

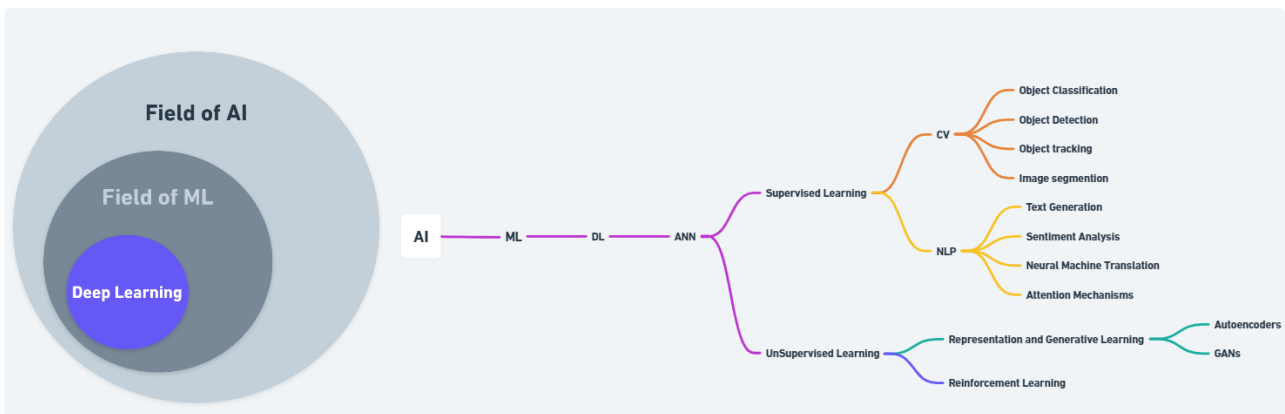
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Introduction to Deep Learning materials

1. What is Deep Learning
2. Why Deep Learning is important
3. Neural Network Overview And Its Use Case
4. Various Neural Network Architect Overview
5. Use Case Of Neural Network In NLP And Computer Vision

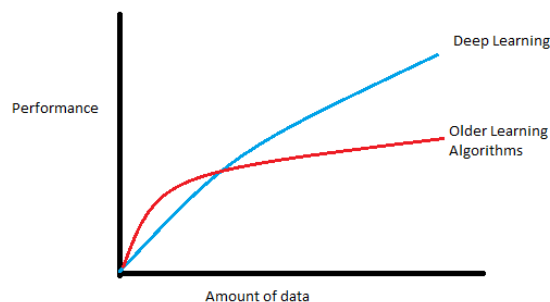
What is Deep Learning

- To understand what deep learning is, we first need to understand the relationship deep learning has with machine learning, neural networks, and artificial intelligence. The best way to think of this relationship is to visualize them as concentric circles:



- At the outer most ring you have artificial intelligence (using computers to reason). One layer inside of that is machine learning. With artificial neural networks and deep learning at the centre.
- Broadly speaking, deep learning is a more approachable name for an artificial neural network. The "deep" in deep learning refers to the depth of the network. An artificial neural network can be very shallow.
- Deep Learning is used to perform complex task which are more computationally expensive, they tend to perform better when compared to machine Learning.

Why Deep Learning is important



- The above diagram shows the relationship between amount of data vs performance of Deep Learning vs other learning algorithms.
- In the above diagram we can see that as the amount of data increases Deep learning Algorithms tend to perform better when compared to other algorithms.
- Let's look at the various use cases of Deep Learning used by companies.
- Facebook has had great success with identifying faces in photographs by using deep learning. It's not just a marginal improvement, but a game changer: "Asked whether two unfamiliar photos of faces show the same person, a human being will get it right 97.53 percent of the time. New software developed by researchers at Facebook can score 97.25 percent on the same challenge, regardless of variations in lighting or whether the person in the picture is directly facing the camera."
- Speech recognition is another area that's felt deep learning's impact. Spoken languages are so vast and ambiguous. Baidu – one of the leading search engines of China – has developed a voice recognition system that is faster and more accurate than humans at producing text on a mobile phone. In both English and Mandarin.
- What is particularly fascinating, is that generalizing the two languages didn't require much additional design effort: "Historically, people viewed Chinese and English as two vastly different languages, and so there was a need to design very different features," Andrew Ng says, chief scientist at Baidu. "The learning algorithms are now so general that you can just learn."
- Google is now using deep learning to manage the energy at the company's data centres. They've cut their energy needs for cooling by 40%. That translates to about a 15% improvement in power usage efficiency for the company and hundreds of millions of dollars in savings

Neural Network Overview And Its Use Case

- Neural networks are a type of machine learning model that are designed to simulate the way the human brain works. They consist of interconnected nodes, called neurons, which are organized in layers. Each neuron receives input from other neurons in the previous layer, processes this information, and passes its output to the next layer of neurons until the output layer is reached.

- The main use case of neural networks is to make predictions or decisions based on input data. This is done by training the neural network on a set of data, called the training data, where the correct outputs are already known. The neural network adjusts its internal parameters, or weights, during training to minimize the difference between its predicted outputs and the correct outputs in the training data. Once the neural network is trained, it can be used to make predictions on new data that it has not seen before.

Use case Of Neural Network In NLP And Computer Vision

- Neural networks have a wide range of applications in fields such as computer vision, natural language processing, speech recognition, and autonomous vehicles.
- For example, in computer vision, neural networks are used to identify and classify objects in images or videos. In natural language processing, they are used to generate text or translate between languages.
- In speech recognition, they are used to convert spoken words into text. In autonomous vehicles, they are used to recognize and respond to road conditions and other vehicles.
- Overall, neural networks have become an important tool for machine learning and artificial intelligence, and their use cases are likely to continue expanding in the future.