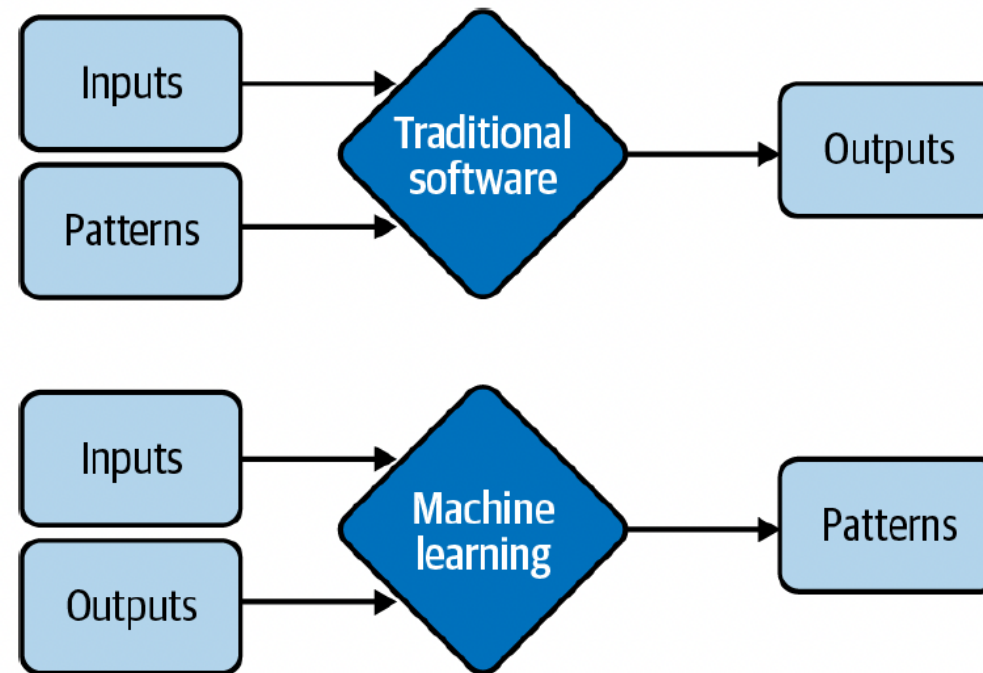


Analytics & Machine Learning

Overview

Jan Kirenz

Machine Learning



Machine Learning characteristics

Machine learning is an approach to (1) learn (2) complex patterns from (3) existing data and use these patterns to make (4) predictions on (5) unseen data.

When to use Machine Learning

- The system has the capacity to learn
- There are patterns to learn, and they are complex
- Data is available, or it's possible to collect data
- It's a predictive problem
- Unseen data shares patterns with the training data



Typical Machine Learning Use Cases

- Recommender system
- Machine translation
- Computer vision
- Chat bots

150 Successful Machine Learning Models: 6 Lessons Learned at Booking.com



Enterprise Machine Learning Use Cases

- Price optimization
- Customer acquisition
- Churn prediction
- Brand monitoring (sentiment analysis)
- Online marketing campaigns

Future of Marketing

- The Future of the Web Is Marketing Copy Generated by Algorithms: <https://www.wired.com/story/ai-generated-marketing-content/>
- copy.ai <https://www.copy.ai/>

State of AI

State of AI in 2022 by McKinsey & Company

Business and ML Objectives

- Goal of any project is to increase profits
 - **Directly:** Increasing sales and cutting costs
 - **Indirectly:** e.g., higher customer satisfaction and increasing traffic on a website
- You need to tie the performance of an ML system to the overall business performance

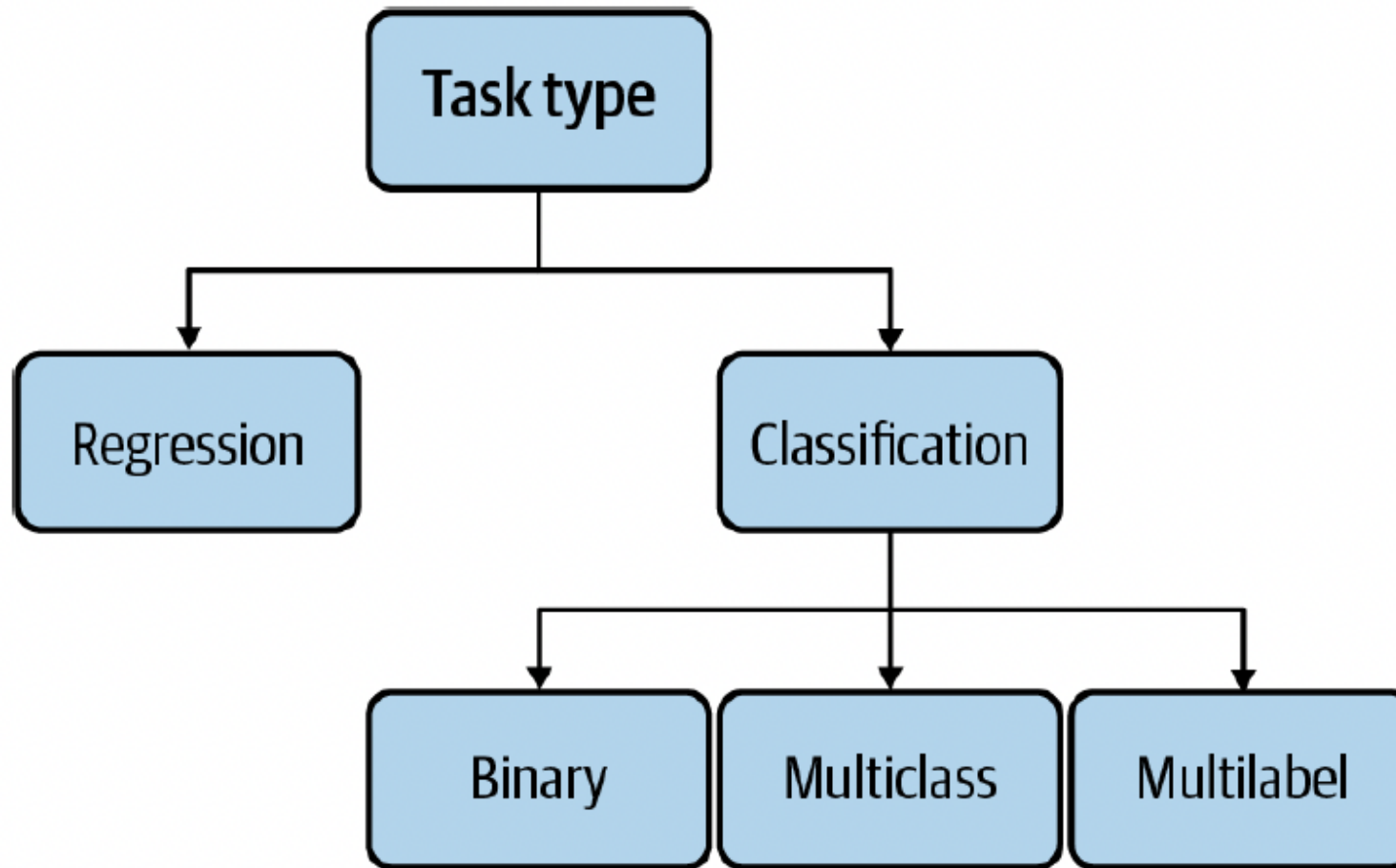
Netflix Recommender example

- Business metric: subscription cancellation rate
- Netflix measures the performance of their recommender system using take-rate: the number of quality plays divided by the number of recommendations a user sees
- The higher the take-rate, the better the recommender system
- A higher take-rate also results in lower subscription cancellation rates

A/B Testing

- Use experiments to learn how ML metrics influence business metrics
- A/B testing to choose the model that leads to better business metrics
- Regardless of whether this model has better ML metrics.

Types of ML Tasks



Classification versus regression

- Classification models classify inputs into different categories
- Regression models output a continuous value

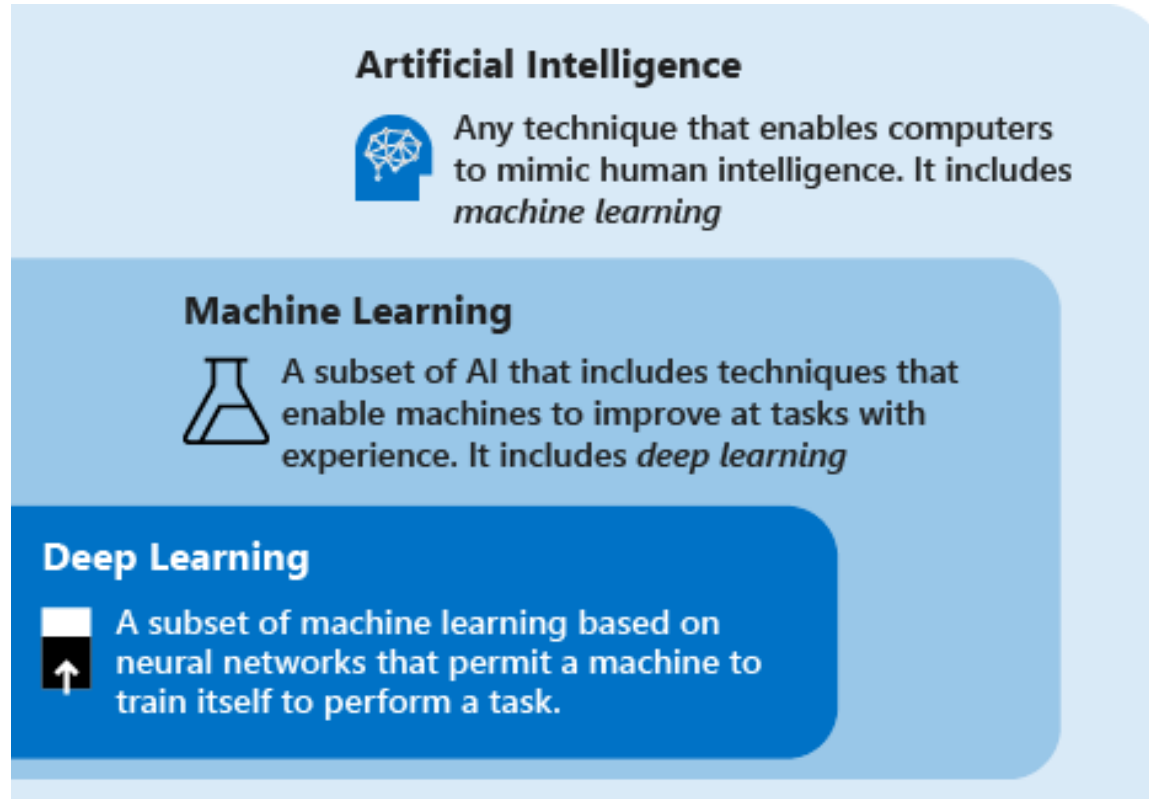
Binary versus multiclass classification

- Binary
 - Only two possible classes
- Multiclass classification
 - More than two classes

Multiclass versus multilabel classification

- Binary and multiclass classification
 - Example belongs to one class
- Multilabel classification problem
 - Example can belong to multiple classes

Machine Learning and Deep Learning



Picture source: [Microsoft](#)