



HPE AI Basics Glossary

Term	Definition
Artificial Intelligence	Artificial intelligence (AI), is intelligence demonstrated by machines, unlike the natural intelligence displayed by humans and animals. Leading AI textbooks define the field as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term "artificial intelligence" is often used to describe machines (or computers) that mimic "cognitive" functions that humans associate with the human mind, such as "learning" and "problem solving."
Cognitive Analytics	Can the machine make the decision? Applies human like intelligence to certain tasks, such as understanding not only the words in a text, but the full context of what is being written or spoken, or recognizing objects in an image within large amounts of information.
Computer vision	<p>Interdisciplinary scientific field that deals with how computers can gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to understand and automate tasks that the human visual system can do. Computer vision tasks include methods for acquiring, processing, analyzing and understanding digital images, and extraction of high-dimensional data from the real world in order to produce numerical or symbolic information, e.g. in the forms of decisions. Understanding in this context means the transformation of visual images (the input of the retina) into descriptions of the world that make sense to thought processes and can elicit appropriate action. This image understanding can be seen as the disentangling of symbolic information from image data using models constructed with the aid of geometry, physics, statistics, and learning theory.^[8]</p> <p>The scientific discipline of computer vision is concerned with the theory behind artificial systems that extract information from images. The image data can take many forms, such as video sequences, views from multiple cameras, multi-dimensional data from a 3D scanner, or medical scanning device. The technological discipline of computer vision seeks to apply its theories and models to the construction of computer vision systems.</p>

Convolutional Neural Networks CNN

In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of deep neural networks, most commonly applied to analyzing visual imagery. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture and translation invariance characteristics. They have applications in image and video recognition, recommender systems, image classification, medical image analysis, natural language processing, brain-computer interfaces, and financial time series.

Data Science

Inter-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data. Data science is related to data mining, machine learning and big data. Data science is a "concept to unify statistics, data analysis and their related methods" in order to "understand and analyze actual phenomena" with data. It uses techniques and theories drawn from many fields within the context of mathematics, statistics, computer science, domain knowledge and information science. Turing award winner Jim Gray imagined data science as a "fourth paradigm" of science (empirical, theoretical, computational, and now data-driven) and asserted that "everything about science is changing because of the impact of information technology" and the data deluge.

Decision support system (DSS)

Information system that supports business or organizational decision-making activities. DSSs serve the management, operations and planning levels of an organization (usually mid and higher management) and help people make decisions about problems that may be rapidly changing and not easily specified in advance—i.e. unstructured and semi-structured decision problems. Decision support systems can be either fully computerized or human-powered, or a combination of both.

While academics have perceived DSS as a tool to support decision making processes, DSS users see DSS as a tool to facilitate organizational processes.

Deep Learning

Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning.

Descriptive Analytics	What happened? Describing or summarising the existing data using existing business intelligence tools to better understand what is going on or what has happened.
Diagnostic Analytics	Why did it happen? Use past performance to determine what happened and why . The result of the analysis is often an analytic dashboard.
Exascale Computing	Exascale computing refers to computing systems capable of calculating at least 10^{18} floating point operations per second.
Expert Systems	A computer system emulating the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if-then rules rather than through conventional procedural code.
FPGA	A field-programmable gate array (FPGA) is an integrated circuit designed to be configured by a customer or a designer after manufacturing – hence the term "field-programmable".
Generative Adversarial Network GAN	Two neural networks contest with each other in a game (in the form of a zero-sum game, where one agent's gain is another agent's loss).
Image Analysis	Image analysis is the extraction of meaningful information from images; mainly from digital images by means of digital image processing techniques.
Inference	Applies knowledge from a trained neural network model and a uses it to infer a result. So, when a new unknown data set is input through a trained neural network, it outputs a prediction based on predictive accuracy of the neural network.
Machine Learning	Machine learning (ML) is the study of computer algorithms that improve automatically through experience. It is seen as a subset of artificial intelligence. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of applications, such as email filtering and computer vision, where it is difficult or unfeasible to develop conventional algorithms to perform the needed tasks.
Memory-driven compute	When the bottleneck in a compute system is constrained by the amount of memory bandwidth available to the processors. As opposed to compute-driven. Usually requires systems to have access fast memory and large memory devices
MLOps	Practice for collaboration and communication between data scientists and operations professionals to help manage production ML lifecycle.
Natural Language Processing	Programming computers to process and analyze large amounts of natural language data. A known use of this is in personal digital assistants.
Natural Language Understanding	Understanding of sentences in text, speech and context

Neural Networks	A neural network is a network or circuit of neurons, or in a modern sense, an artificial neural network, which is a computing system based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal to other neurons. An artificial neuron that receives a signal then processes it and can signal neurons connected to it.
Nodes	A computational unit that has one or more weighted input connections, a transfer function that combines the inputs in some way, and an output connection. Nodes are then organized into layers to comprise a network. Also called a neuron
Pattern recognition	The automated recognition of patterns and regularities in data. It has applications in statistical data analysis, signal processing, image analysis, information retrieval, bioinformatics, data compression, computer graphics and machine learning.
Petascale	Petascale computing refers to computing systems capable of calculating at least 10^{15} floating point operations per second (1 petaFLOPS).
Predictive Analytics	What will happen? Predicting the possible outcome using statistical models and machine learning techniques.
Prescriptive Analytics	How to get the best result? It is a type of predictive analytics that is used to recommend one or more course of action on analyzing the data.
Recurrent Neural Network RNN	A recurrent neural network (RNN) is a class of artificial neural networks where connections between nodes form a directed graph along a temporal sequence. This allows it to exhibit temporal dynamic behavior. Derived from feedforward neural networks, RNNs can use their internal state (memory) to process variable length sequences of inputs. This makes them applicable to tasks such as unsegmented, connected handwriting recognition or speech recognition.
Robotic process automation (or RPA)	Form of business process automation technology based on metaphorical software robots (bots) or on artificial intelligence (AI)/digital workers. It is sometimes referred to as <i>software robotics</i> (not to be confused with robot software). In traditional workflow automation tools, a software developer produces a list of actions to automate a task and interface to the back-end system using internal application programming interfaces (APIs) or dedicated scripting language. In contrast, RPA systems develop the action list by watching the user perform that task in the application's graphical user interface (GUI), and then perform the automation by repeating those tasks directly in the GUI. This can lower the barrier to use of automation in products that might not otherwise feature APIs for this purpose.
Supervised learning	In machine learning and artificial intelligence, supervised learning refers to a class of systems and algorithms that determine a predictive model using data points with known outcomes. The model is learned by training through an appropriate learning algorithm (such as linear regression, random forests, or neural networks) that typically works through some optimization routine to minimize a loss or error function.

Training

Deep learning neural network models learn to map inputs to outputs given a training dataset of examples. The training process involves finding a set of weights in the network that proves to be good, or good enough, at solving the specific problem.

Unsupervised learning

Type of machine learning that looks for previously undetected patterns in a data set with no pre-existing labels and with a minimum of human supervision. In contrast to supervised learning that usually makes use of human-labeled data, unsupervised learning, also known as self-organization, allows for modeling of probability densities over inputs. It forms one of the three main categories of machine learning, along with supervised and reinforcement learning.
