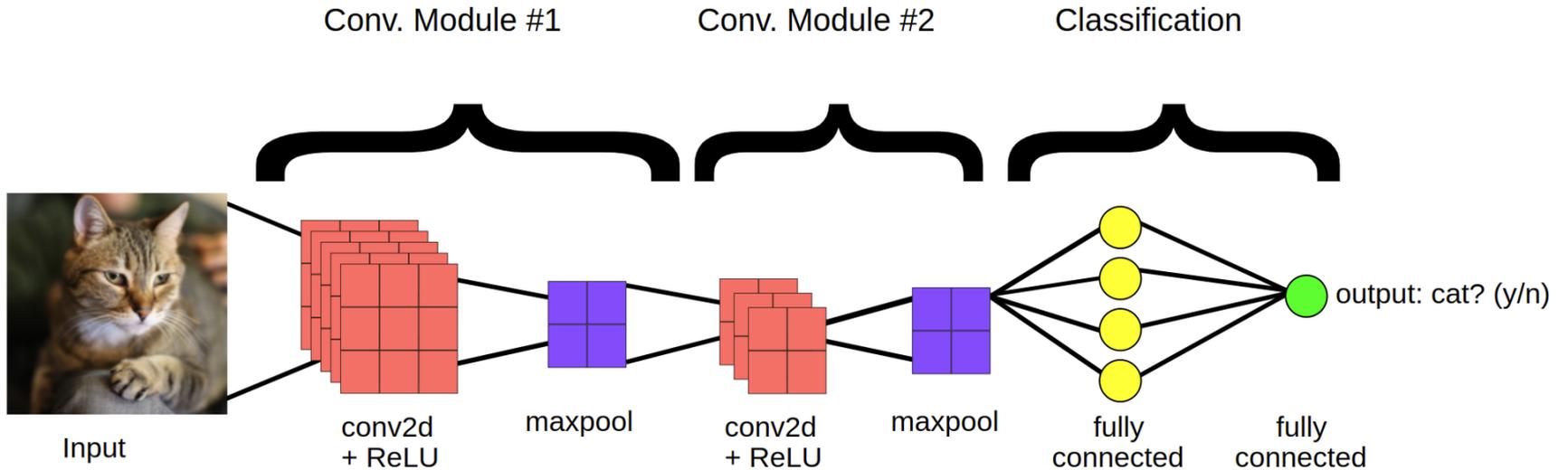


2 Anwendungsbeispiele

Anwendungsbeispiele

Bildklassifikation mit Convolutional Neural Networks (CNN)



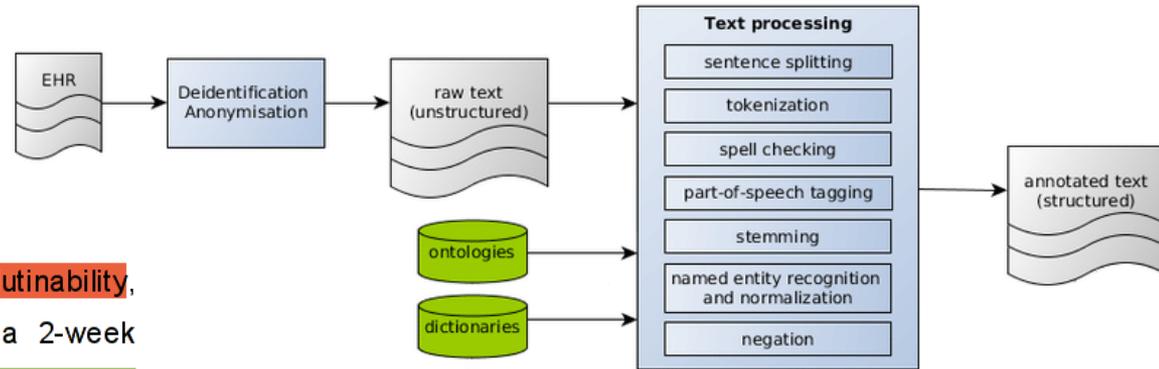
[https://developers.google.com/machine-](https://developers.google.com/machine-learning/practica/image-classification/convolutional-)

[learning/practica/image-classification/convolutional-](https://developers.google.com/machine-learning/practica/image-classification/convolutional-)

[neural-networks](https://developers.google.com/machine-learning/practica/image-classification/convolutional-)

Anwendungsbeispiele

Klassifikation von Text



A 12-year old girl with known hyperagglutinability, presented to the emergency department with a 2-week history of headaches and facial weakness. Neurologic examination indicated sensorineural hearing loss on the right side with Weber's test lateralizing to the left, and the Rinne's test demonstrating bone conduction greater than air conduction on the right. Magnetic resonance imaging of the head revealed severe structural defects of the right petrous temporal bone. No indication of cerebral infarction.

Starlinger, Johannes & Kittner, Madeleine

Blankenstein, Oliver & Leser, Ulf. (2016). How to improve

information extraction from German medical records.

Anwendungsbeispiele

Weitere Beispiele und Lösungsstrategien

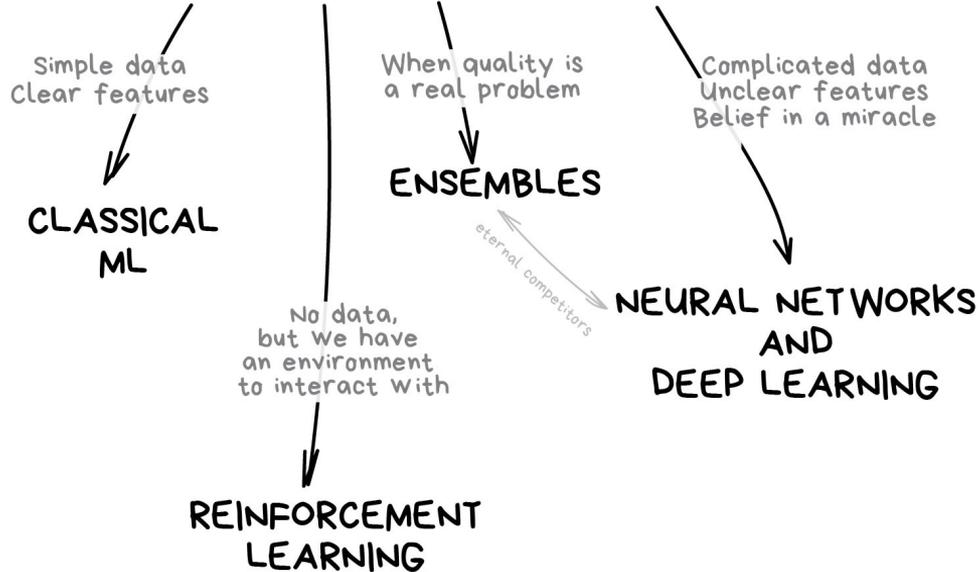
Bilder von Produkten klassifizieren	Image Classification mit CNNs
Tumore auf Bildern erkennen	Semantic Segmentation mit CNNs
autom. Klassifikation von Artikeln	NLP Text Classification, RNNs, CNNs, Transformers
autom. Flaggen von anstößigen Foren-Kommentaren	NLP Text Classification, RNNs, CNNs, Transformers
Chatbot oder pers. Assistent	NLP Natural Language Understanding
Vorhersage des Umsatzes	Regression, SVM, Regression Random Forest, RNNs, CNNs
Reaktion auf Sprachkommandos	Speech Recognition, RNNs, CNNs, Transformers
Kreditkartenbetrug	Anomaly Detection
Kunden für dedizierte Marketing-Strategie einteilen	Clustering
komplexe, hoch-dimensionale Daten visualisieren	Data Visualization, Dimensionality Reduction (PCA)
Produktempfehlungssystem	Recommender System
Game-Bot	Reinforcement Learning

3 Arten maschineller Lernensysteme

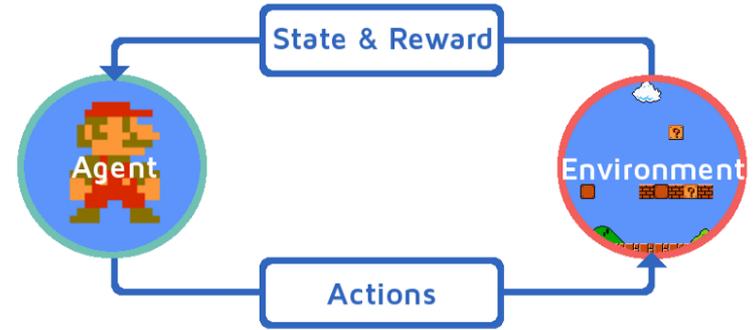
Arten von ML

Top Down

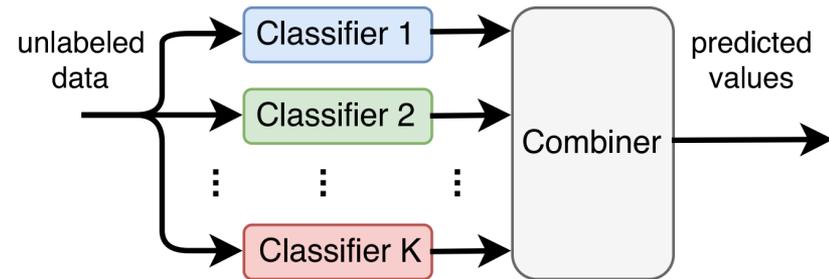
THE MAIN TYPES OF MACHINE LEARNING



https://vas3k.com/blog/machine_learning



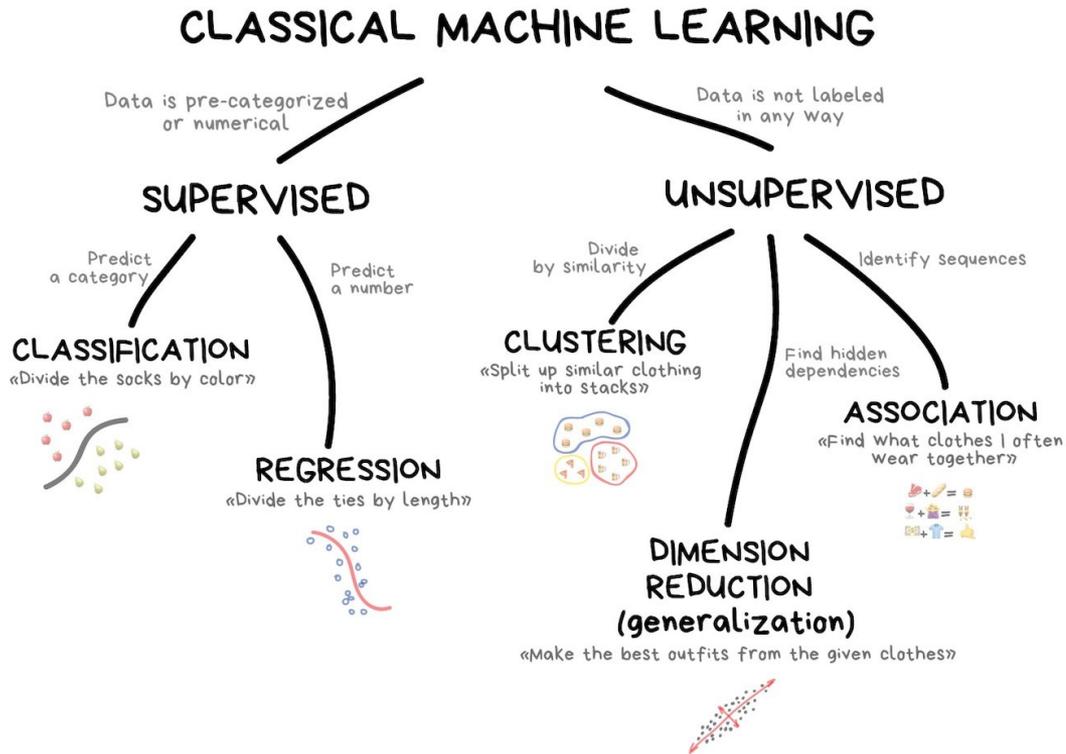
www.educba.com/what-is-reinforcement-learning



de.mathworks.com/matlabcentral/fileexchange/68383-ensemble-learning-toolbox

Arten von ML

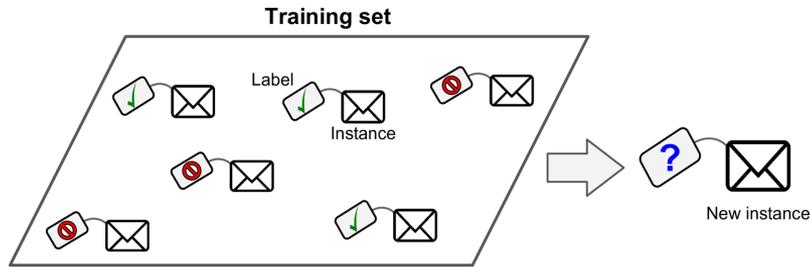
Klassisches ML



Arten von ML

Supervised Learning

20



Antworten (Labels) werden dem Algorithmus zum Zeitpunkt des Trainings gegeben

k-Nearest Neighbors

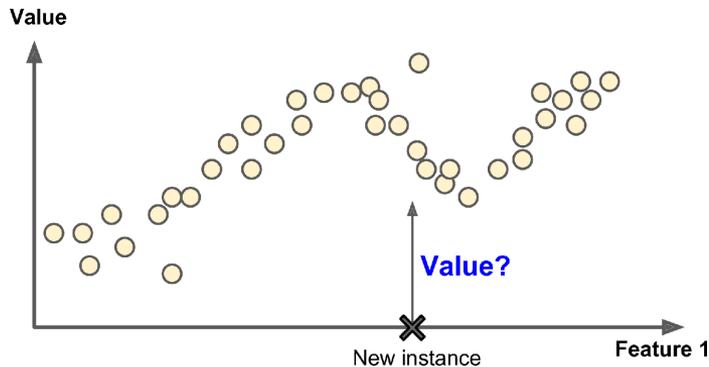
linear/logistic Regression

Support Vector Machines (SVMs)

Decision Trees und Random Forests

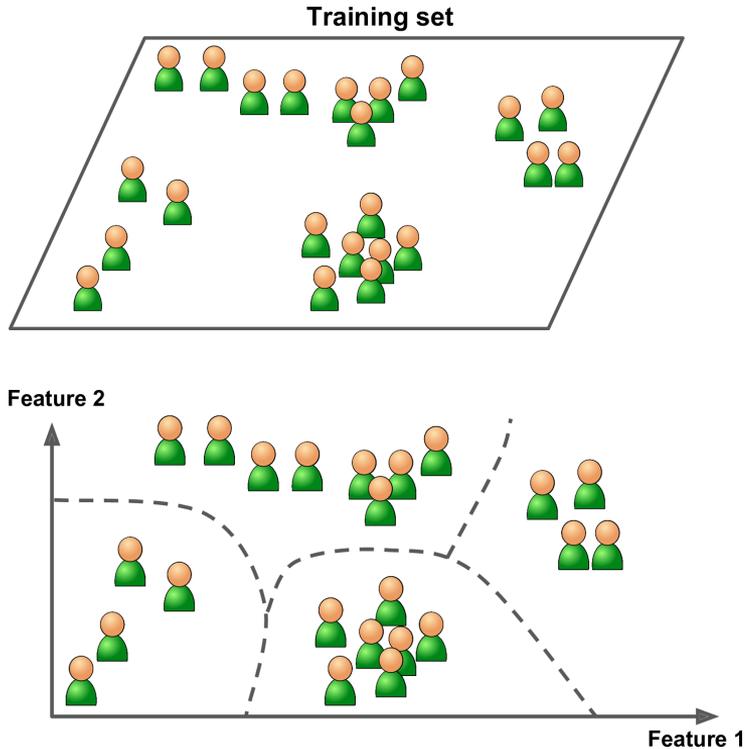
Neural Networks

Regressionsalgorithmen können auch zur Klassifikation verwendet werden.



Arten von ML

Unsupervised Learning



Antworten (Labels) sind zum Zeitpunkt des Trainings **nicht** verfügbar

Clustering

k-Means

DBSCAN

Anomaly/Novelty Detection

One-Class SVM

Isolation Forest

Visualisierung und Dimensionalitätsreduktion

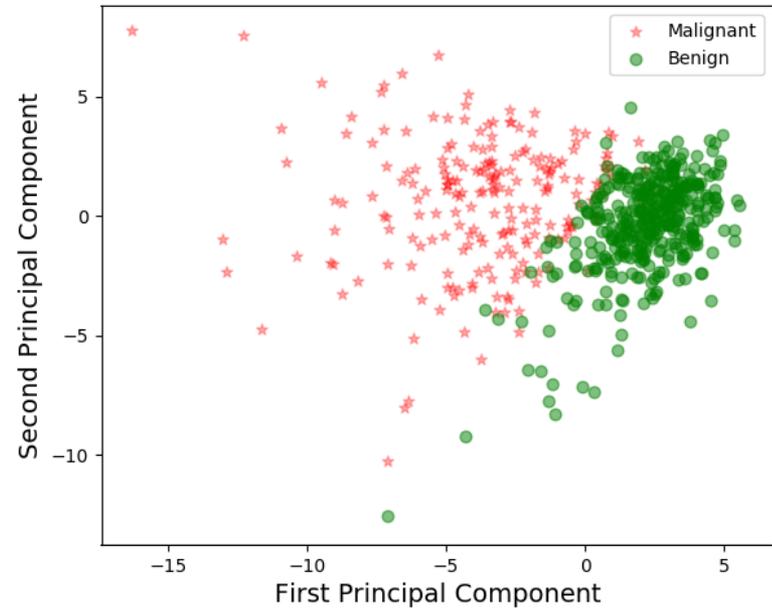
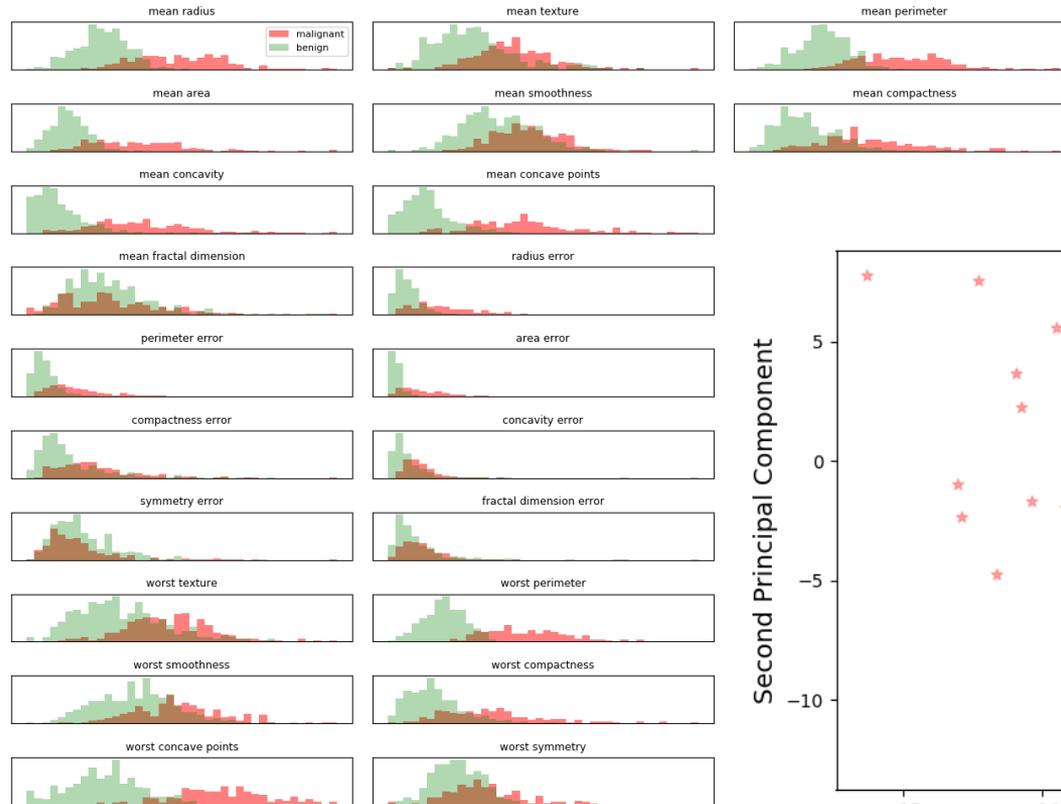
Principal Component Analysis (PCA)

Locally Linear Embedding (LLE)

Association Rule Learning

Apriori

Eclat

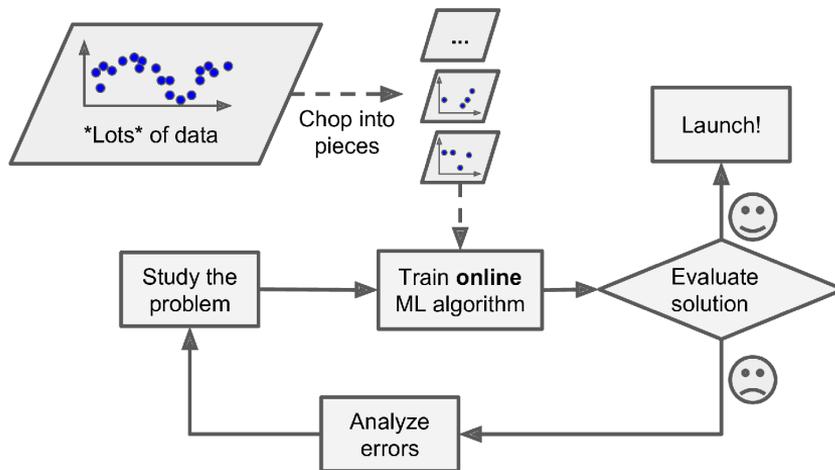


Arten von ML

Batch vs. Online Learning

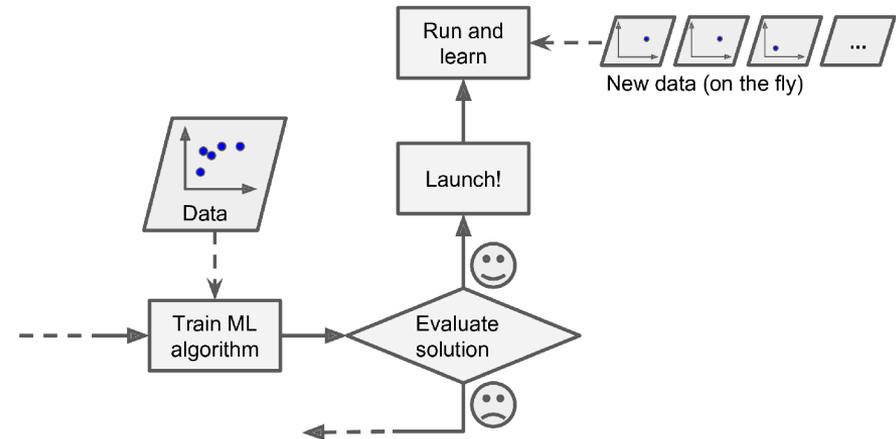
Batch

- Training vor produktivem Einsatz
- Training anhand vollständiger Daten
- Aktualisierung braucht vollst. Training



Online

- inkrementelles Training während Betrieb
- Training mit einz. Samples/Mini-Batches
- stetige Aktualisierung durch neue Samples

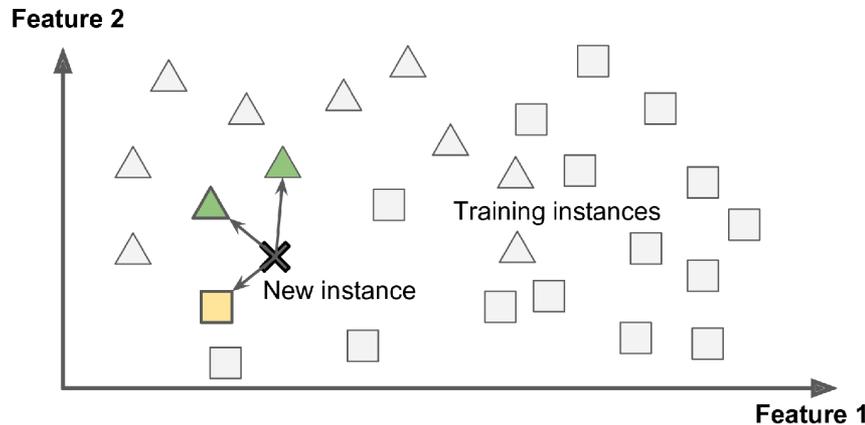


Arten von ML

Instance vs. Model-Based Learning

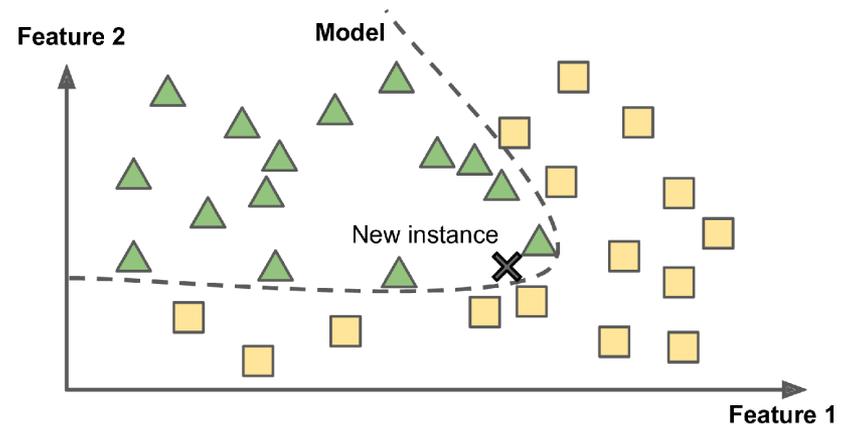
Instance-based

Neue Instanzen werden mit bekannten **durch ein Ähnlichkeitsmaß verglichen**.



Model-based

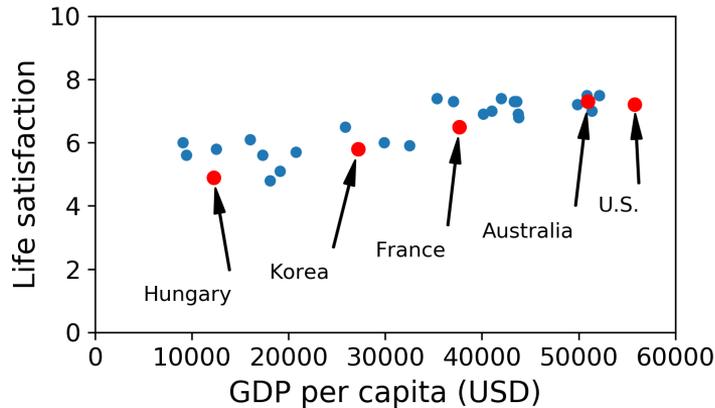
Auf Grundlage der Trainingsdaten wird ein **Modell gelernt**, mit dem dann Vorhersagen für neue Instanzen getroffen werden.



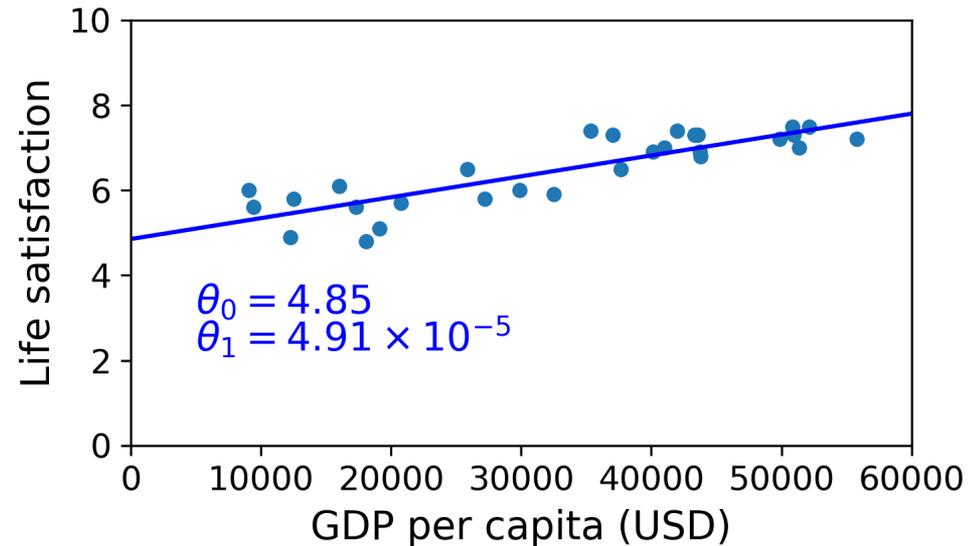
Arten von ML

Sum up - Macht Geld glücklich?

Country	GDP per capita [USD]	Life Satisfaction
Hungary	12,240	4.9
Korea	27,195	5.8
France	37,675	6.5
Australia	50,962	7.3
United States	55,805	7.2



$$life_satisfaction = \theta_0 + \theta_1 \times GDP$$



4 Herausforderungen