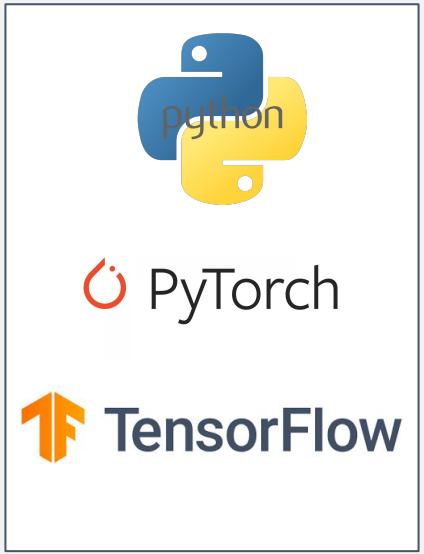
Machine learning

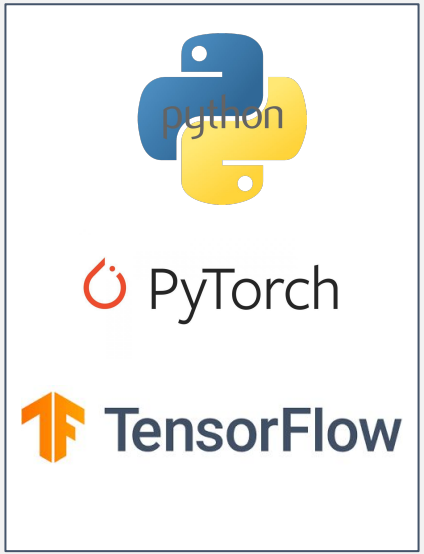
Deep learning



How do you *do* machine learning these days?

Machine learning

Deep learning

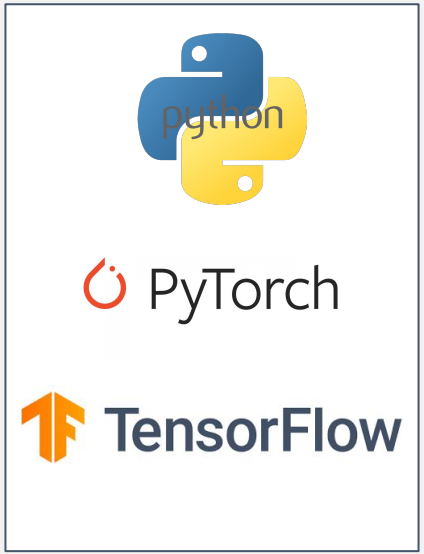


Processing / compute

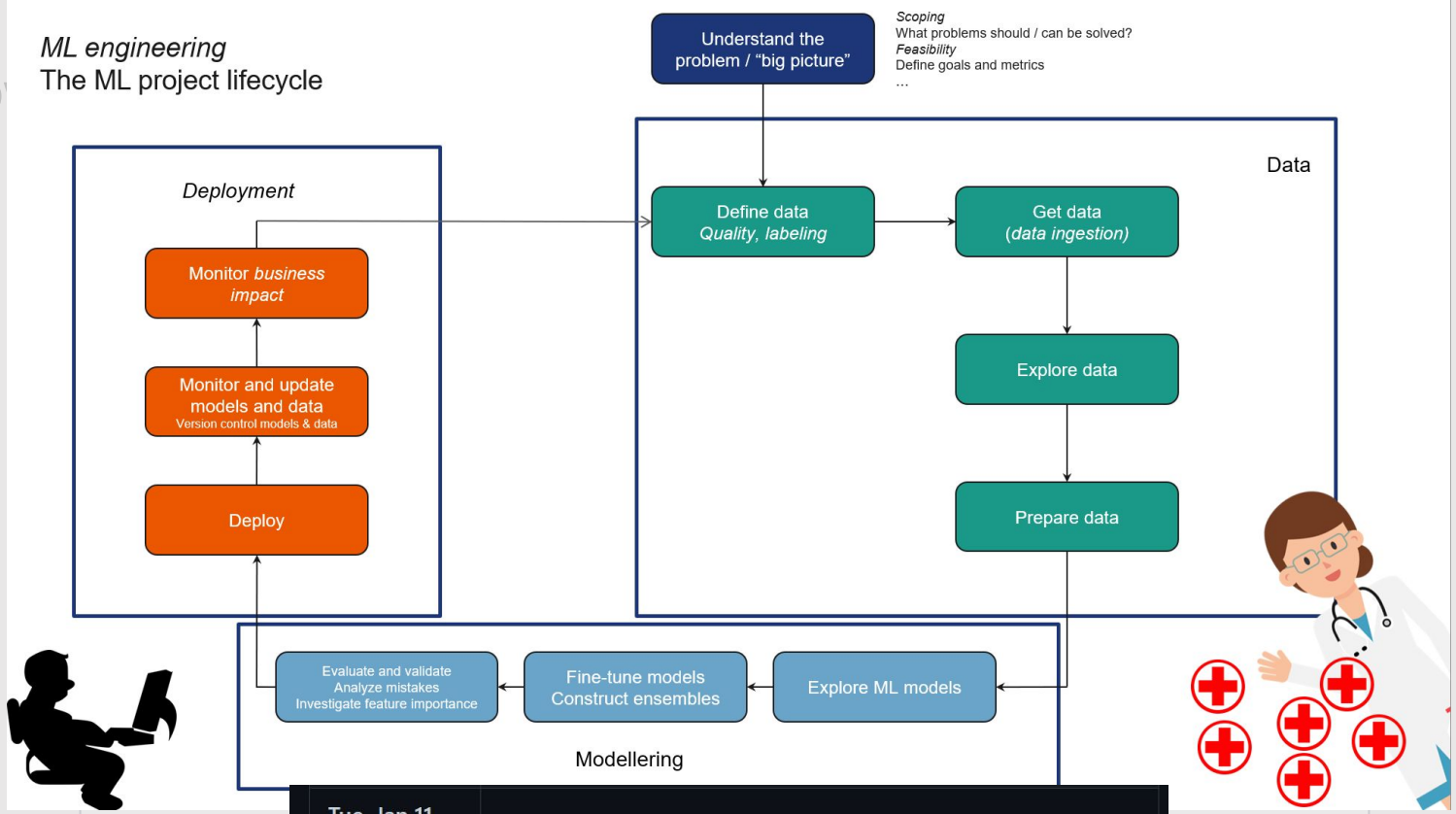
How do you *do* machine learning these days?

Machine learning

Deep learning

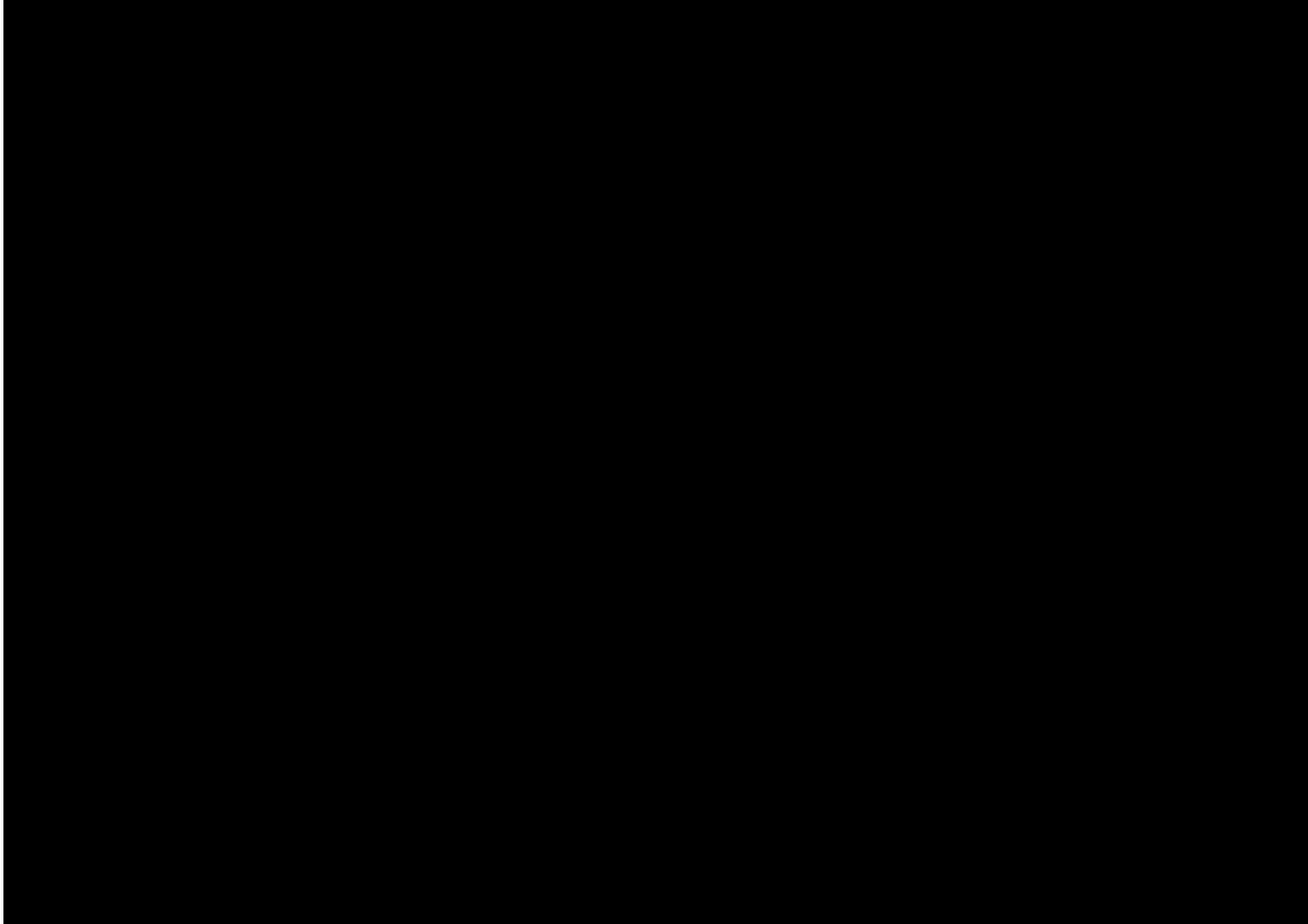


Processing / compute



Tue, Jan 11	
10:15-11:00	LAB 1: Medical health records and natural language processing
	Alexander Selvikvåg Lundervold
12:15-13:00	LAB 2: The machine learning project lifecycle
	Alexander Selvikvåg Lundervold

Further exploration of the basics of ML



Further exploration of the basics of ML

DataCamp