Basics

What is AI?	Artificial intelligence (AI) is a field of computer science that focuses on creating machines that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

Timeline

1935	Alan Turing, a British logician and computer pioneer, did the earliest substantial work in the field of artificial intelligence
1940	Edward Condon displayed Nimatron, a digital computer that played Nim perfectly. Konrad Zuse built the first working program-controlled computers.
1943	Warren Sturgis McCulloch and Walter Pitts published "A Logical Calculus of the Ideas Immanent in Nervous Activity," laying foundations for artificial neural networks.
1950	Alan Turing proposed the Turing test as a measure of machine intelligence. Claude Shannon published a detailed analysis of chess playing as search. Isaac Asimov published his Three Laws of Robotics
1955	John McCarthy, known as the father of AI, developed the programming language LISP and coined the term "artificial intelligence".
1956	The Dartmouth College summer AI conference was organized by John McCarthy, Marvin Minsky, Nathan Rochester of IBM, and Claude Shannon. McCarthy coined the term "artificial intelligence," and the conference is considered the formal founding of the field of AI.
1957-1974	AI flourished, and computers became faster, cheaper, and more accessible. Machine learning algorithms improved, and people got better at knowing which algorithm to apply to their problem. Early demonstrations such as Newell and Simon's General Problem Solver and John McCarthy's Advice Taker showed the promise of AI.
1980s	AI was reignited by two sources: an expansion of the algorithmic toolkit and a boost of funds. John Hopfield and David Rumelhart popularized "deep learning" techniques, which allowed computers to learn using experience. Edward Feigenbaum introduced expert systems, which used a knowledge base of rules to make decisions.
1990s	AI research shifted toward practical applications, such as speech recognition, computer vision, and robotics. The development of the World Wide Web and the explosion of digital data created new opportunities for AI.

Basics (cont)

2000s	AI experienced a resurgence, thanks to advances in deep learning, big data, and cloud computing. Companies such as Google, Facebook, and Microsoft invested heavily in AI research and development, leading to breakthroughs in natural language processing, image recognition, and game playing

Classification of AI

Type 1	
Narrow AI	This type of AI is designed to perform a specific task with intelligence. It is the most common and currently available AI in the world of artificial intelligence. Examples of narrow AI include playing chess, purchasing suggestions on e-commerce sites, self-driving cars, speech recognition, and image recognition.
General AI	This type of AI is designed to perform any intellectual task with efficiency like a human. It is capable of understanding and learning any intellectual task that a human can perform.
Super AI	This type of AI is hypothetical and does not exist yet. It is capable of performing intellectual tasks that are beyond human capabilities.
Capabilities of AI	
Make Predictions	Detect Anomalies
Analyze images	Comprehend speech
interact in natural ways	
Type 2 AI	
Reactive Machines	hese are the most basic types of AI that do not store memories or past experiences. They can only react to the current situation based on pre-programmed rules.
Limited Memory	These types of AI can use past experiences to inform future decisions. They can learn from historical data and use that knowledge to make decisions.
Theory of Mind	This type of AI can understand the emotions, beliefs, and intentions of others. It can predict the behavior of others based on their mental state.
Self Aware	This is the most advanced type of AI that can have consciousness and understand its own existence. It can have desires, needs, and emotions.

Machine Learning

Machine learning is an application of artificial intelligence that involves algorithms and data that automatically analyze and make decision by itself without human intervention. It describes how computer perform tasks on their own by previous experiences. Therefore we can say in machine language artificial intelligence is generated on the basis of experience.

Supervised learning: AI systems that learn from labelled training data. Example: Email spam filter

Unsupervised learning: AI systems that learn from unlabelled data. Example: Clustering customer data.

Reinforcement learning: AI systems that learn from the feedback of the environment. Example: AlphaGo.

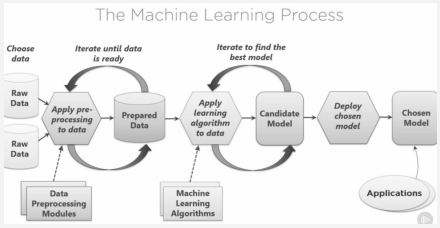
Supervised Learning

Classification	Regression	Time series forecasting

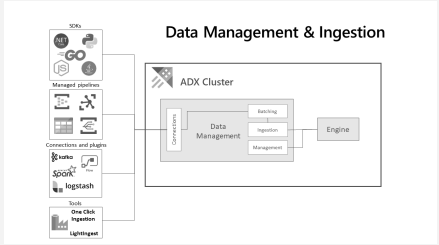
Supervised Learning (cont)

to identify the category of new observations on the basis of training data. In Classification, a program learns from the given dataset or observations and then classifies new observation into a number of classes or groups.	is a process of finding the correlations between dependent and independent variables. It helps in predicting the continuous variables such as prediction of Market Trends, prediction of House prices, etc.	Time series forecasting is the process of analyzing time series data using statistics and modeling to make predictions and inform strategic decision-making. It's not always an exact prediction, and likelihood of forecasts can vary wildly—especially when dealing with the commonly fluctuating variables in time series data as well as factors outside our control.

Machine Learning Process



Data Ingestion



Interdependency and Key Features of AI

Artificial Intelligence	Any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (including deep learning.
Machine Learning	A subset of AI that includes abstruse statistical techniques that enables machines to improve the tasks with experience. The category includes deep learning.

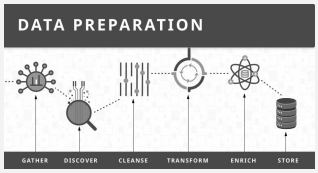
Interdependency and Key Features of AI (cont)

Deep Learning	The subset of machine learning composed of algorithms that permit software to train itself to perform task, like speech and image recognition, by exposing multilayered neural networks to vast amount of data
Key Features of AI	1. Machine Learning
	2. Deep Learning
	3. Natural Language Processing
	4. Computer Vision
	5. Neural Network
	6. Cognitive Computing

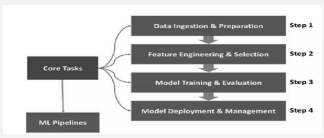
Labelled and Unlabelled Data

Labelled Data	Unlabelled Data
Data that has some predefined tags such as name, type, or number.	Contains no tags or no specified name.
Used in Supervised Learning techniques.	Used in Unsupe-rvised Learning.
Difficult to get.	Easy to acquire.
e.g., An image has an apple or banana.	e.g., Anomaly detection, association rule learning.

Data Preparation

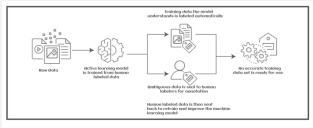


ML solutions



Labels and Features in Machine Learning

How Data Labelling Works



Benefits and Challenges of Data Labelling

Benefits	Challenges
Precise Predic-tions	Costly and time-cons-uming
Better Data Usability	Possibilities of Human--Error

Approaches to Data Labeling

- Internal / In-house data labeling
- Synthetic Labeling
- Programmatic Labeling
- Outsourcing
- Crowdsourcing

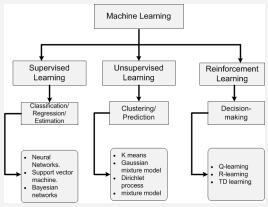
Labels and Features in Machine Learning

Labels	Features
1.Also known as tags 2. Give an identification to a piece of data 3. Provide some information about that element.	1. Individual independent variables. 2. Work as input for the ML system.

Unsupervised Learning

Clustering	An unsupervised learning method is a method in which we draw references from datasets consisting of input data without labeled responses. Generally, it is used as a process to find meaningful structure, explan-atory underlying processes, generative features, and groupings inherent in a set of examples.

Types of Machine Learning



Data Ingestion