

**Artificial Intelligence (AI) and Machine Learning (ML)** -based technologies are playing a crucial role in the response to the COVID-19 pandemic. Experts are using AI/ML to study the virus, test potential treatments, diagnose individuals, analyze the public health impacts, and more. Let's take a deep dive in understanding the difference between AI, machine learning, and deep learning — the terms which are often used interchangeably.



You can think of artificial intelligence (AI), machine learning and deep learning as a set of a *matryoshka* doll, also known as a Russian nesting doll. Deep learning is a subset of machine learning, which is a subset of AI.

**Artificial intelligence** is any computer program that does something smart. It can be a stack of a complex statistical model or if-then statements. AI can refer to anything from a computer program playing chess, to a voice-recognition system like Alexa. However, the technology can be broadly categorized into three groups — Narrow AI, artificial general intelligence (AGI), and super intelligent AI.



**Machine learning** is a subset of AI. The theory is simple, machines take data and ‘learn’ for themselves. It is currently the most promising tool in the AI pool for businesses. Machine learning systems can quickly apply knowledge and training from large datasets to excel at facial recognition, speech recognition, **object recognition**, translation, and many other tasks. Machine learning allows a system to learn to recognize patterns on its own and make predictions, contrary to hand-coding a software program with specific instructions to complete a task.

While Deep Blue and DeepMind are both types of AI, Deep Blue was rule-based, dependent on programming – so it was not a form of machine learning. DeepMind, on the other hand – beat the world champion in Go by training itself on a large data set of expert moves.

**Deep learning** is a subset of machine learning. Deep artificial neural networks are a set of algorithms reaching new levels of accuracy for many important problems, such as image recognition, sound recognition, recommender systems, etc.

It uses some machine learning techniques to solve real-world problems by tapping into neural networks that simulate human decision-making. Deep learning can be costly and requires huge datasets to train itself. This is because there are a huge number of parameters that need to be understood by a learning algorithm, which can primarily yield a lot of false-positives. For example, a deep learning algorithm could be trained to 'learn' how a dog looks like. It would take an enormous dataset of images for it to understand the minor details that distinguish a dog from a wolf or a fox.

## Artificial Intelligence

### Machine Learning

#### Deep Learning

The subset of machine learning composed of algorithms that permit software to train itself to perform tasks, like speech and image recognition, by exposing multilayered neural networks to vast amounts of data.

A subset of AI that includes abstruse statistical techniques that enable machines to improve at tasks with experience. The category includes deep learning

Any technique that enables computers to mimic human intelligence, using logic, if-then rules, decision trees, and machine learning (including deep learning)