Artificial Intelligence
Glossary

Ai

The field of AI encompasses a wide range of disciplines and technologies. This glossary of the most important key terms can help broaden your understanding and delve deeper into this fascinating world.

SIEMENS

A

Artificial Intelligence

Artificial Intelligence (AI) refers to software that has the ability to learn and adapt. AI can solve tasks that require it to interpret the meaning of input data and adapt to the requirements. Typically, these are tasks that previously could only be solved by natural intelligence. There are several types of AI methods, which differ significantly in terms of their fields of application, their potentials and the risks associated with them. The basic principles of AI were developed in the 20th century. Because all AI methods require large amounts of training data, the technology is now gaining increased critical relevance through digitization and big data.

Augmented Reality (AR)

A technology that allows digital information to be overlayed on real world environments and objects, typically using immersive 3D Virtual Reality. AR allows an enhanced version of the physical world by adding digital visual, sound and other sensory elements.

Autonomous Systems

Systems that can operate without human intervention, such as self-driving cars and drones.

Autonomous Vehicles

Vehicles that can operate without human intervention, such as self-driving cars and trucks.

B

Bias in AI

Unintended prejudice or favoritism that may occur in AI systems due to biased training data or algorithms.

Big Data

Large and complex data sets, often generated by (industrial) sensors, but also by companies, organizations and people. As this data is often unstructured, incomplete or incorrect, non-AI-powered software usually cannot process it in a meaningful way.

C

Chatbot

An AI-powered program that can interact with humans through text or voice communication.

Cognitive Computing

A type of AI that aims to replicate human cognitive processes, such as perception, reasoning, and decision-making.

Computer Vision

A subset of AI that allows computers to extract information from visuals, such as images and videos, to understand and interpret them.

Cybersecurity

Strategies, measurements, and tools to help secure digital information from external attackers. AI can be used to detect and prevent cyberattacks, and to identify and respond to security breaches.

D

Data Analytics

The process of analyzing and interpreting data to uncover insights and make informed decisions.

Decision Support Systems

Computer systems that are designed to assist humans in making decisions by providing relevant information and analysis.

Deep Learning

A subset of Machine Learning that involves the use of neural networks with multiple layers to enable machines to learn from data.

Digital Twin

A mathematical model that describes the behavior of a physical object or process. In a simulation environment, a digital twin can be used to simulate what would happen in the real world if the parameters of the system were to be changed. Digital twins can be used throughout the product lifecycle, including the design, manufacturing, operation, and service phases. Visual representations of digital twins look and behave like their physical counterparts, mirroring the real world and adapting in real time to what is happening there.

E

Edge AI/ Edge Computing

Edge Computing is a type of system architecture that, unlike cloud computing, brings computing and data storage closer to the data sources (the "edge"). It helps to reduce response times and the amount of energy required for data transfer. Edge AI systems can be implemented physically close to the actual execution device. These devices can run AI applications without being connected to the cloud.

Embodied AI

AI that is designed to interact with and navigate the physical world, often through the use of robots or autonomous vehicles.

Ethics in AI

The study and application of moral principles in the development and use of AI, including issues such as bias, privacy, and accountability.

Explainable AI

AI that is designed to be transparent and explainable, enabling humans to understand how and why a machine made a particular decision.

F

Federated Learning

Is a training method in machine learning where multiple separate devices train a machine learning model with their own (separate) dataset. Only the end results are shared with the main actor in the network.

G

Generative AI

AI that is designed to generate new content, such as images, videos, and music by combining and learning from existing content.

Generative Design

Capability of an application, e.g., CAD software, to autonomously generate a number of design alternatives given a set of constraints. Uses techniques such as AI, optimization and simulation.

I

Industrial AI

Industrial AI refers to the application of AI within the industries that form the backbone of our economies – industry, infrastructure, mobility and healthcare.

Industrial-grade AI

Industrial-grade AI denotes a level of quality; reliable, secure, and trustworthy, designed to meet the rigorous requirements and standards of the most demanding professional environments.

Industry 4.0

A term used to describe the fourth industrial revolution, which involves the integration of AI, IoT, and other advanced technologies into manufacturing and industry.

Internet of Things (IoT)

The network of technical devices embedded with sensors, software, and connectivity to enable data exchange. The IoT is one of the main drivers of digitalization and big data.

K

Knowledge Graph

A database that represents knowledge as a graph of interconnected nodes and edges, used for AI applications such as NLP and search.

L

LLM (Large Language Model)

A type of AI language model that is trained on massive amounts of data, such as GPT-3, to generate human-like text.

M

Machine Learning (ML)

A subset of AI that involves the use of algorithms and statistical models to enable machines to learn from experience or data.

Machine Vision

A subset of AI that allows machines with attached cameras to extract visual information for understanding and interpreting their surroundings.

N

Natural Language Processing (NLP)

A subset of AI that focuses on the interaction between computers and human language.

Natural User Interface (NUI)

An interface that enables humans to interact with computers using natural gestures, speech, and other forms of expression.

Neural Networks

A type of Machine Learning algorithm that is modeled after the structure of the human brain and is used to recognize patterns in data.

Non-intrusive Load Monitoring (NILM)

A process for analyzing changes in the voltage and current of buildings or machines that comprise multiple sub-devices to deduce the individual contribution of each device in the system.

P

Predictive Analytics

The use of AI and statistical models to predict future events or trends based on historical data.

Predictive Maintenance

The use of AI to predict when machines will need maintenance or repairs, based on real-time data.

Q

Quality Control

The use of AI to detect defects and ensure that products meet quality standards.

R

Reinforcement Learning

A type of Machine Learning where untrained agents learn a strategy through penalties and rewards of the system after performed actions.

Responsible AI

AI applications that meet defined ethical and moral standards.

Robotics

The branch of engineering and AI that focuses on the design, construction, and operation of robots.

S

Sentiment Analysis

The use of AI to analyze and interpret the emotions
and opinions expressed in text or speech.

Smart Grid

An electrical grid that uses AI and other advanced technologies
to optimize the generation, distribution, and consumption of electricity.

Speech Recognition

The ability of machines to recognize and interpret human speech.

Supervised Learning

A learning method where machine learning models are trained
with a labeled (known) data sets to predict an outcome.

Supply Chain Optimization

Flow optimization of goods and materials in a supply chain
to reduce cost and improve efficiency. AI is often used for
processes automation, inefficiency detections, quality assurance
of goods and demand forecasting.

Synthetic Data

Artificial data generated by algorithms rather than real-world
events that is used to train and validate Machine Learning models. The
quality of the synthetic data is critical. It determines whether the AI will
produce acceptable results after training.

U

Unsupervised Learning

A learning method where Machine Learning models discover patterns
and groupings in data that is previously unknown (unlabeled).

V

Virtual Reality (VR)

Virtual Reality (VR) presents a digitally rendered environment that can replicate an actual space, create an alternative reality or combine the two. The user is able to explore the virtual space from the confines of home, office or factory floor.