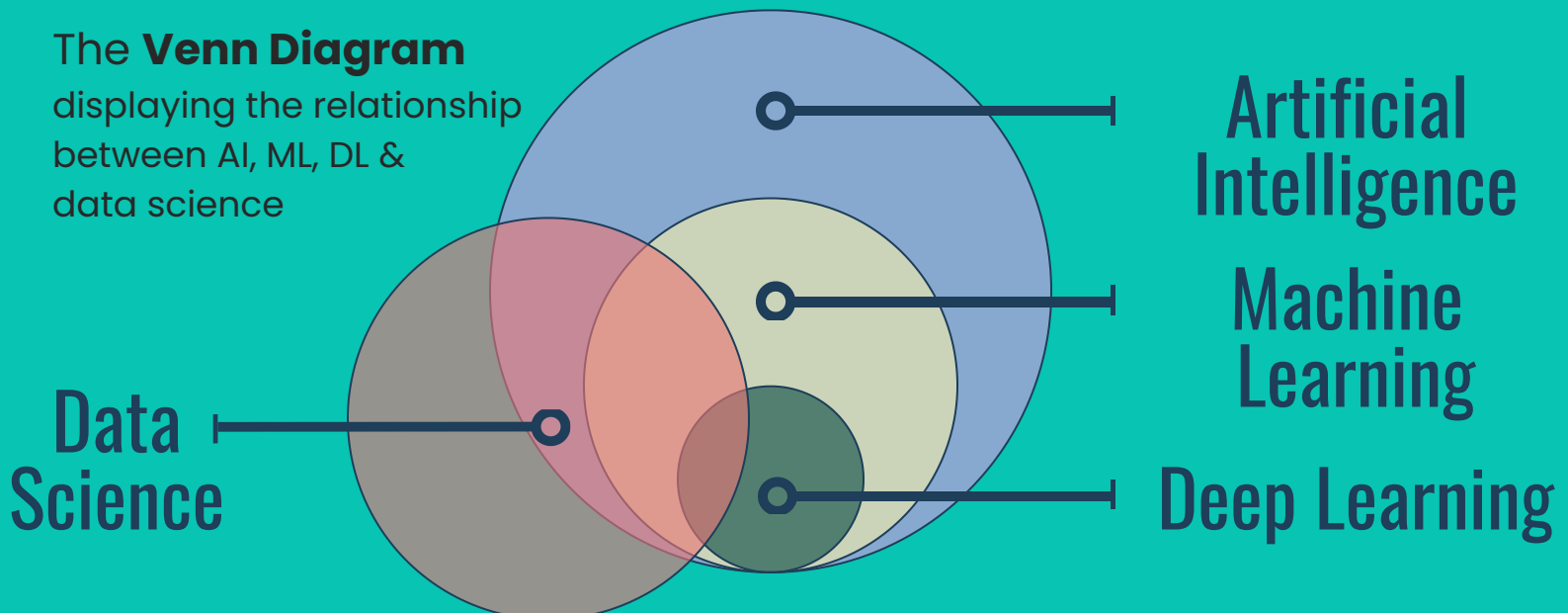


Artificial Intelligence, Machine Learning, Deep Learning & Data Science



The Venn Diagram

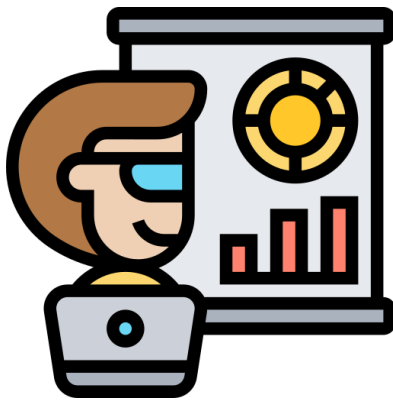
displaying the relationship between AI, ML, DL & data science



Data Science

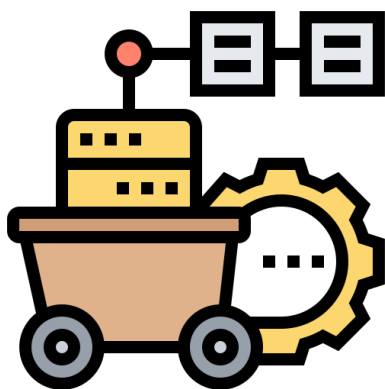
Data Science, at a high level, is the scientific study that focuses on making sense of data. It is a broad field that envelops all activities and technologies that help build such systems, particularly those we discussed earlier (i.e. Machine Learning, Deep Learning, Artificial Intelligence). Data science involves analyzing data for the purpose of business goals, but often data pools are too vast for humans to manually process. As a result, data scientists harness these technologies to process large volumes of data to create patterns and meaningful insights.

Data Science Overview



Data science has a more general use. It's a field of study just like computer science or applied math. Data science uses techniques like Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL) & Data mining to build the needed knowledge base and extract meaningful insights from the data.

Data science is a constantly evolving scientific discipline that aims at understanding data (both structured and unstructured) and searches for insights that it presents. This scientific field highly relies on data analysis, statistics, mathematics, and programming as well as data visualization and interpretation. This helps data scientists make informed decisions based on data and determine how to gain value and relevant business insights from it.



Data mining is commonly a part of the data science, but unlike data science, data mining is more about techniques and tools used to unfold patterns in data that were previously unknown and make data more usable for analysis.

"Data science is the study of the generalizable extraction of knowledge from data"

- Vasant Dhar, Professor at the Stern School of Business.

Artificial Intelligence

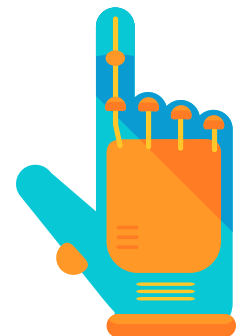
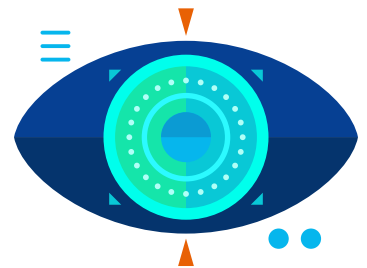
Artificial Intelligence or AI is defined as human intelligence displayed by machines. An AI system is a software product that is simply an algorithm, code, or technique that enables machines to mimic, develop, and demonstrate human cognition or behavior. To build an AI product, you need to use data mining, machine learning, and sometimes deep learning. According to the Association for the Advancement of Artificial Intelligence (AAAI), researchers broadly seek to understand the mechanisms, underlying thought, intelligent behavior and their embodiment in machines. This helps researchers develop algorithms to help machines demonstrate intelligent behavior.

AI Use Cases

Artificial Intelligence came into light just as a prediction for decades. It was initially associated with robots but today, we can find it in everything we use. Some meaningful use cases for AI have been in the fields of speech recognition, wayfinding, facial recognition, self-driving cars, manufacturing, chatbots, and email spam filters, to name a few. And now it is on its way to help us save our time and consume less effort and energy to get things done. We are only at the beginning stages of discovering how AI is going to impact our society, business, operations, and culture.

Google, Facebook, Apple, Microsoft are all moving ahead at great speed in improving their artificial intelligence software. Artificial intelligence is going to be extremely helpful and the risk that it gets super smart, that's way out in the future.

- Bill Gates



Machine Learning

Machine learning is a set of methods, tools, and computer algorithms used to train machines to analyze, understand, and find hidden patterns in data and make predictions. The eventual goal of machine learning is to utilize data for self-learning, eliminating the need to program machines in an explicit manner. Once trained on datasets, machines can apply memorized patterns on new data and as such make better predictions.



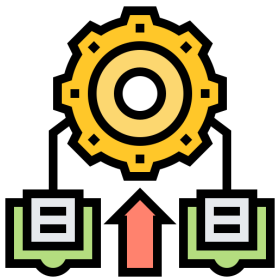
ML Use Cases

Machine learning aims at reviewing, processing and perceiving data to identify patterns and set up a reasoning system based on those findings. Some of the most important use cases of ML are:

Predictive Reporting: Data scientists use machine learning algorithms to study transactional data to make valuable predictions. Also known as supervised learning, this model can be implemented to suggest the most effective courses of action for any company.

Pattern Discovery: Pattern discovery is important for businesses to set parameters in various data reports and the way to do that is through machine learning. This is basically unsupervised learning where there are no pre-decided parameters. The most popular algorithm used for pattern discovery is Clustering.

Statistical Modeling: The goal of statistical modeling is to understand the structure of the data – fit theoretical distributions to the data that are well understood and mathematically proven. This helps businesses build consistent and repeatable products.



Artificial Intelligence and its offshoot machine learning will be a foundational tool to creating social good as well as business success.

- Mark Hurd, Co-CEO of Oracle Corporation

Deep Learning

Deep learning is a subset of machine learning, but it is advanced with complex neural networks, originally inspired by biological neural networks in human brains. Neural networks contain nodes in different interconnected layers that communicate with each other to make sense of voluminous input data.

While machine learning is restricted to structured or semi structured data, reading and analyzing images is a task that machines are currently not very efficient at. Deep learning allows machines to input images, voices and videos.

DL Use Cases

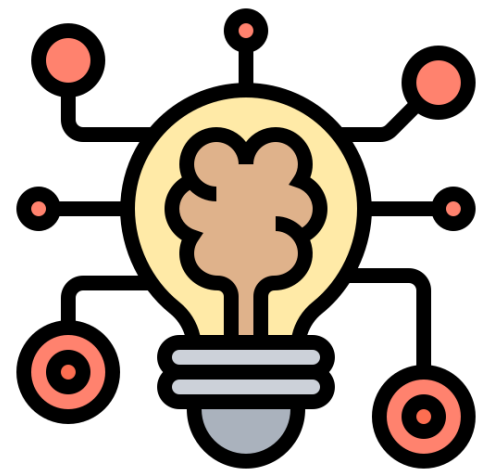
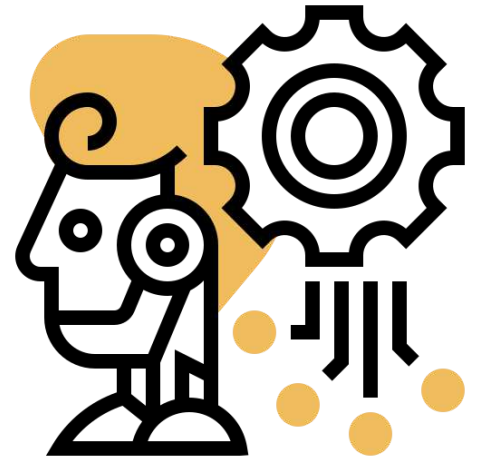
Deep learning is going to incorporate simplified programming networks for fast coding. Deep learning techniques are currently state of the art for identifying objects in images and words in sounds. Researchers are now looking to apply these successes in pattern recognition to more complex tasks such as automatic language translation, medical diagnoses and numerous other important social and business problems.

Some of the popular and successful implementations of deep learning has been in the fields of:

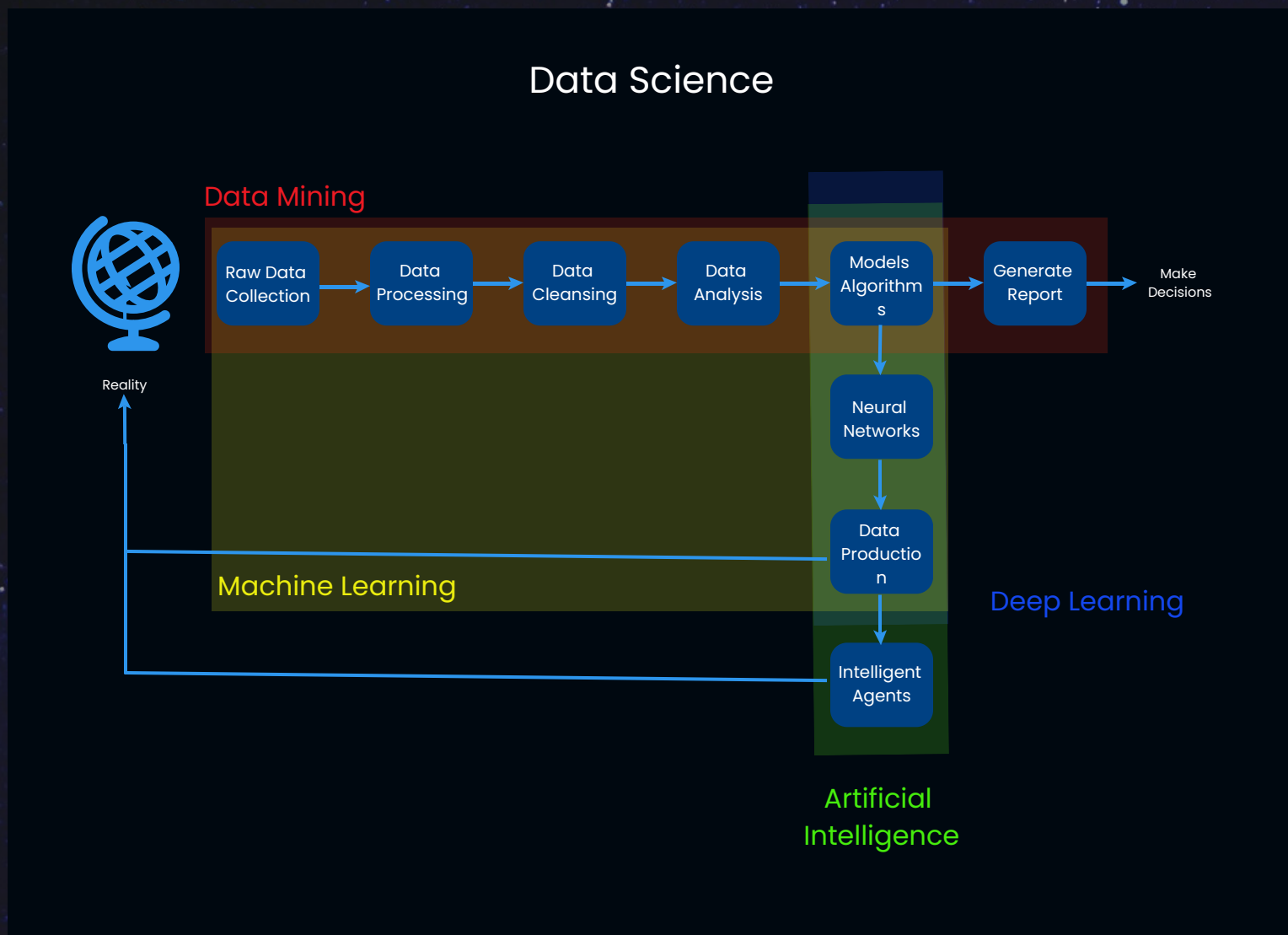
- Automatic speech and image recognition
- Natural language processing
- Drug discovery and toxicology
- Customer relationship management
- Recommendation systems
- Bioinformatics
- Gesture recognition

Deep learning is a superpower. With it you can make a computer see, synthesize novel art, translate languages, render a medical diagnosis, or build pieces of a car that can drive itself. If that is not a superpower, I do not know what is.

- Andrew Ng, Founder and CEO of Landing AI



DATA SCIENCE MODEL



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