Difference Between Artificial Intelligence vs Machine Learning vs Deep Learning

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Artificial Intelligence is basically the mechanism to incorporate human intelligence into machines through a set of rules(algorithm). AI is a combination of two words: “Artificial” meaning something made by humans or non-natural things and “Intelligence” meaning the ability to understand or think accordingly. Another definition could be that **“AI is basically the study of training your machine(computers) to mimic a human brain and its thinking capabilities”**.

AI focuses on 3 major aspects(skills): learning, reasoning, and self-correction to obtain the maximum efficiency possible.

Machine Learning:

Machine Learning is basically the study/process which provides the system(computer) to learn automatically on its own through experiences it had and improve accordingly without being explicitly programmed. **ML is an application or subset of AI.** ML focuses on the development of programs so that it can access data to use it for itself. The entire process makes observations on data to identify the possible patterns being formed and make better future decisions as per the examples provided to them. **The major aim of ML is to allow the systems to learn by themselves through experience without any kind of human intervention or assistance.**

Deep Learning:

Deep Learning is basically a sub-part of the broader family of Machine Learning which makes use of **Neural Networks**(similar to the neurons working in our brain) to mimic human brain-like behavior. DL algorithms focus on **information processing patterns** mechanism to possibly identify the patterns just like our human brain does and classifies the information accordingly. DL works on larger sets of data when compared to ML and the **prediction mechanism is self-administered by machines**.

Below is a table of differences between Artificial Intelligence, Machine Learning and Deep Learning:

Artificial Intelligence	Machine Learning	Deep Learning
AI stands for Artificial Intelligence, and is basically the study/process which enables machines to mimic human behaviour through particular algorithm.	ML stands for Machine Learning, and is the study that uses statistical methods enabling machines to improve with experience.	DL stands for Deep Learning, and is the study that makes use of Neural Networks(similar to neurons present in human brain) to imitate functionality just like a human brain.
AI is the broader family consisting of ML and DL as it's components.	ML is the subset of AI.	DL is the subset of ML.

Artificial Intelligence	Machine Learning	Deep Learning
		analyze data and provide output accordingly.
Search Trees and much complex math is involved in AI.	If you have a clear idea about the logic(math) involved in behind and you can visualize the complex functionalities like K-Mean, Support Vector Machines, etc., then it defines the ML aspect.	If you are clear about the math involved in it but don't have idea about the features, so you break the complex functionalities into linear/lower dimension features by adding more layers, then it defines the DL aspect.
The aim is to basically increase chances of success and not accuracy.	The aim is to increase accuracy not caring much about the success ratio.	It attains the highest rank in terms of accuracy when it is trained with large amount of data.
Three broad categories/types Of AI are: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI)	Three broad categories/types Of ML are: Supervised Learning, Unsupervised Learning and Reinforcement Learning	DL can be considered as neural networks with a large number of parameters layers lying in one of the four fundamental network architectures: Unsupervised Pre-trained Networks, Convolutional Neural Networks, Recurrent Neural Networks and Recursive Neural Networks
The efficiency Of AI is	Less efficient than DL as it	

Artificial Intelligence	Machine Learning	Deep Learning
Examples of AI applications include: Google's AI-Powered Predictions, Ridesharing Apps Like Uber and Lyft, Commercial Flights Use an AI Autopilot, etc.	Examples of ML applications include: Virtual Personal Assistants: Siri, Alexa, Google, etc., Email Spam and Malware Filtering.	Examples of DL applications include: Sentiment based news aggregation, Image analysis and caption generation, etc.
AI refers to the broad field of computer science that focuses on creating intelligent machines that can perform tasks that would normally require human intelligence, such as reasoning, perception, and decision-making.	ML is a subset of AI that focuses on developing algorithms that can learn from data and improve their performance over time without being explicitly programmed.	DL is a subset of ML that focuses on developing deep neural networks that can automatically learn and extract features from data.
AI can be further broken down into various subfields such as robotics, natural language processing, computer vision, expert systems, and more.	ML algorithms can be categorized as supervised, unsupervised, or reinforcement learning. In supervised learning, the algorithm is trained on labeled data, where the desired output is known. In unsupervised learning, the algorithm is trained on unlabeled data, where the desired output is unknown.	DL algorithms are inspired by the structure and function of the human brain, and they are particularly well-suited to tasks such as image and speech recognition.

process data in a hierarchical

Artificial Intelligence	Machine Learning	Deep Learning
	form of rewards or punishments.	manner, allowing them to learn increasingly complex representations of the data.

AI vs. Machine Learning vs. Deep Learning Examples:

Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that would normally require human intelligence.

Some examples of AI include:

There are numerous examples of AI applications across various industries. Here are some common examples:

- **Speech recognition:** speech recognition systems use deep learning algorithms to recognize and classify images and speech. These systems are used in a variety of applications, such as self-driving cars, security systems, and medical imaging.
- **Personalized recommendations:** E-commerce sites and streaming services like Amazon and Netflix use AI algorithms to analyze users' browsing and viewing history to recommend products and content that they are likely to be interested in.
- **Predictive maintenance:** AI-powered predictive maintenance systems analyze data from sensors and other sources to predict when equipment is likely to fail, helping to reduce downtime and maintenance costs.
- **Medical diagnosis:** AI-powered medical diagnosis systems analyze medical images and other patient data to help doctors make more accurate diagnoses and treatment plans.
- **Autonomous vehicles:** Self-driving cars and other autonomous vehicles use AI algorithms and sensors to analyze their environment and make decisions about speed, direction, and other factors.
- **Virtual Personal Assistants (VPA) like Siri or Alexa** – these use natural language processing to understand and respond to user requests, such as playing music, setting reminders, and answering questions.
- **Autonomous vehicles** – self-driving cars use AI to analyze sensor data, such as cameras and lidar, to make decisions about navigation, obstacle avoidance, and route planning

- **Image recognition** – AI is used in applications such as photo organization, security systems, and autonomous robots to identify objects, people, and scenes in images.
- **Natural language processing** – AI is used in chatbots and language translation systems to understand and generate human-like text.
- **Predictive analytics** – AI is used in industries such as healthcare and marketing to analyze large amounts of data and make predictions about future events, such as disease outbreaks or consumer behavior.
- **Game-playing AI** – AI algorithms have been developed to play games such as chess, Go, and poker at a superhuman level, by analyzing game data and making predictions about the outcomes of moves.

Examples of Machine Learning:

Machine Learning (ML) is a subset of Artificial Intelligence (AI) that involves the use of algorithms and statistical models to allow a computer system to "learn" from data and improve its performance over time, without being explicitly programmed to do so.

Here are some examples of Machine Learning:

- **Image recognition:** Machine learning algorithms are used in image recognition systems to classify images based on their contents. These systems are used in a variety of applications, such as self-driving cars, security systems, and medical imaging.
- **Speech recognition:** Machine learning algorithms are used in speech recognition systems to transcribe speech and identify the words spoken. These systems are used in virtual assistants like Siri and Alexa, as well as in call centers and other applications.
- **Natural language processing (NLP):** Machine learning algorithms are used in NLP systems to understand and generate human language. These systems are used in chatbots, virtual assistants, and other applications that involve natural language interactions.
- **Recommendation systems:** Machine learning algorithms are used in recommendation systems to analyze user data and recommend products or services that are likely to be of interest. These systems are used in e-commerce sites, streaming services, and other applications.
- **Sentiment analysis:** Machine learning algorithms are used in sentiment analysis systems

- **Spam filters in email** – ML algorithms analyze email content and metadata to identify and flag messages that are likely to be spam.
- **Recommendation systems** – ML algorithms are used in e-commerce websites and streaming services to make personalized recommendations to users based on their browsing and purchase history.
- **Predictive maintenance** – ML algorithms are used in manufacturing to predict when machinery is likely to fail, allowing for proactive maintenance and reducing downtime.
- **Credit risk assessment** – ML algorithms are used by financial institutions to assess the credit risk of loan applicants, by analyzing data such as their income, employment history, and credit score.
- **Customer segmentation** – ML algorithms are used in marketing to segment customers into different groups based on their characteristics and behavior, allowing for targeted advertising and promotions.
- **Fraud detection** – ML algorithms are used in financial transactions to detect patterns of behavior that are indicative of fraud, such as unusual spending patterns or transactions from unfamiliar locations.
- **Speech recognition** – ML algorithms are used to transcribe spoken words into text, allowing for voice-controlled interfaces and dictation software.

Examples of Deep Learning:

Deep Learning is a type of Machine Learning that uses artificial neural networks with multiple layers to learn and make decisions.

Here are some examples of Deep Learning:

- **Image and video recognition:** Deep learning algorithms are used in image and video recognition systems to classify and analyze visual data. These systems are used in self-driving cars, security systems, and medical imaging.
- **Generative models:** Deep learning algorithms are used in generative models to create new content based on existing data. These systems are used in image and video generation, text generation, and other applications.
- **Autonomous vehicles:** Deep learning algorithms are used in self-driving cars and other autonomous vehicles to analyze sensor data and make decisions about speed, direction,

- **Speech recognition** – Deep Learning algorithms are used to transcribe spoken words into text, allowing for voice-controlled interfaces and dictation software.
- **Natural language processing** – Deep Learning algorithms are used for tasks such as sentiment analysis, language translation, and text generation.
- **Recommender systems** – Deep Learning algorithms are used in recommendation systems to make personalized recommendations based on users' behavior and preferences.
- **Fraud detection** – Deep Learning algorithms are used in financial transactions to detect patterns of behavior that are indicative of fraud, such as unusual spending patterns or transactions from unfamiliar locations.
- **Game-playing AI** – Deep Learning algorithms have been used to develop game-playing AI that can compete at a superhuman level, such as the AlphaGo AI that defeated the world champion in the game of Go.
- **Time series forecasting** – Deep Learning algorithms are used to forecast future values in time series data, such as stock prices, energy consumption, and weather patterns.

AI vs. ML vs. DL works: Is There a Difference?

Working in AI is not the same as being an ML or DL engineer. Here's how you can tell those careers apart and decide which one is the right call for you.

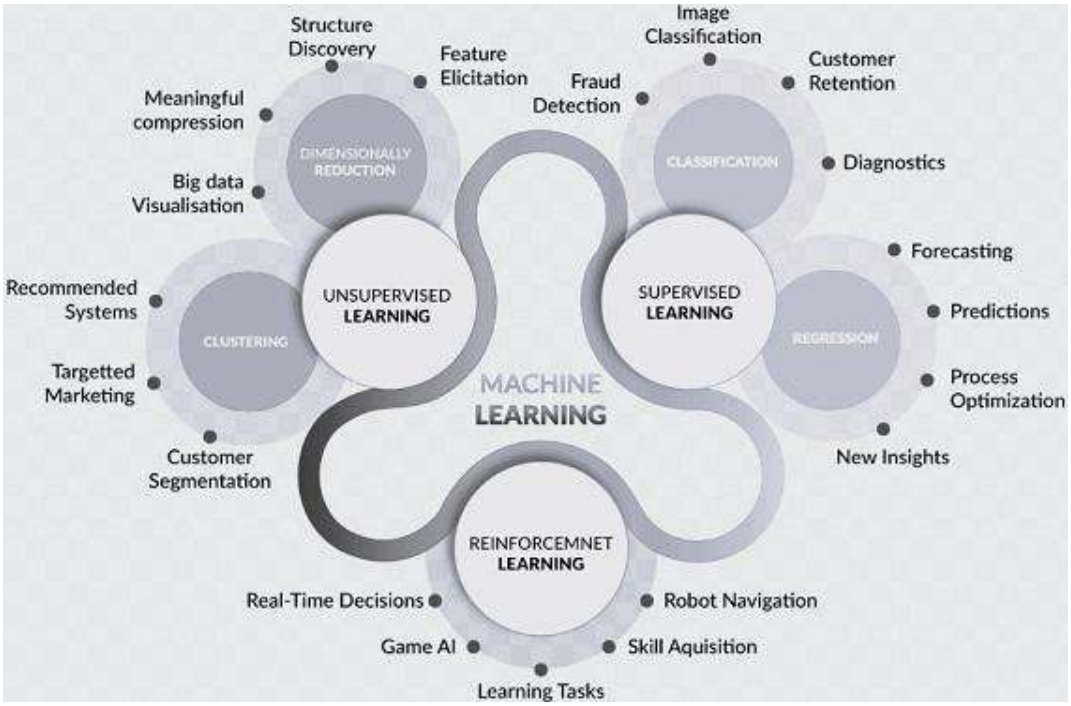
What Does an AI Engineer Do?

An AI Engineer is a professional who designs, develops, and implements artificial intelligence (AI) systems and solutions. Here are some of the key responsibilities and tasks of an AI Engineer:

- **Design and development of AI algorithms:** AI Engineers design, develop, and implement AI algorithms, such as decision trees, random forests, and neural networks, to solve specific problems.
- **Data analysis:** AI Engineers analyze and interpret data, using statistical and mathematical techniques, to identify patterns and relationships that can be used to train AI models.
- **Model training and evaluation:** AI Engineers train AI models on large datasets, evaluate their performance, and adjust the parameters of the algorithms to improve accuracy.
- **Deployment and maintenance:** AI Engineers deploy AI models into production environments and maintain and update them over time.
- **Collaboration with stakeholders:** AI Engineers work closely with stakeholders, including data scientists, software engineers, and business leaders, to understand their requirements and ensure that the AI solutions meet their needs.
- **Research and innovation:** AI Engineers stay current with the latest advancements in AI and contribute to the research and development of new AI techniques and algorithms.
- **Communication:** AI Engineers communicate the results of their work, including the performance of AI models and their impact on business outcomes, to stakeholders.

An AI Engineer must have a strong background in computer science, mathematics, and statistics, as well as experience in developing AI algorithms and solutions. They should also be familiar with programming languages, such as Python and R.

What Does a Machine Learning Engineer Do?



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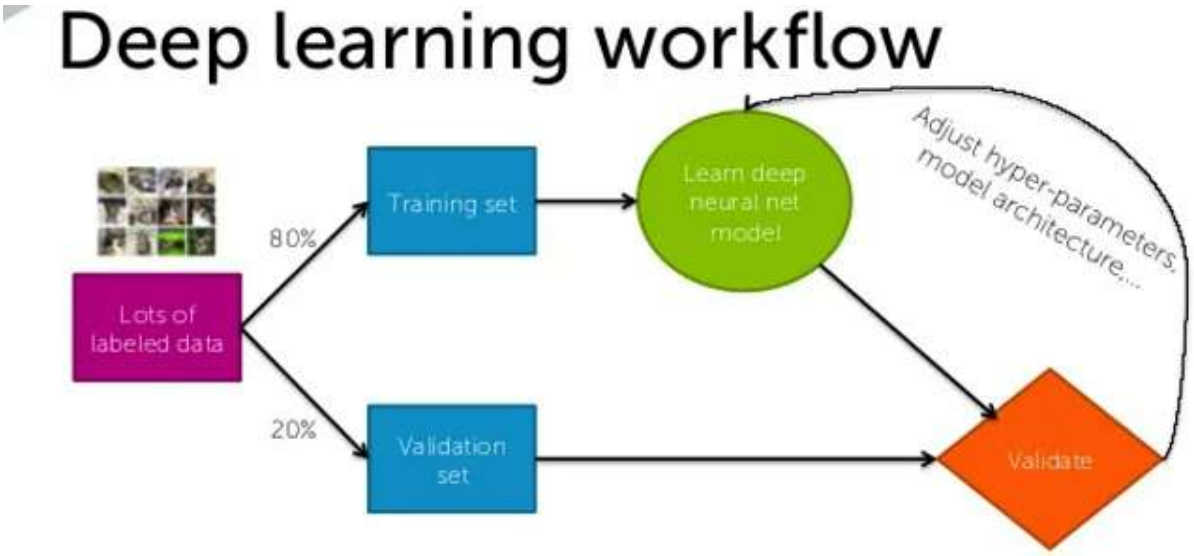
A Machine Learning Engineer must have a strong background in computer science, mathematics, and statistics, as well as experience in developing ML algorithms and solutions. They should also be familiar with programming languages, such as Python and R, and have experience working with ML frameworks and tools.

What Does a Deep Learning Engineer Do?



A Deep Learning Engineer is a professional who designs, develops, and implements deep learning (DL) systems and solutions. Here are some of the key responsibilities and tasks of a Deep Learning Engineer:

- **Design and development of DL algorithms:** Deep Learning Engineers design, develop, and implement deep neural networks and other DL algorithms to solve specific problems.
- **Data analysis:** Deep Learning Engineers analyze and interpret large datasets, using statistical and mathematical techniques, to identify patterns and relationships that can be used to train DL models.
- **Model training and evaluation:** Deep Learning Engineers train DL models on massive datasets, evaluate their performance, and adjust the parameters of the algorithms to improve accuracy.

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