



Advanced Analytics Deep Learning Frameworks



Challenge

Developing your own framework to solve AI problems like natural language processing or recommendation engines can be time-consuming and expensive, and maybe not even possible for some organizations to do on their own unless they have the requisite resources to do so.

Solution

On AWS Marketplace, organizations of any size can choose one of the AI-based solutions to help them with their AI, machine learning, or deep learning problem. Using an AI-based solution from AWS Marketplace allows you to solve your problem without needing to implement your own AI framework.

Artificial Intelligence is Driving 21st Century Business

Artificial Intelligence (AI) and the accurate, relevant interpretation of data are transforming the way we do business. For example, the AI behind the following services is offered to customer in the form of [Amazon AI](#):

- [Amazon Go](#) helps create a better user experience in stores.
- [Amazon Prime Air](#) gets products into the hands of people faster than buying them in a physical store.
- [Amazon Robotics](#) helps Fulfillment Centers retrieve customer orders.
- [Amazon Alexa](#) allows customers to interact with devices with their voice.
- Amazon's product recommendation engine helps people find what they want without having to search the vast item inventory.

Machines mimicking the human brain is at the core of AI, and it's currently driving the initiatives of many business and technology leaders worldwide across a wide range of applications.

- Artificial Intelligence is essentially an overarching term within computer science that refers to machines carrying out tasks in smart ways that imitate human cognitive functions such as learning, communicating and problem solving.
- Machine Learning is an aspect of AI that enables computers to learn without being explicitly programmed. It focuses on algorithms that can learn from and make predictions on data. Rather than humans coding software to accomplish a particular task, the machine is trained using large amounts of data and algorithms that give it the ability to learn how to perform the task. This model is called a neural network. The basic foundational unit of this Artificial Neural Network (ANN) is the neuron.
- Deep Learning is a branch of ML that is focused on developing algorithmic networks— complex logic networks that can assess and classify large datasets. In deep learning a computer is not limited to “fed” or supervised logic. Instead the computer is trained to learn from each stage or layer of learning to use in the next. Deep learning algorithms transform their inputs through more layers than shallow learning algorithms. It promises general, powerful, and fast machine learning, moving us one step closer to true AI.

Deep Learning involves “training” a multi-layered neural network. This allows a deep learning algorithm to do things like understand natural language, or understand what is around it by analyzing images such as faces or license plate numbers.

The advantages of Machine Learning and Deep Learning are already being realized in industries like:

- Aerospace and Drones
- Agriculture
- Automated Speech Recognition
- Automatic Game Playing
- Automatic Machine Translation
- Biomedical Informatics
- Customer Relationship Management
- Cybersecurity
- Face Detection and Recognition
- Healthcare (including genomics and pharmaceutical)
- Image Caption Generation
- Image Recognition
- Logistics
- Marketing Automation
- Natural Language Processing
- Self-driving Cars (for lane, street sign and traffic light detection)

How Deep Learning Works

When exposed to data, the artificial neural network (ANN) assigns terms and numerical values to infer meaning. It's then posed a series of binary questions that enable it to “learn” from the experience and then apply that learning to subsequent data and experiences, building its knowledge and insight.

Within the right framework, deep learning enables a computer system to be fed large amounts of data and then use that information to make decisions about new concepts and data towards specific objectives. ANNs do not execute programmed instructions; they respond in parallel (either simulated or actual) to the pattern of inputs presented to it. Thus, the depth of learning is based upon the volume of data and experiences with data that a machine has. The more layers of data and experiences, the deeper the data architecture, the more in-depth the machine learning. The objective is self-automated learning, informed problem solving and faster, more accurate output predictions.

Deep learning and neural network models can be applied across almost all of your business functions to speed training, and produce more in-depth and accurate output. Best results are obtained when you have:

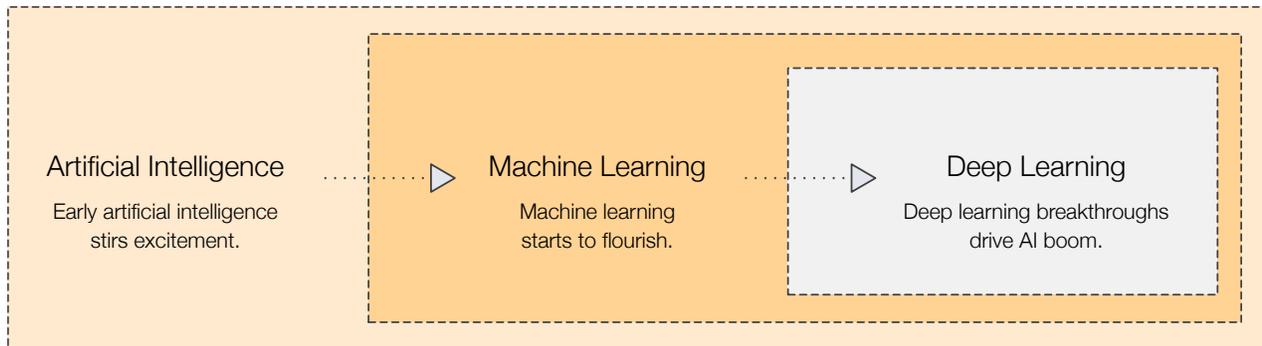
- Large amounts of historical data to train the deep learning algorithms
- A recurring need for predicting things such as cutting costs, updating or improving processes, creating value for customers, and driving sales

Through Deep Learning you can take Machine Learning closer to true Artificial Intelligence. Deep Learning essentially hones machine learning problem-solving tools and techniques with more complex logic networks. It thrives on massive amounts of data, which offer more opportunities to “learn”. The logic networks, or neural networks, assess data via a series of binary true/false questions and numerical value assignments, and then classify the data according to the answers received, creating algorithms.

Deep Learning thus enables computers to learn and teach themselves to learn through cumulative learning in multiple layers. For businesses, this means assessing and gaining intelligence around data can be done more quickly and accurately than individuals on your work force and it offers faster, more intuitive problem solving than traditional machine learning.

Sensors, Data, and Computation Prompt the Demand for New Applications

The short answer is that artificial intelligence, as the overarching concept, brought forth machine learning, and out of machine learning came deep learning. Mathematicians would argue they have been using complex math models for over 50 years. Powered by low cost GPU processing and big data, Deep Learning — with its focus on self-automated machine learning, is currently driving the AI industry.



Choosing a Deep Learning Framework

If you're considering using or enhancing your use of deep learning, choose a framework that provides:

Scalability. Your framework should be able to scale from one to multiple graphics processing units (GPUs) across multiple hosts, to train larger more sophisticated models with larger, more sophisticated datasets. Deep learning models can take days or weeks to train, so even modest improvements here make a huge difference in the speed at which new models can be developed and evaluated.

Fast development speed and programmability. Deep learning allows the opportunity to use languages they are already familiar with, so that they can quickly build new models and update existing ones.

Portability and flexibility. To run on a broad range of devices and platforms, because deep learning models must run in many, many different places: from laptops and server farms with great networking and tons of computing power to mobiles and connected devices which are often in remote locations, with less reliable networking and considerably less computing power.

Conclusion

With its promise to realize more potent AI, many organizations like yours have become interested in applying deep learning in their own innovations. The potential advantages are not just greater accuracy and faster analysis of data, but for certain industries, an equalizing of services as the technology becomes more standard.

As developers explore and integrate deep learning in new ways with other artificial intelligence techniques, the possibilities are potentially limitless.

Visit <https://aws.amazon.com/mp/deeplearning> to learn more about Deep Learning on AWS.

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