Machine learning is similar to human processing

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- Over time with experience, we learn to recognize different patterns.
- E.g., recognizing good apples from bad apples. As we taste different apples, we build experiences (data) of what we like and gather these experiences in our brain and create a model. This model allows us to recognize good apples from bad ones.

Image source: LinkedIn

Machine learning is a really powerful tool for many industries

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For example, in the healthcare industry, **ML models can be used to predict protein structure** based on amino acids. This is something that we can use in the future not only for for detecting diseases, but it is **a good starting point for transfer learning** for all other questions that are similar in this area.

Image source: DeepMind

What makes machine learning so exiting?

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Machine learning is a way to explore data and make predictions that was not possible in the past.

Machine learning enables more automation and better decision making.

Machine learning is versatile and can be applied to a variety of industries.

Machine learning enables fast and efficient problem solving.

The practical advantages of machine learning

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- More data analysis in less time
- Automation of repetitive tasks
- Improved accuracy & efficiency
- Handling of large amounts of data
- Faster adaptation to data changes

Defining a machine learning pipeline

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1. Feeding the system with raw data
2. Transforming data in a form that is understandable by a computer
3. Performing a series of mathematical steps (ML algorithm)
4. Computing an output with input data using different parameters

The system = Machine learning model

Training process

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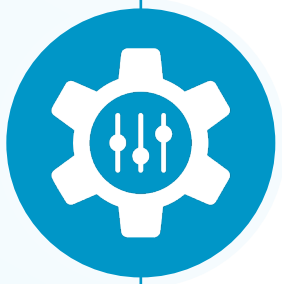

How does the ML training process work?

The machine tries to minimize the difference between the predicted and the expected output, the so-called **loss**, by adjusting the learned parameters over a number of iterations. This entire process is called **training.**

For a well-functioning ML model an appropriate dataset is a must

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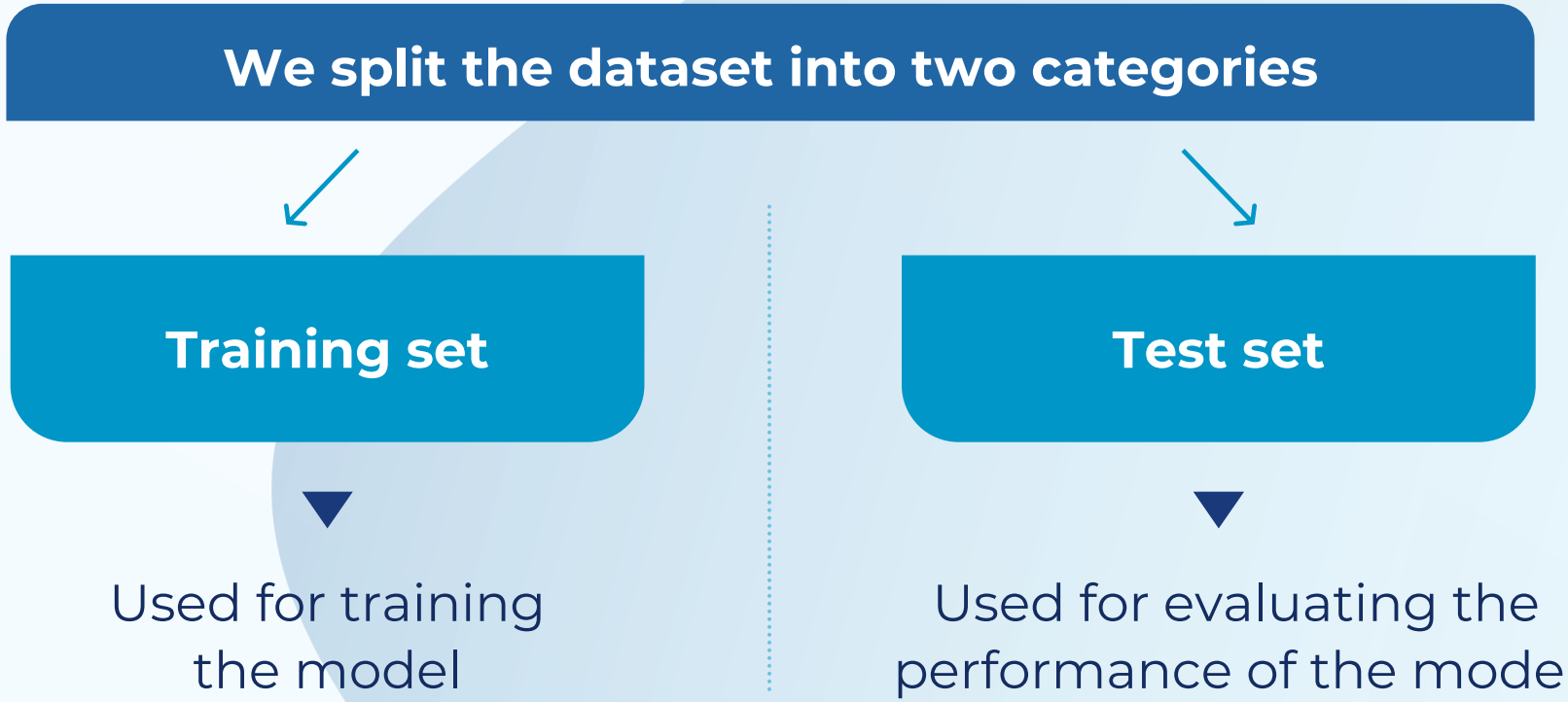

Evaluating the performance of a trained ML model

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We can use evaluation metrics to differentiate a good model from a bad one

The performance of a machine learning model indicates how accurately it predicts the expected output:

- Evaluation metrics are calculated using the predicted and actual values and indicate whether the ML model learned the relations between different features in input.