Navigating the AI Journey

From Inception to Excellence
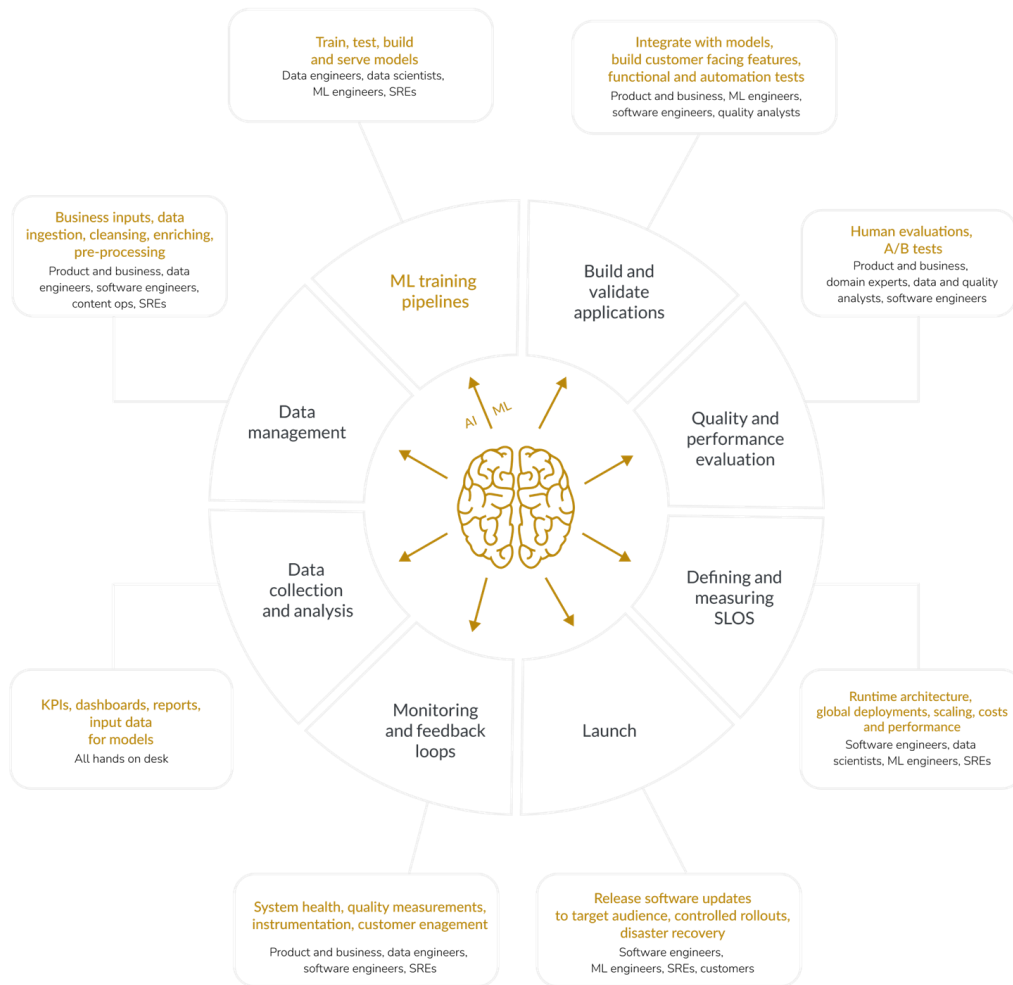
Speaker: Simeon Harrison
Trainer at EuroCC Austria

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Navigating the Journey
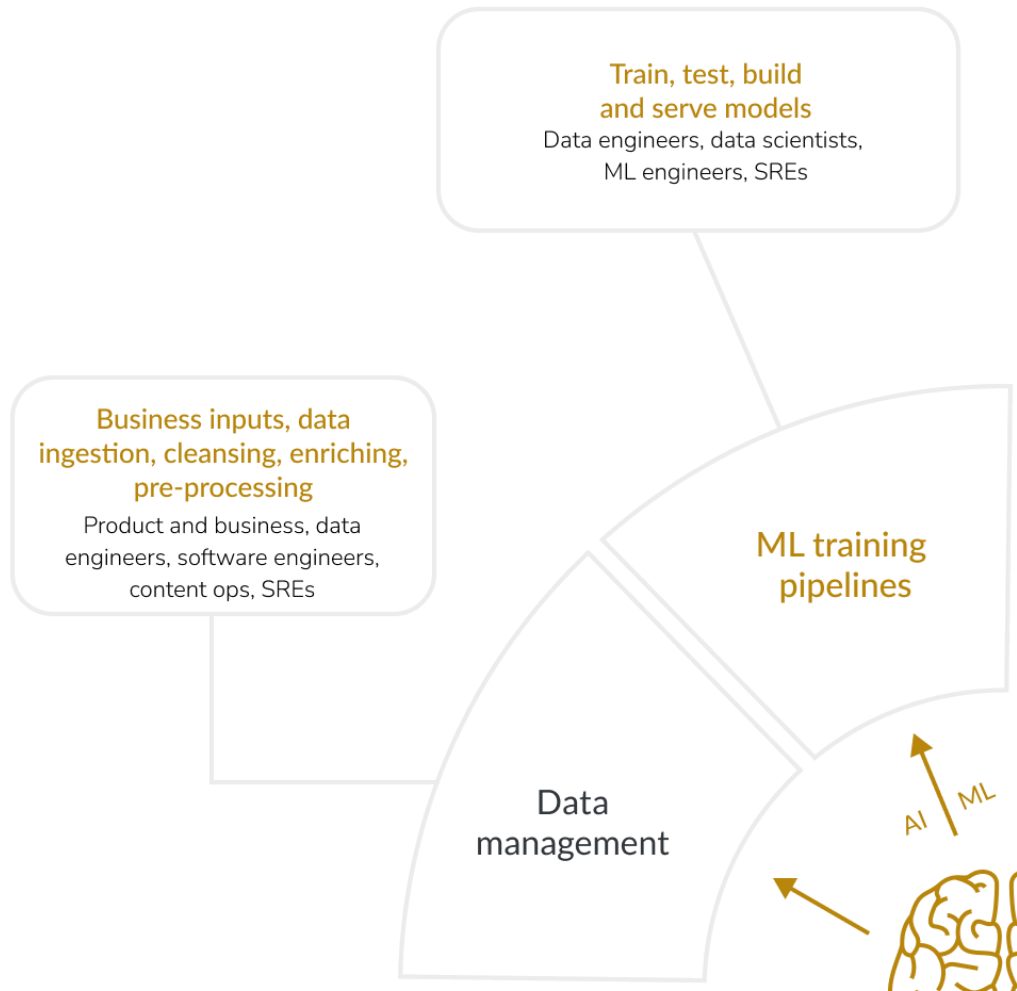
„Computers are useless.
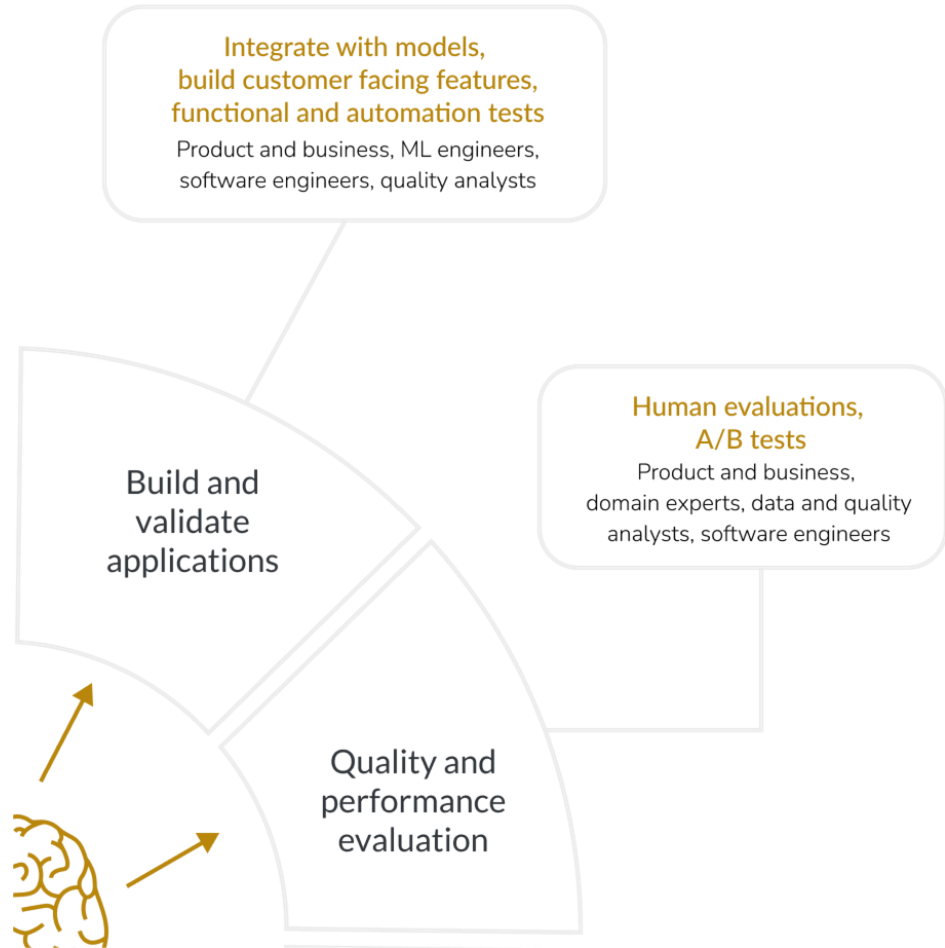They can only give you answers."

Pablo Picasso

Train, test, build and serve models
Data engineers, data scientists, ML engineers, SREs

Integrate with models, build customer facing features, functional and automation tests
Product and business, ML engineers, software engineers, quality analysts

Business inputs, data ingestion, cleansing, enriching, pre-processing
Product and business, data engineers, software engineers, content ops, SREs

Human evaluations, A/B tests
Product and business, domain experts, data and quality analysts, software engineers

KPIs, dashboards, reports, input data for models
All hands on desk

Runtime architecture, global deployments, scaling, costs and performance
Software engineers, data scientists, ML engineers, SREs

System health, quality measurements, instrumentation, customer enagement
Product and business, data engineers, software engineers, SREs

Release software updates to target audience, controlled rollouts, disaster recovery
Software engineers, ML engineers, SREs, customers

ML training pipelines

Build and validate applications

Data management

Quality and performance evaluation

Data collection and analysis

Defining and measuring SLOS

Monitoring and feedback loops

Launch

AI ML

AI Product Lifecycle

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ML training pipelines

Data management

AI | ML

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AI Product Lifecycle

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AI Product Lifecycle

AI Product Improvement

Data Management

AI Lingo

- [ ] Machine Learning is a subset of Artificial Intelligence

- [ ] Deep Learning is a subset of Machine Learning

- [ ] "Deep" does not mean a deeper understanding of the problem at hand. "Deep" stands for many successive layers of abstract representation

AI **ML** **Deep learning**

Supervised Learning

error reduction

100%

60%

$$\omega := \omega - \eta \, \triangledown \, Q(\omega) = \omega - \frac{\eta}{n} \sum_{i=l}^{n} \triangledown \, Q_i(\omega)$$

algorithm generated
by computer

application to
real scenarios
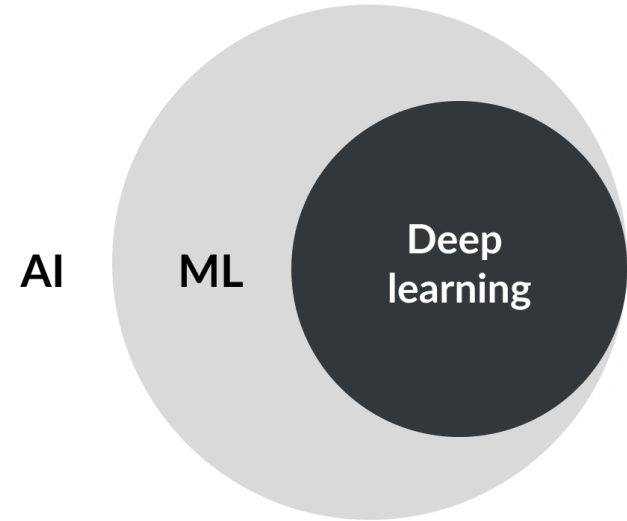
generation and training of the model

Unsupervised Learning

$$\omega := \omega - \eta \bigtriangledown Q(\omega) = \omega - \frac{\eta}{n} \sum_{i=l}^{n} \bigtriangledown Q_i(\omega)$$
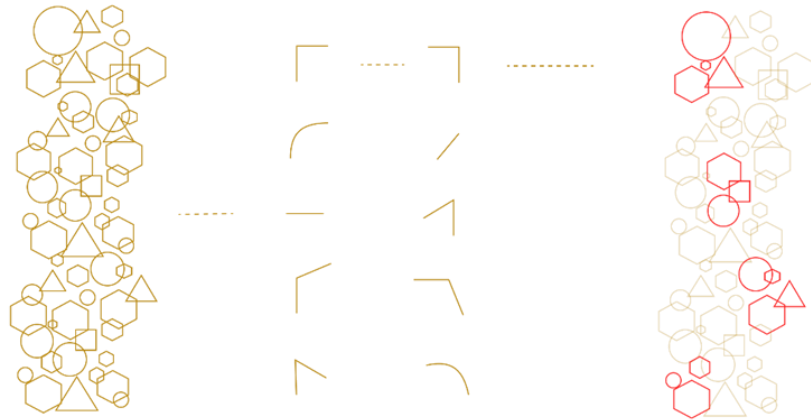
generation and training of the model

output

classification by features

result not known

algorithm generated
by computer

application to
real scenarios

Reinforcement Learning

programming
simple rules

failure

punishment

game over

success

reward

win

algorithm generated
by computer

application to
real scenarios
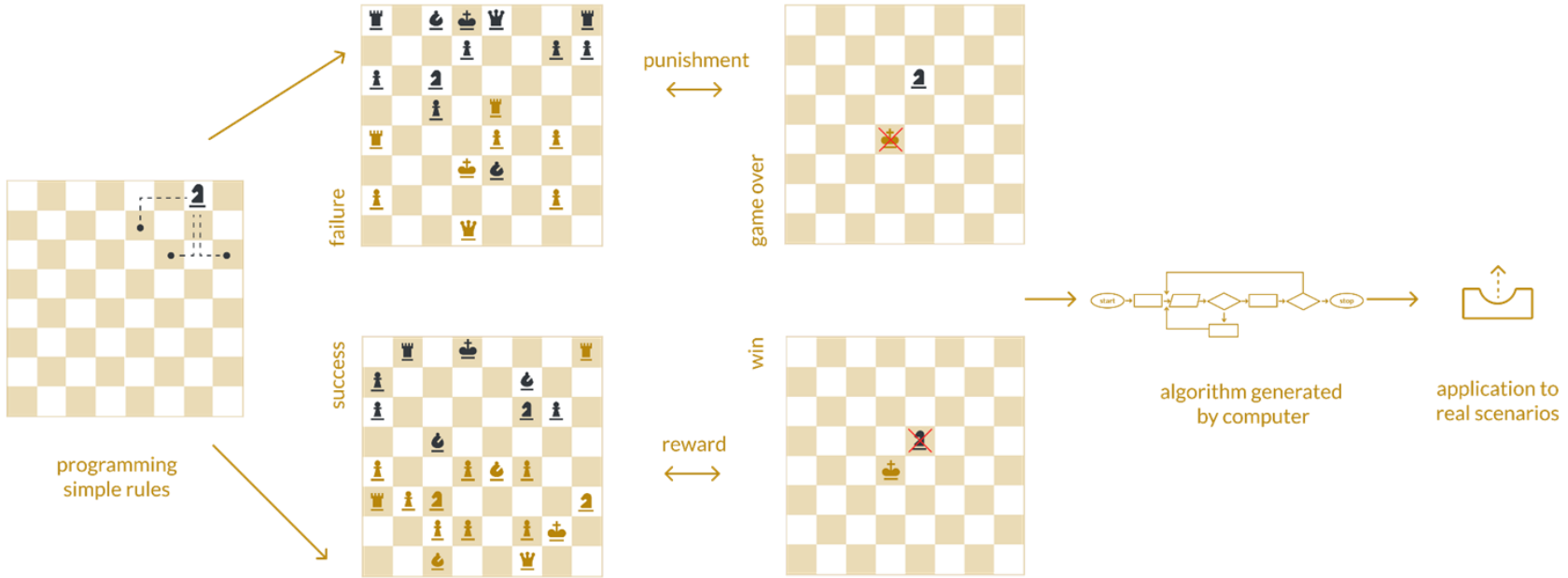
Classification

☐ Algorithm tries to predict the correct label of input data

☐ Learning happens by exposure to examples i.e. mapping inputs to targets

This is a dog
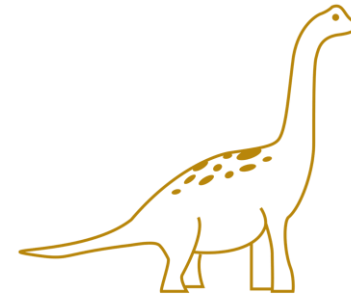
This is (most likely) not a dog

Regression

- Algorithm tries to predict continuous valuse

- It models the relationship between the input fatures and the target varable(s)

What is a model?
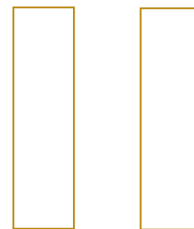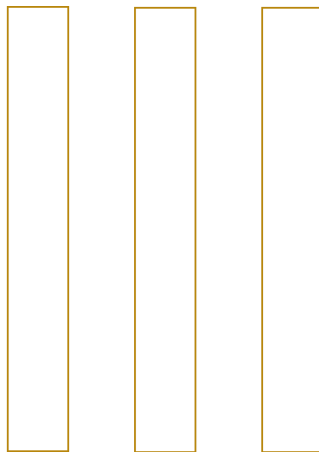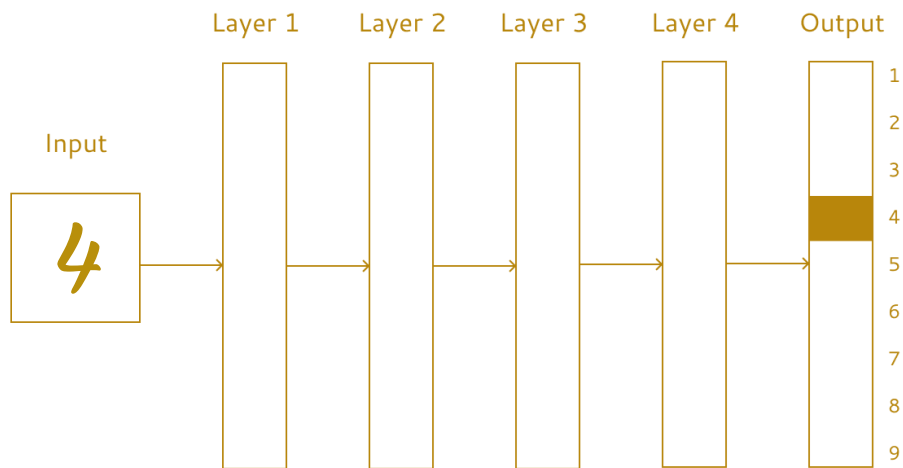
Predictions

Predictions
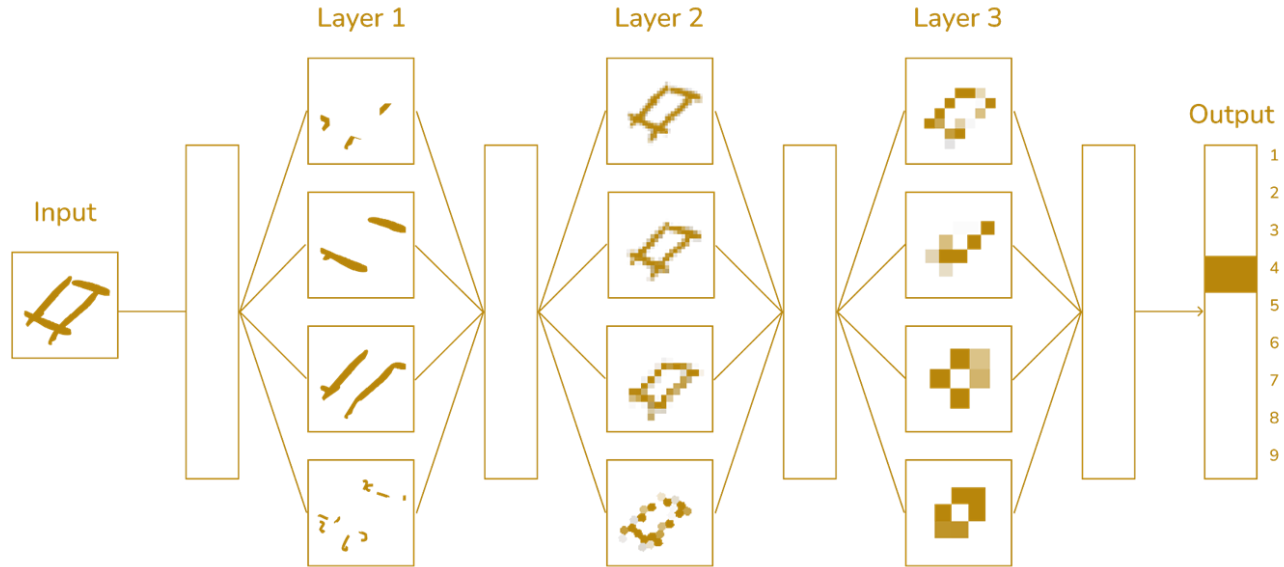
From Input to Output

Predictions   Labels

[0.7]   [1]

[0.1]   [0]

[0.1]   [0]

[0.1]   [0]

Output

1	2	1
1	3	5
1	0	0

Flattening

1
2
1
1
3
5
1
0
0

Input   Hidden layers

Major Model Types
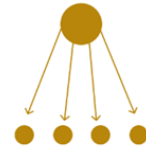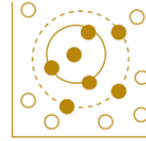
	support vector machines	decision trees	k-nearest neighbours	naive Bayes	neural networks
regression	✓	✓	✓		✓
classification	✓	✓	✓	✓	✓

Data Preprocessing

Drop bad prediction requests

Can't do this for business critical decisions and will get a filters view of the state of your predictions

Imputations (predict or set default values)

Can create drift in your predictions and could introduce data leakage if done improperly

Do nothing

Simplest, but not always possible. Service might throw an error or bad data is used to make business decisions

Raw input

Weight of X:

100g

NaN

120g

150g

1200g

Processed input

Weight of X:

100g

120g

120g

150g

120g

MODEL

Transformation Pipelines

Aim is to get the data ready for the ML model.

For a CV model this might include:

- ☐ Resizing
- ☐ Normalisation
- ☐ Randomisation
- ☐ Data augmentation
- ☐ Batching

Tests of ML Artefacts

Training data

☐ Core dataset for the model to learn on
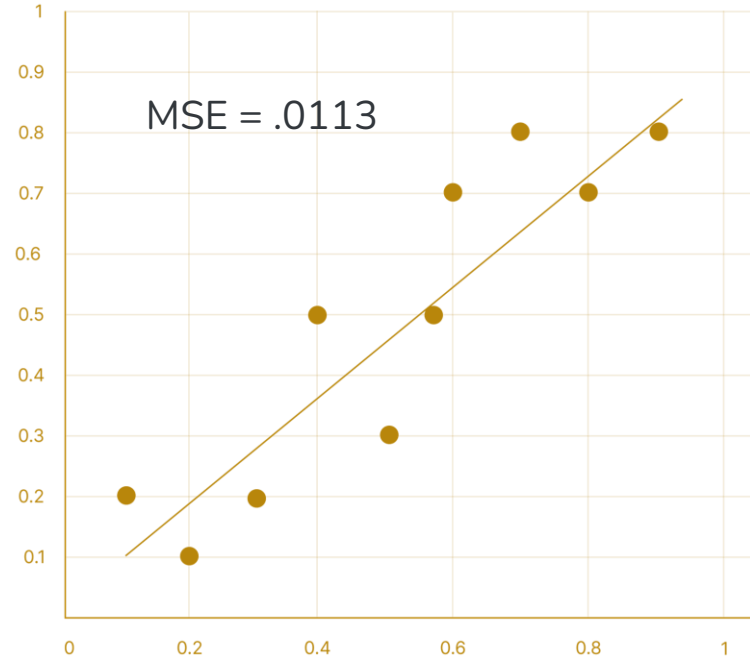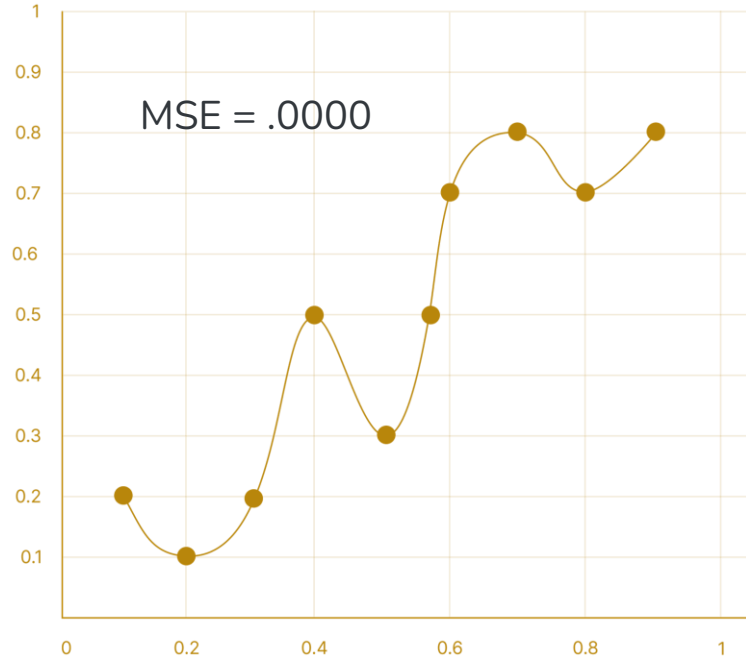
Validation data

☐ Test model on new data

Test data

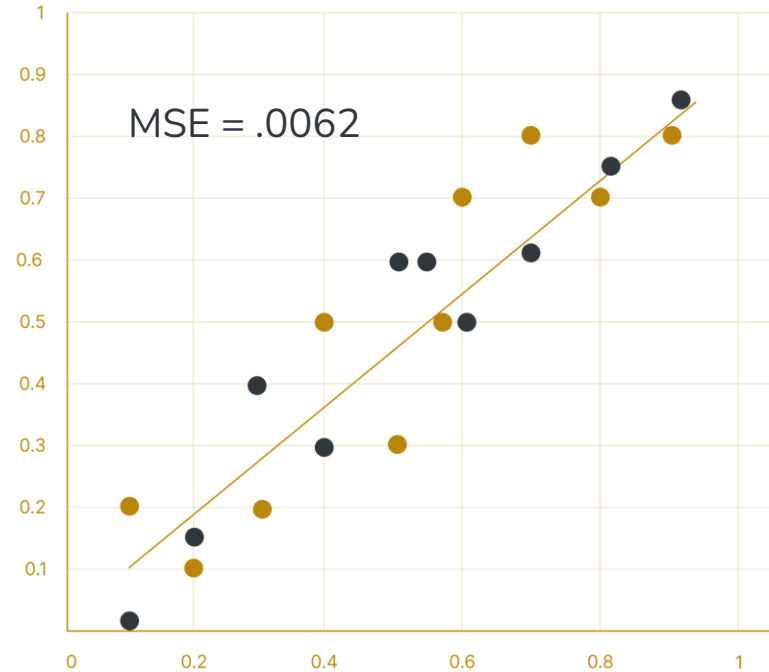☐ Final test before release

☐ Model shouldn't be tuned thereafter

MSE per Epoch

MSE

Epoch

— Training MSE

— Validation MSE - Expected

— Validation MSE - Overfitting

Which trendline is better?

MSE = .0000

MSE = .0113

Which trendline is better?

MSE = .0308

MSE = .0062
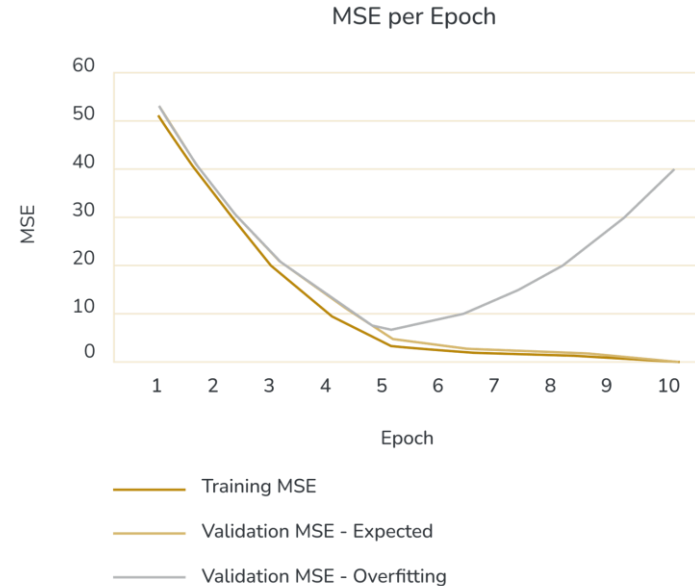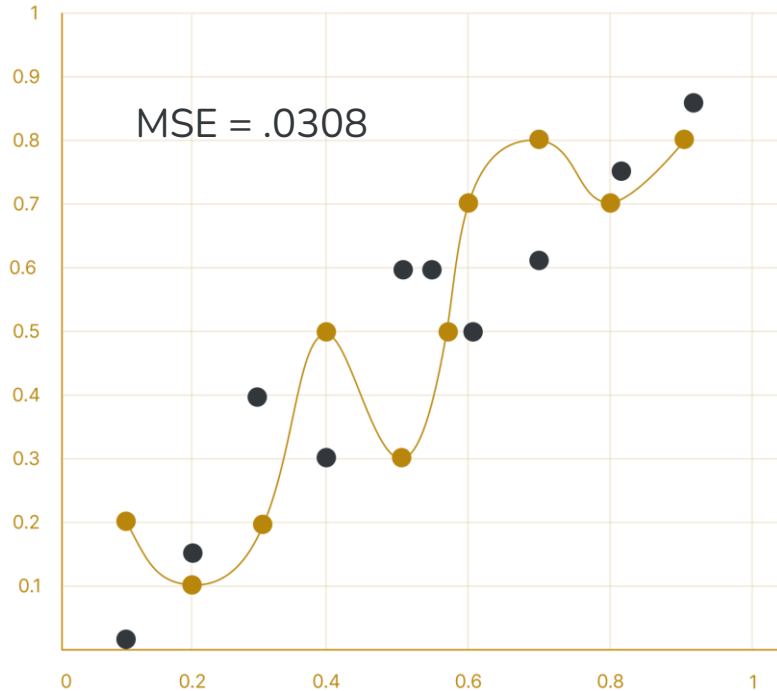
Monitoring and Live Experimentation

Dicipline still in early stages

Detect model rot early

Use logs, dashboeards & alerts

Monitor specific metrics:

- ☐ Accuracy related (user feedback)
- ☐ Predictions
- ☐ Features
- ☐ Raw inputs

Wrap-up

We are here to help

EuroCC can help you with the HPC side of things

- Training
- Consulting
- Access to a supercomputer

Don't hesitate to contact us!

STAY IN TOUCH

in EuroCC Austria

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THANK YOU

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