

The development of a machine learning model



VIP Machine Learning Course

Definition of machine learning

- Machine learning is a term coined by Arthur Samuel in 1959.
- This technology is a branch of artificial intelligence and computer science.
- Machine learning involves making computers intelligent without directly teaching them how to behave.
- But how does this happen? Computers can automatically learn repeating patterns from vast amounts of data without human intervention. The learning of these algorithms mimics the way humans learn, and as the computer gains more experience, its accuracy gradually improves.

Types of Learning

- Supervised learning
- Unsupervised learning
- Reinforcement learning

Supervised learning

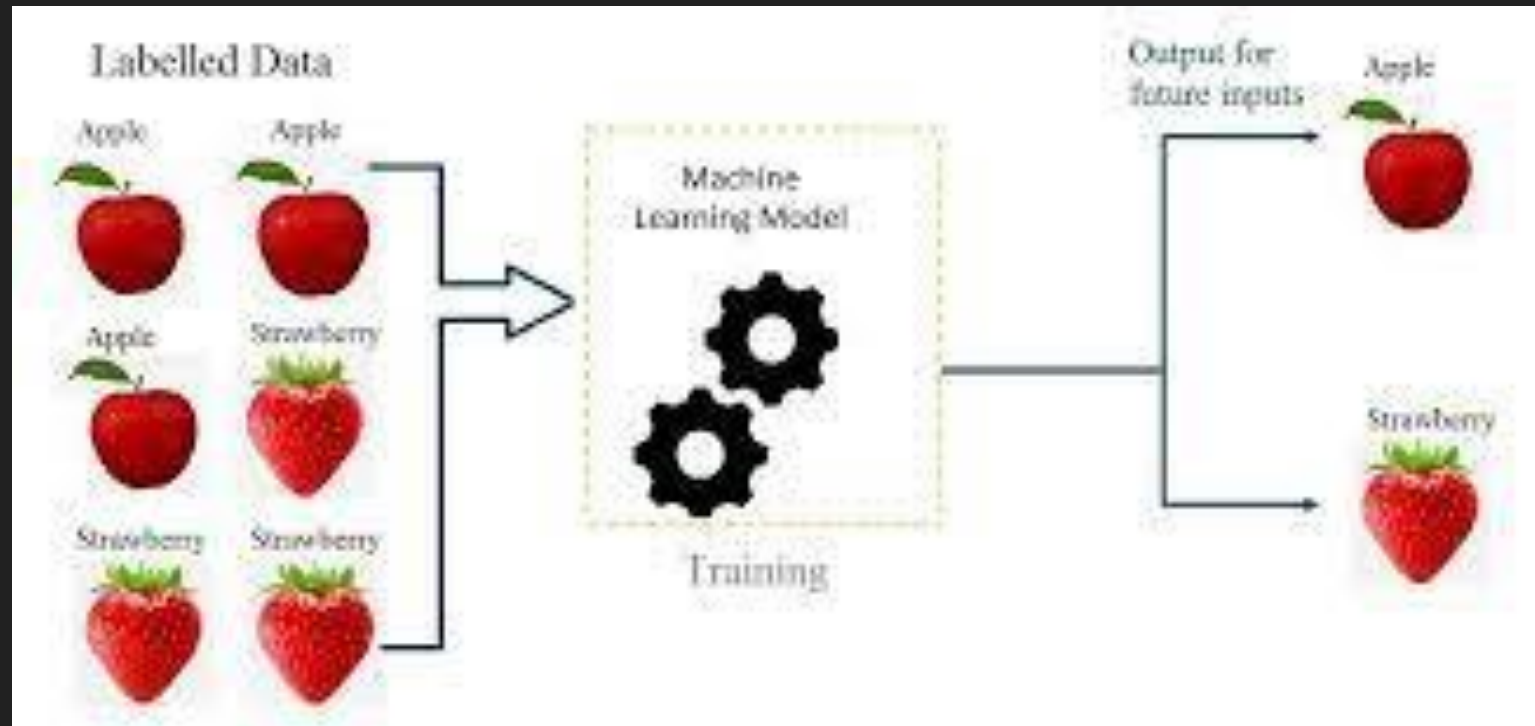
- Most machine learning methods fall under the category of supervised learning. In this method, the system tries to learn from training examples and identify patterns within those examples.
- Mathematically speaking, when there is an input variable X and an output variable Y , and an algorithm can be used to obtain a function mapping inputs to outputs, it is considered supervised learning.
- This mapping function is represented as $Y=f(X)$.

Supervised learning

- In supervised learning, data is labeled, meaning for specific inputs, there are corresponding known outputs. For example, consider the following data samples:

Name	Loan Amount	Loan Repaid	Fraud
Ashley	100000	1	1
Chuck	25000	0	0
Tim	4000	1	1
Mike	150000	1	1
Colin	200000000	0	
Libby	400400	1	0
Sheila	3200	1	1
Mandi	34850	1	
Gareth	6570	0	0

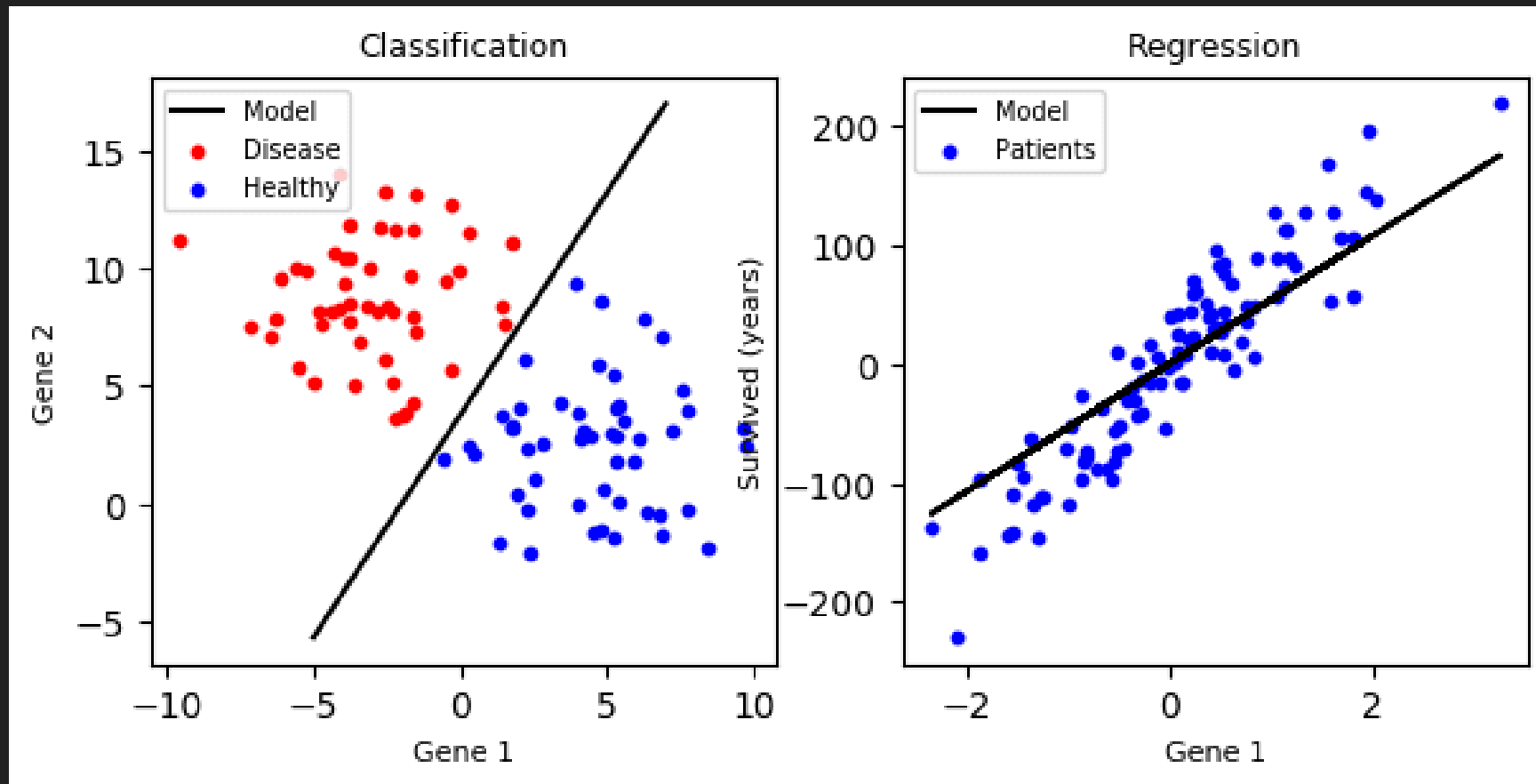
Supervised learning



Classification VS Regression

- Classification: A problem is considered a classification problem when the output variable is a category or group. For example, classifying a sample as "black" or "white," or classifying an email as "spam" or "non-spam".
- Regression: A problem is classified as a regression problem when the output variable is a real value, such as predicting "height".
- In essence, classification deals with discrete variables, while regression deals with continuous variables.

Classification VS Regression

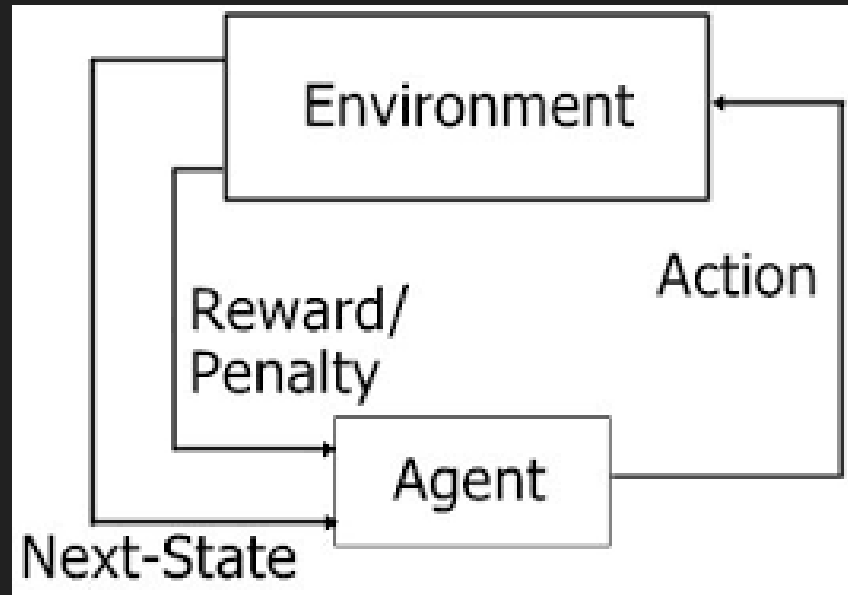


Unsupervised learning

- In unsupervised learning, the algorithm must autonomously seek interesting structures within the data.
- Mathematically, unsupervised learning occurs when the dataset consists only of input variables X without any corresponding output variables. This type of learning is called unsupervised because, unlike supervised learning, there are no correct answers provided, and the machine itself must find patterns and relationships in the data.
- In other words, when the algorithm operates on a dataset lacking labeled data (output variables), it employs a different mechanism for learning and decision-making. This type of learning is referred to as unsupervised learning. Unsupervised learning can be divided into clustering and association problems.
- Clustering: Clustering is one category of unsupervised learning where the goal is to discover inherent groups (data points that naturally belong to the same group). For example, clustering customers based on their purchasing behavior.

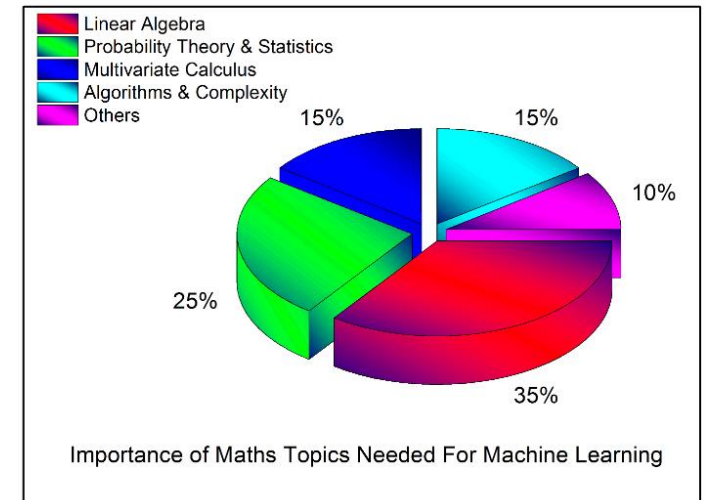
Reinforcement learning

- A computer program interacting with a dynamic environment, such as playing against an opponent or driving a car, aims to achieve specific objectives. This program provides feedback in the form of rewards and punishments, guiding its problem space accordingly. Through reinforcement learning, the machine learns to make certain decisions in an environment that is constantly subjected to trial and error.

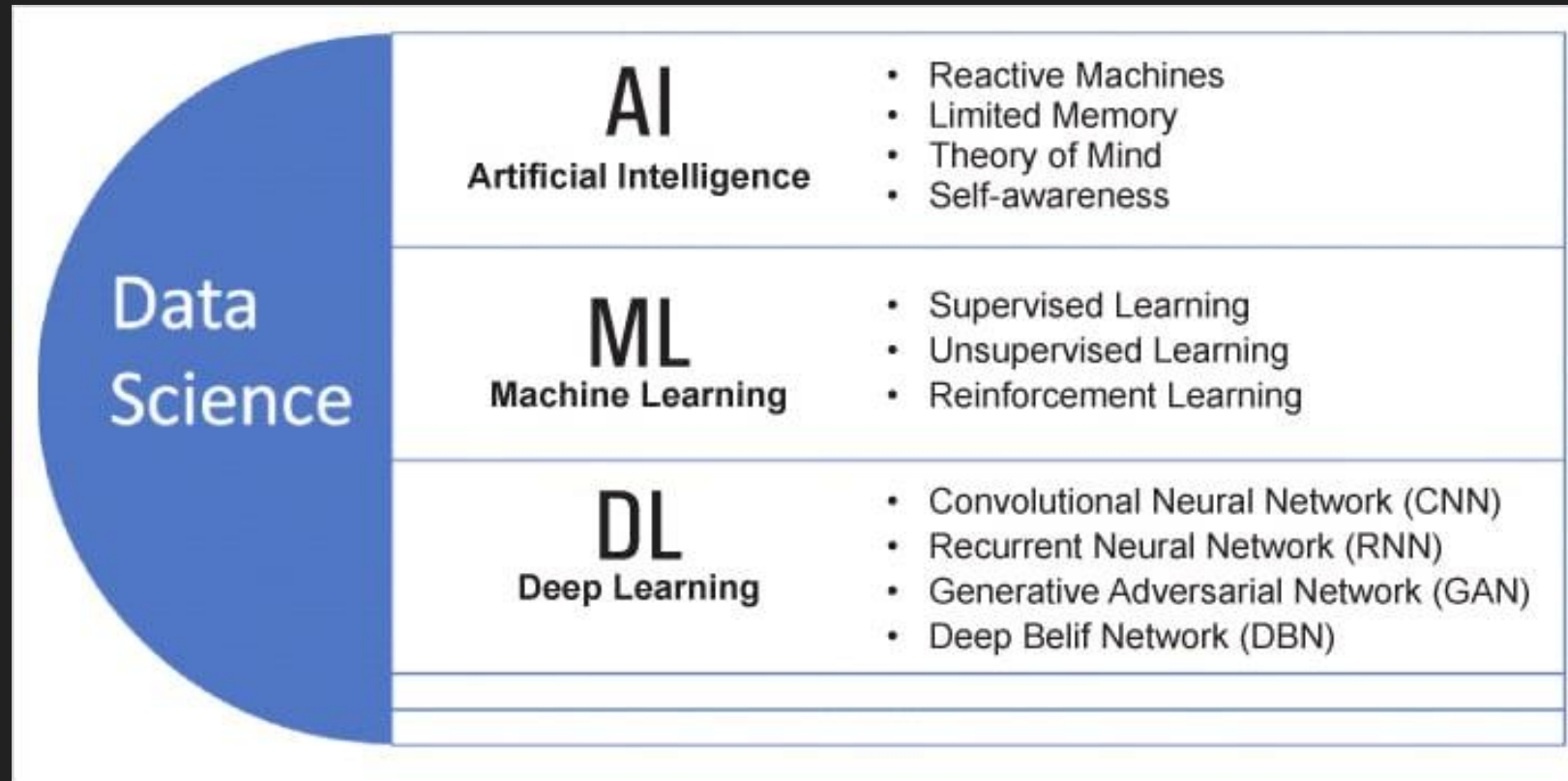


Mathematical Concepts and Their Importance

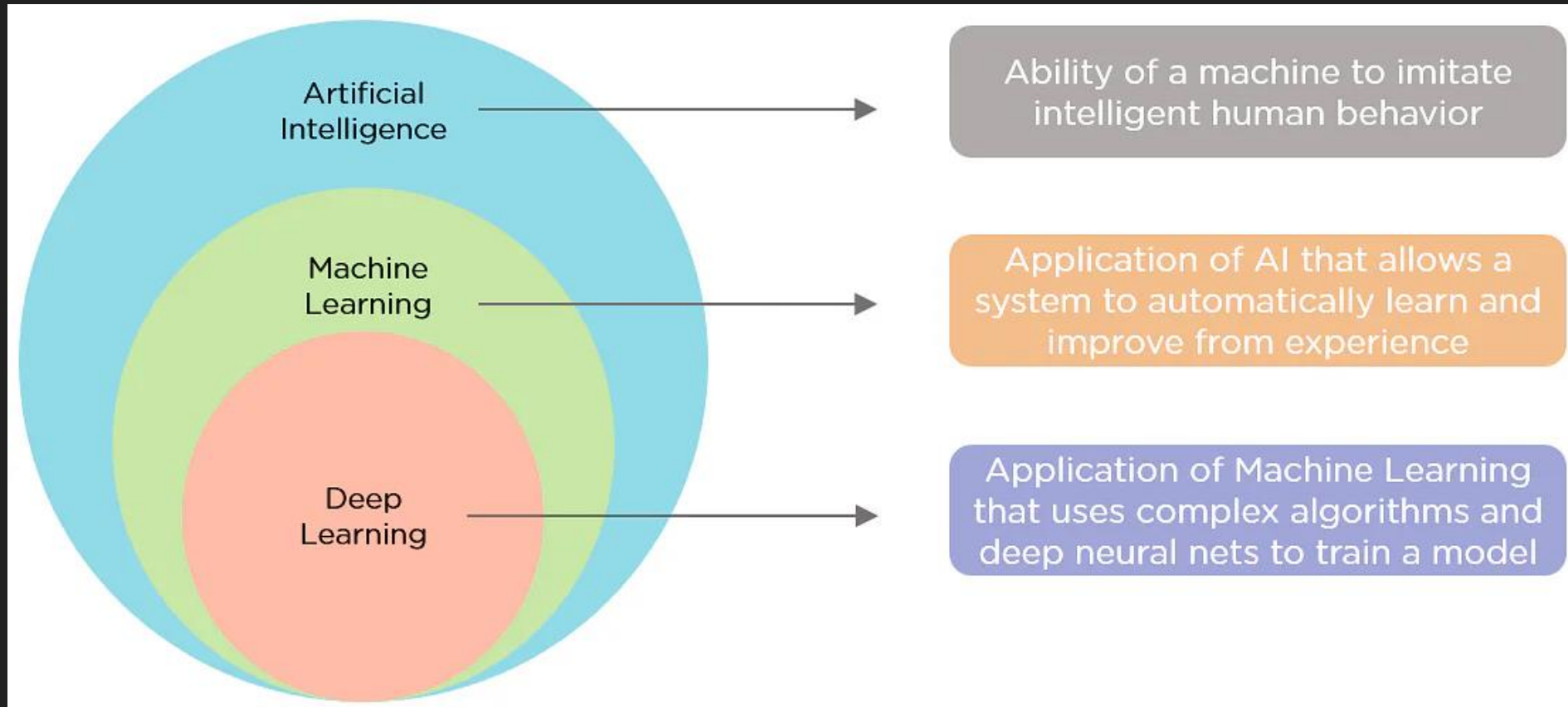
- Linear Algebra: Matrices and operations on them, projection union and decomposition, symmetric matrices, orthogonalization.
- Theory of Statistics and Probability: Probability laws and principles, Bayesian theory, random variables, variance and expected value, joint and conditional distributions, standard distribution.
- Calculus: Differential and integral calculus, partial derivatives.
- Algorithms and Optimization: Binary trees, heap, stack.



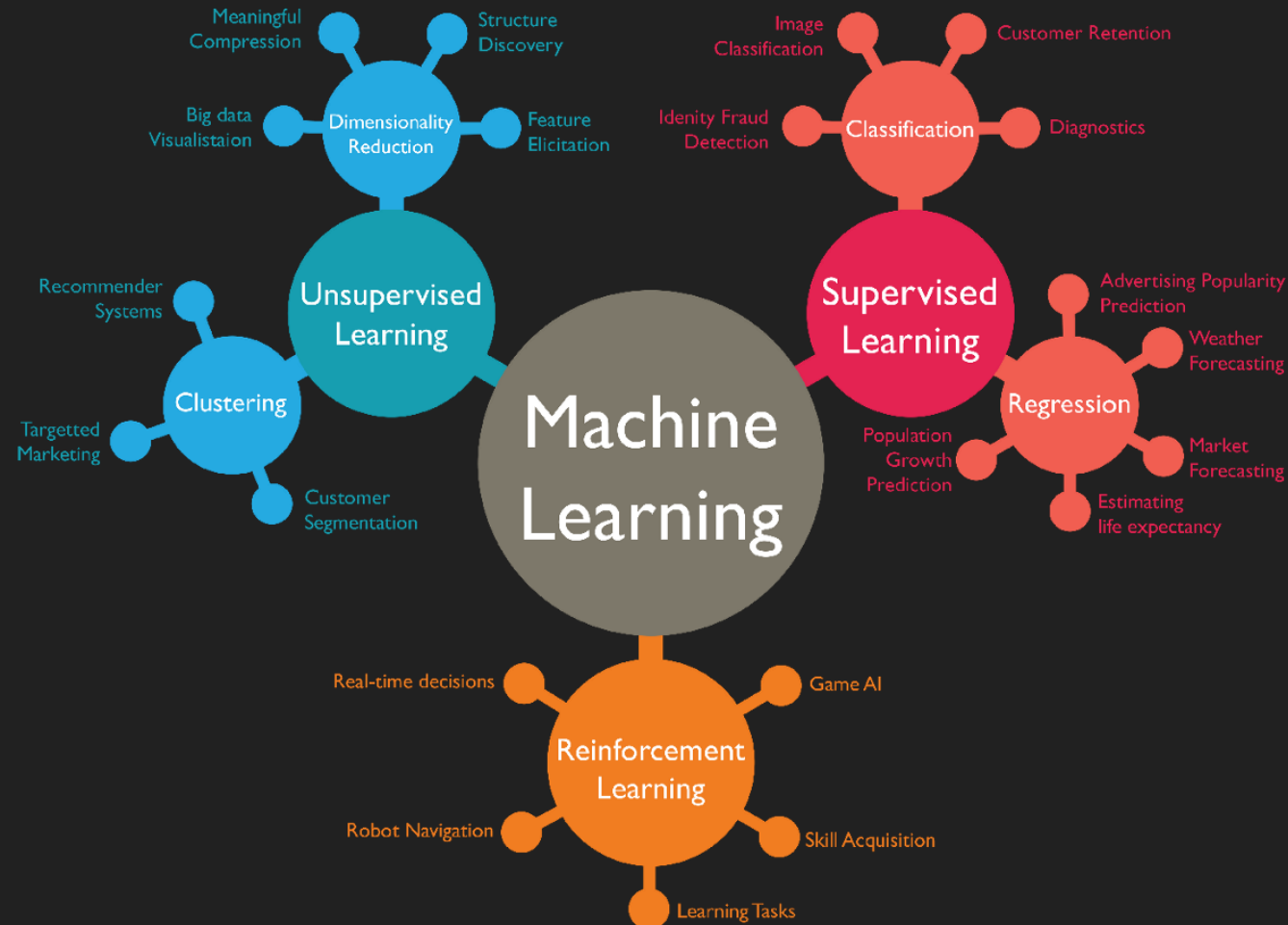
machine learning VS deep learning VS artificial intelligence



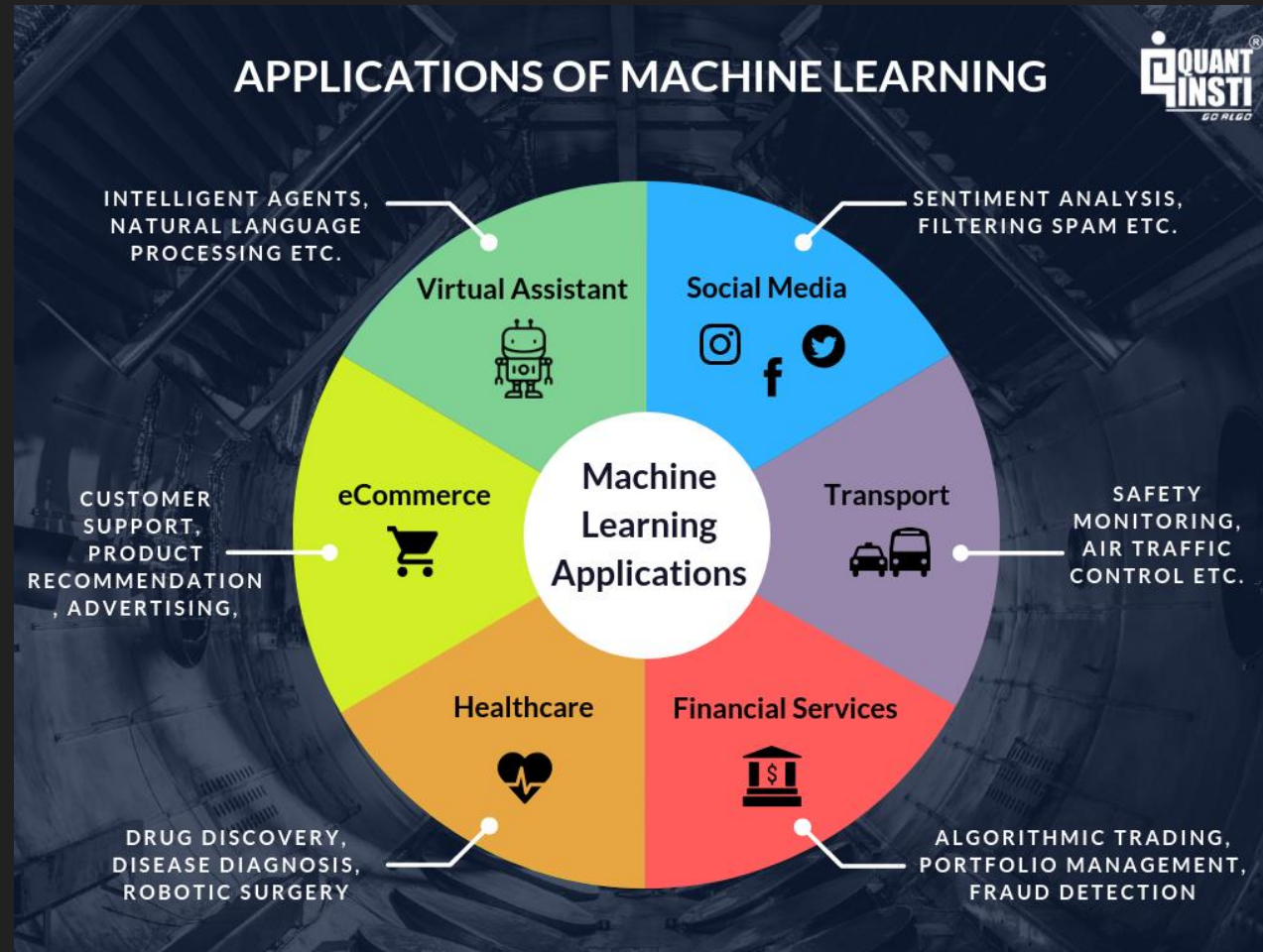
machine learning VS deep learning VS artificial intelligence



Some applications of machine learning



Some applications of machine learning



The End

Thank you for your attention. I wish you pleasant times ahead.