

# ML Definitions / Glossary

**Artificial Intelligence (AI)** The broader field of creating machines capable of performing tasks that typically require human intelligence, such as problem-solving, understanding natural language, and recognizing patterns. AI has its roots in the 1950s, and Machine Learning is a subset of AI that focuses on algorithms and statistical models.

**Machine Learning (ML)** A subset of AI that enables systems to learn and improve from experience without being explicitly programmed. The term was coined by Arthur Samuel in 1959, who also developed one of the first self-learning algorithms.

**Neural Networks** A set of algorithms, modeled loosely after the human brain, designed to recognize patterns. Neural Networks gained popularity in the 1980s and 1990s with the development of backpropagation, an algorithm essential for training deep neural networks.

**Deep Learning** A subset of Machine Learning that uses neural networks with many layers (hence "deep"). It became widely recognized in the 2010s for its success in fields like image and speech recognition, though its conceptual foundations date back to the 1980s.

**Algorithm** A set of rules or instructions given to an AI or ML system to help it learn from data and make decisions. The development of various algorithms, such as decision trees and support vector machines, marked key milestones in ML's history.

**Backpropagation** A method used to train neural networks by adjusting the weights in the network based on the error rate obtained in the previous epoch (iteration). Developed in the 1970s and popularized in the 1980s, backpropagation was a breakthrough in making deep learning feasible.

**Overfitting** A modeling error in machine learning that occurs when a model learns not only the underlying pattern in the training data but also the noise,

leading to poor generalization to new data. The concept of overfitting has been a critical issue in ML since its early days.

**Underfitting** Underfitting occurs when a machine learning model is too simple to capture the underlying patterns in the data, leading to poor performance on both the training data and new, unseen data.

**Matrix Multiplication** Matrix multiplication is an operation that takes two matrices and produces a third matrix by multiplying rows of the first matrix with columns of the second matrix, and summing the products. In the context of Machine Learning, matrix multiplication is crucial for operations such as transforming data, computing weighted sums in neural networks, and solving systems of linear equations.