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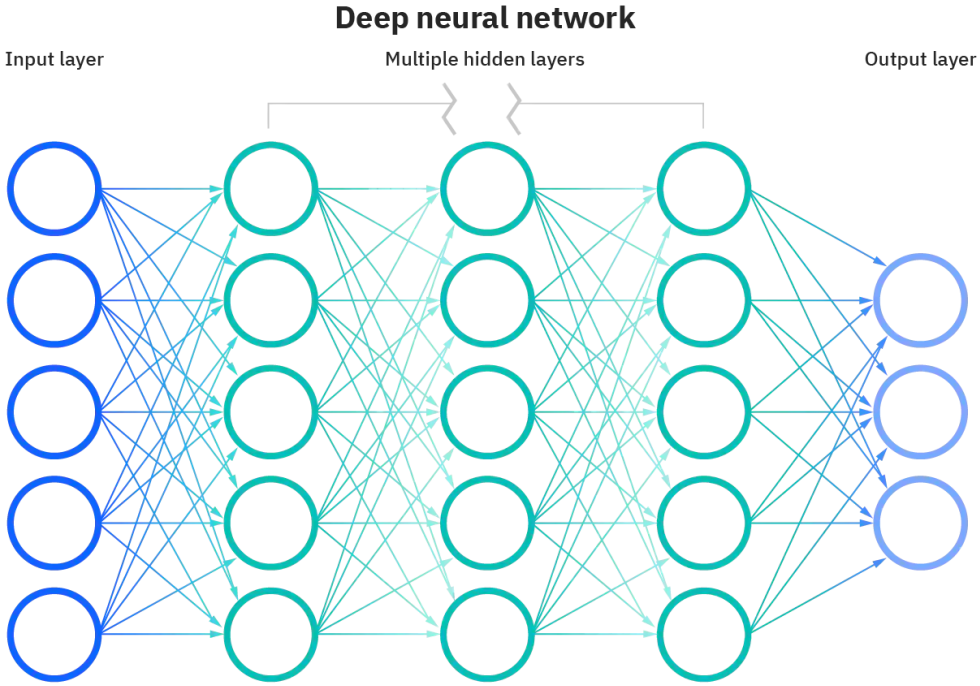
Deep Learning & GitHub

Deep Learning

The previous research explained what Machine Learning is and what roles it plays in the world of Artificial Intelligence. But today we are going to analyze and understand what Deep Learning is. As we said previously, Artificial Intelligence, as you might imagine from the name, tries to mimic what is human intelligence. In order to do so, we need a brain, which will function as our brain. It will have neurons that are connected forming a big network and ultimately communicating between them through synapses, which in this case are performed through algorithms and modules to interact with Big Data and not. Deep Learning is a subset of machine learning which is a subset of Artificial Intelligence. Therefore, deep learning is the ultimate checkpoint of the architecture of an AI system. Deep Learning becomes very powerful and useful when analyzing large datasets and performing complex computational problems.



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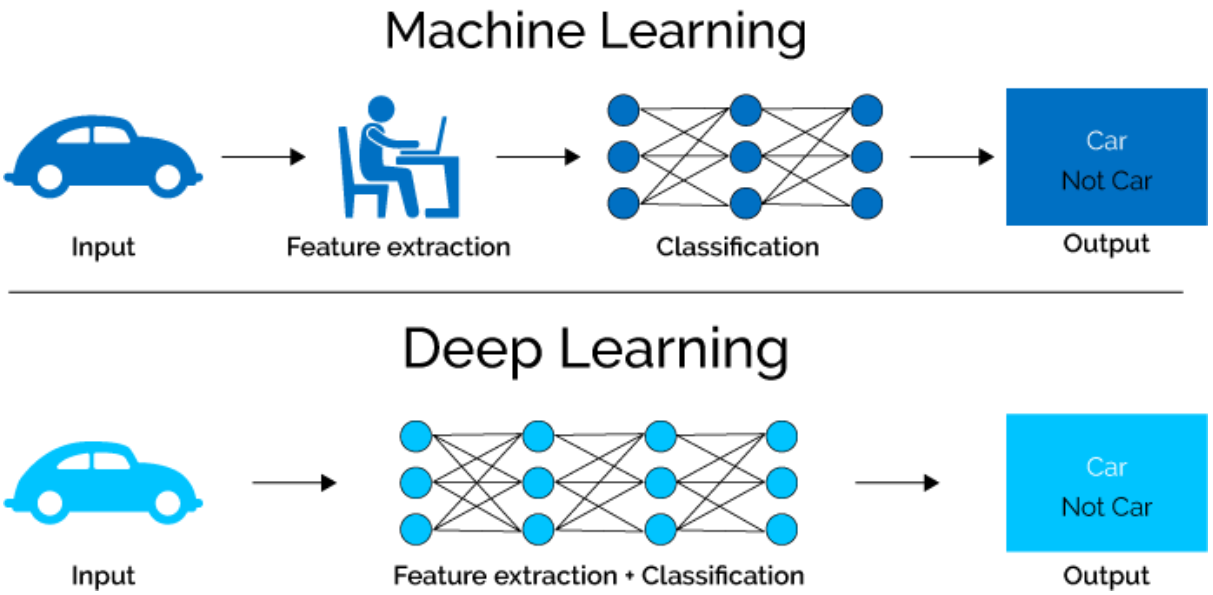
Example of Neural Network used in Deep Learning - Figure 1.0 (source URL)



Example of deep learning image recognition, CNN - Figure 1.2 (source URL)

Looking at the image above, we can see the basic structure of a deep neural network. The input and output layers are also referred to as visible layers, while the hidden layers are those where the predictions are made by using the weights which are values calculated by the neural network. In deep learning, there are two processes of communication between the neural networks which are forward propagation and backpropagation. The first one will be useful for calculating predictions over data, while backpropagation is to calculate the minimization of prediction errors. Two examples of deep learning neural networks based on the purpose of the application are Convolutional neural networks used in computer vision, such as image recognition. The second is a recurrent neural network that is used in natural language and speech recognition. The following are some advantages and disadvantages of deep learning:

Pros

- The same neural network-based approach can be applied to many different applications and data types.
- Can handle huge amounts of data and perform complex calculations with it
- Predict data
- Image recognition
- It can learn over time improving its capabilities
- It can become any kind of system. It can be for one thing, such as just face recognition, or another, such as image reconstruction. It can be with a large number of weights, or with a very small number. It can be linear or nonlinear.

Cons

- It is not 100% accurate and it might present difficult problems.
- If the data is not accurate the output won't be
- Requires huge high-performance processors to hold big data
- Expensive at large-scale
- There is no standard theory to guide you in selecting the right deep learning tools as it requires knowledge of topology, training methods, and other parameters.

There are different methods that deep learning can be used, and some examples are Law Enforcement through their applications to identify criminal or fraudulent activity. Financial services to predict the stock market prices, bank systems, and detect fraud, as well as advising customers in investment and credit management. Customer services such as chatbots, or other services might help a customer find the right answer without the need for an individual available 24/7.

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GitHub

First, let's start with what GitHub is and its definition. GitHub is a web-based interface that uses Git, the open-source version control software that lets multiple people make separate changes to web pages at the same time. As Carpenter notes, because it allows for real-time collaboration, GitHub encourages teams to work together to build and edit their site's content. (Digital.gov) GitHub is a huge community of developers around the world that collaborate, share, and complete personal and non-personal projects. GitHub gives you the ability to perform and interact through various programming languages with maximum flexibility. You can code, write a simple text document, and upload multimedia content for any purpose. If you need to work or collaborate with other people's projects or your personal ones, you can commit and pull requests to make changes to the code or other services related to the project. GitHub is the ultimate environment for developers where they can build without limitations and without fear. Stuck somewhere in your project? Let others give you feedback and it will help you improve more than you would by yourself. So, how does GitHub work? What is it that makes it so powerful? GitHub functions based on personal accounts and each profile can manage and organize its projects through repositories, which can be either private or public. GitHub has a few terms but is crucial for understanding its functionalities. On GitHub, we will have a branch where we can work with different versions of a repository at the same time. We can manage projects avoiding overriding an official source code by working on an alternative branch and committing the changes after. Another term is commits, which are the changes that someone makes to a repository. Then we have Pull Requests which are the proposals for changes to merge in the original source code of the project. Then we have basic terms such as repository which is the folder where you hold the projects. The markdown is a method to convert text into GitHub code.

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Let's focus on a summary of the advantages and disadvantages of GitHub:

Pros:

- Flexibility to work on various programming languages
- Flexibility to choose the preferred text editor
- Strong for collaboration projects
- Flexibility to convert several files into a working Git repository
- Availability to backup your work
- Accurate and large availability of documentation for a huge archive of public applications

Cons:

- Some features require a payment
- Security issues, such as malicious exploits, code theft, etc…
- Difficult to use for beginners, not very intuitive

GitHub however is a wonderful instrument. It can be helpful for many reasons, and if you need to work professionally with other people, or to make your application more flexible to commitments, and visibility, GitHub will be the best choice. We could also clone repositories of other people and practice as much as we want. We can help developers build awesome projects, and earn a reputation. GitHub is what a developer needs to improve his/her skills and share them with others, as well as learn from others and ask for feedback in circumstances of difficulties. However, be careful of malicious agents that try to extort data and more from you!

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