

Machine Learning

Discussing through available diagrams

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Artificial Intelligence

3 Types of Artificial Intelligence

Artificial Narrow Intelligence (ANI)



Stage-1

Machine Learning

- Specialises in one area and solves one problem



Siri



Alexa



Cortana

Artificial General Intelligence (AGI)



Stage-2

Machine Intelligence

- Refers to a computer that is as smart as a human across the board

Artificial Super Intelligence (ASI)







Stage-3

Machine Consciousness

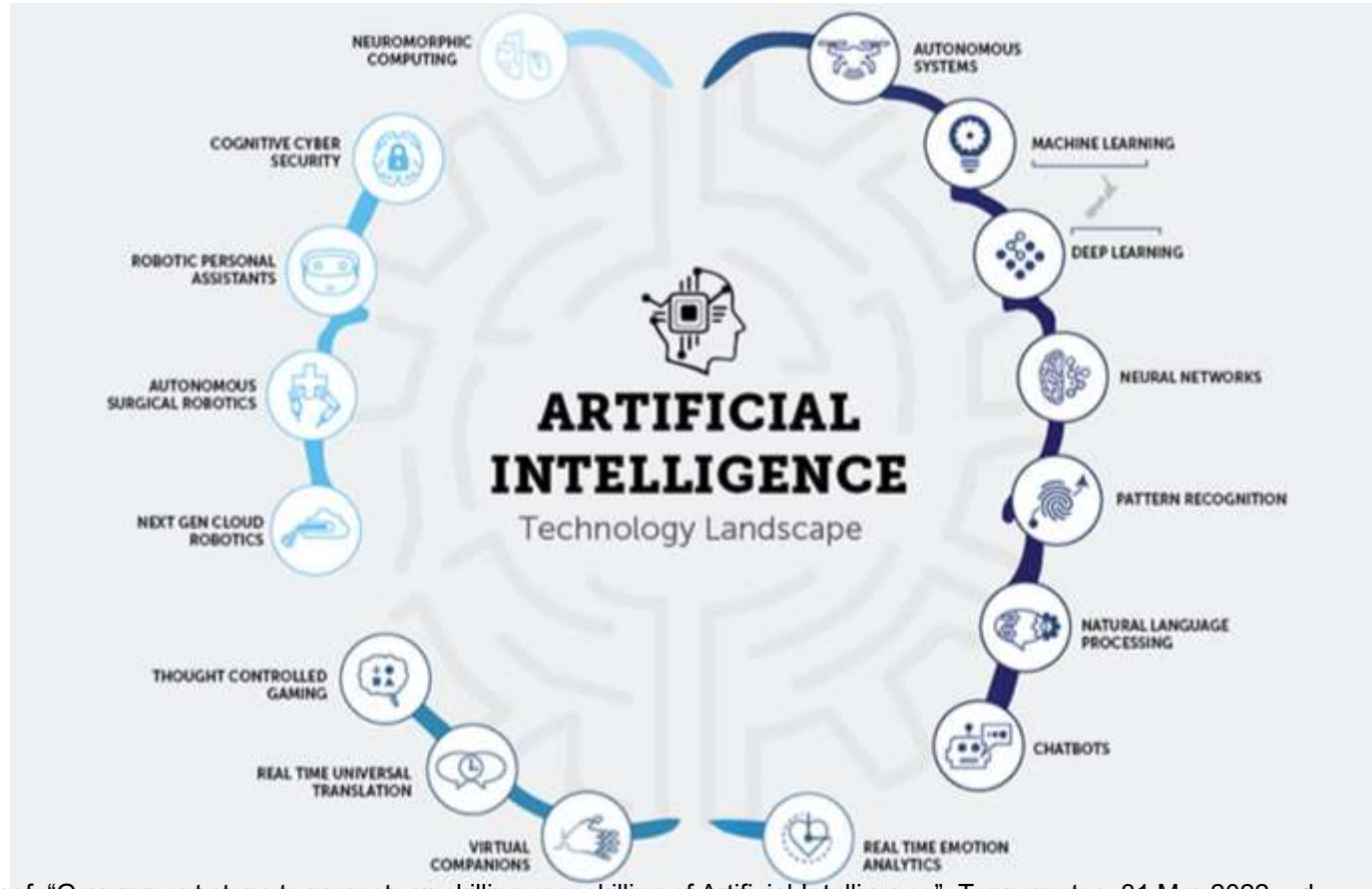
- An intellect that is much smarter than the best human brains in practically every field

Great Learning Team, "What is Artificial Intelligence in 2023? Types, Trends, and Future of it?", 7 Mar 2023, url <https://www.mygreatlearning.com/blog/what-is-artificial-intelligence/> [20230411].

Types of AI

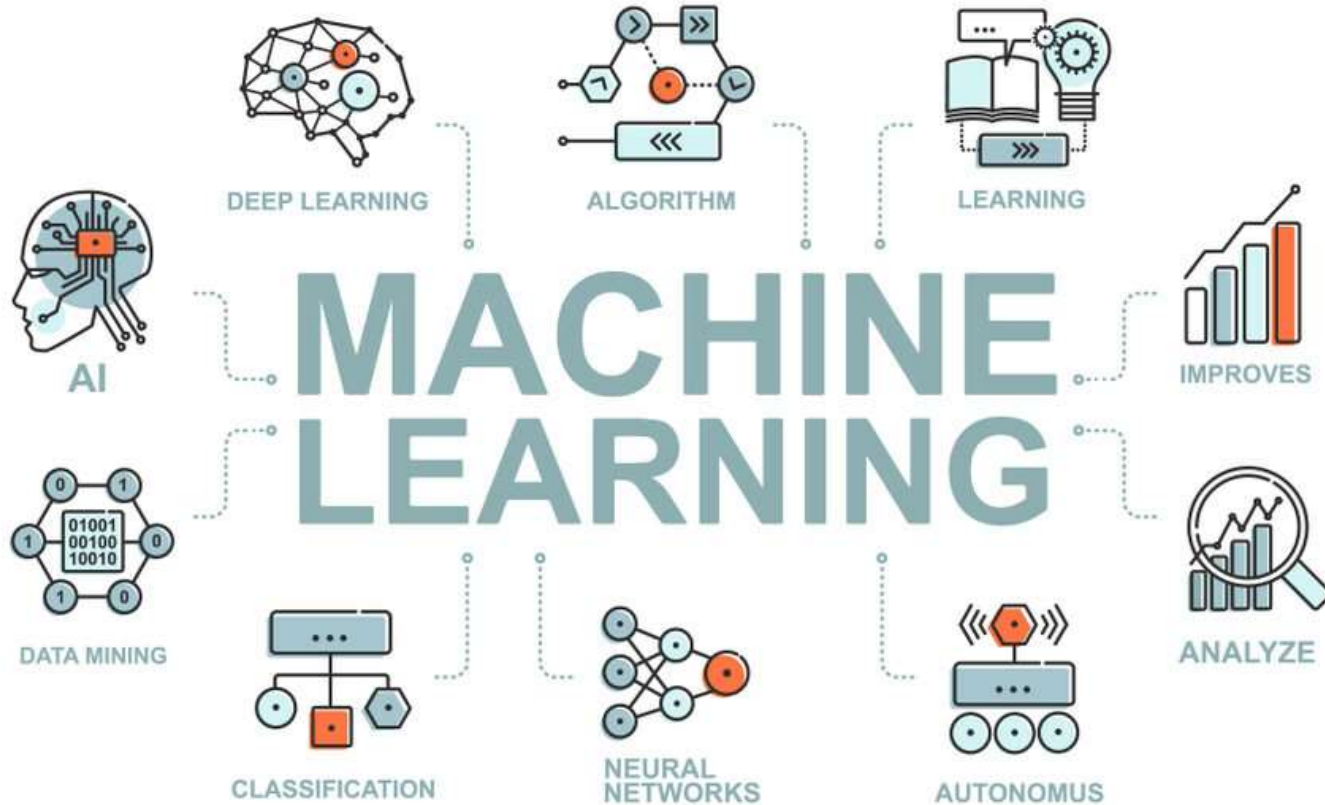
Reactive AI	Limited memory	Theory of mind	Self-aware
<ul style="list-style-type: none">Good for simple classification and pattern recognition tasksGreat for scenarios where all parameters are known; can beat humans because it can make calculations much fasterIncapable of dealing with scenarios including imperfect information or requiring historical understanding	<ul style="list-style-type: none">Can handle complex classification tasksAble to use historical data to make predictionsCapable of complex tasks such as self-driving cars, but still vulnerable to outliers or adversarial examplesThis is the current state of AI, and some say we have hit a wall	<ul style="list-style-type: none">Able to understand human motives and reasoning. Can deliver personal experience to everyone based on their motives and needs.Able to learn with fewer examples because it understands motive and intentConsidered the next milestone for AI's evolution	<ul style="list-style-type: none">Human-level intelligence that can bypass our intelligence, too
			

-, "4 Types of Artificial Intelligence", Huawei, 20 Jun 2022, url <https://forum.huawei.com/enterprise/en/4-types-of-artificial-intelligence/thread/891503-891> [20230411].

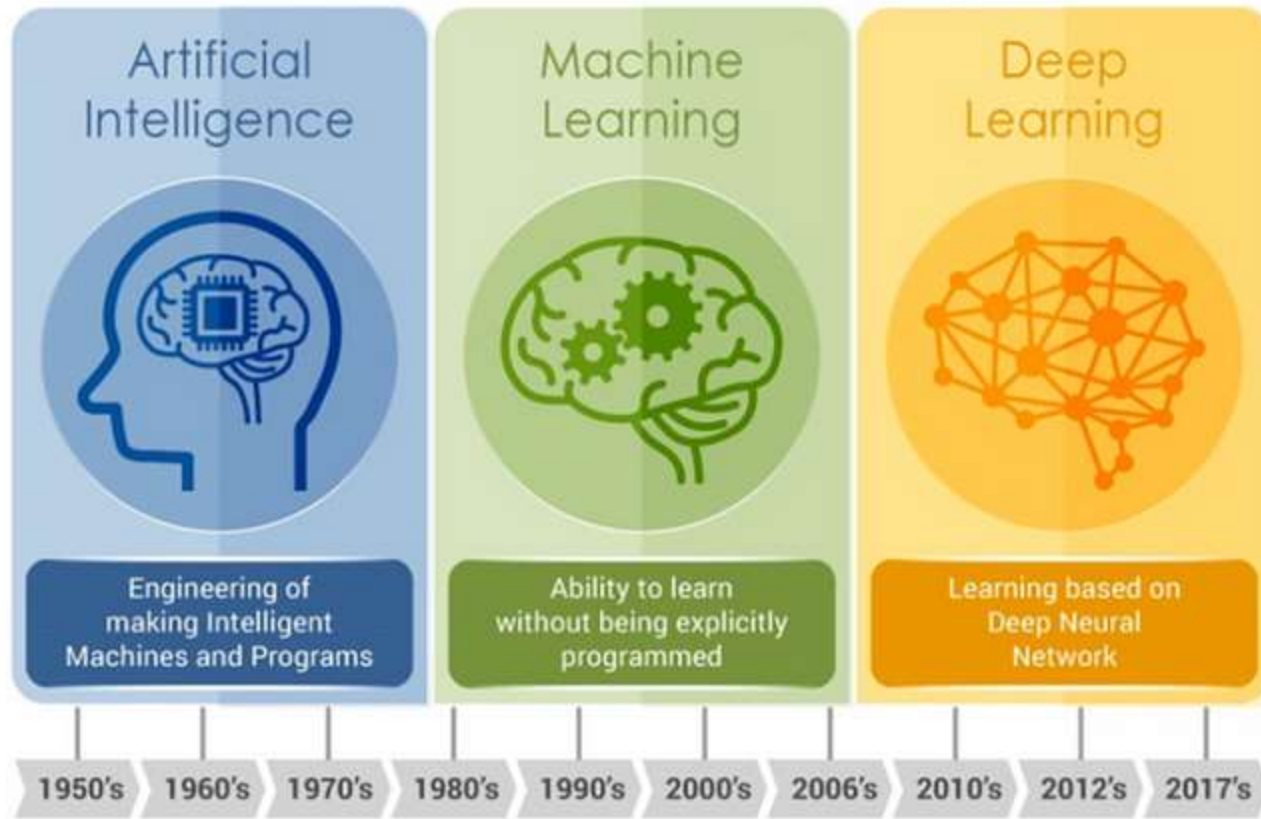


Abhishek Saraf, "Government steps to promote upskilling or reskilling of Artificial Intelligence", Toppersnotes, 31 Mar 2022, url <https://web.toppersnotes.com/current-affairs/blog/government-steps-to-promote-upskilling-or-reskilling-of-artificial-intelligence-Bog9> [20230411].

Machine Learning

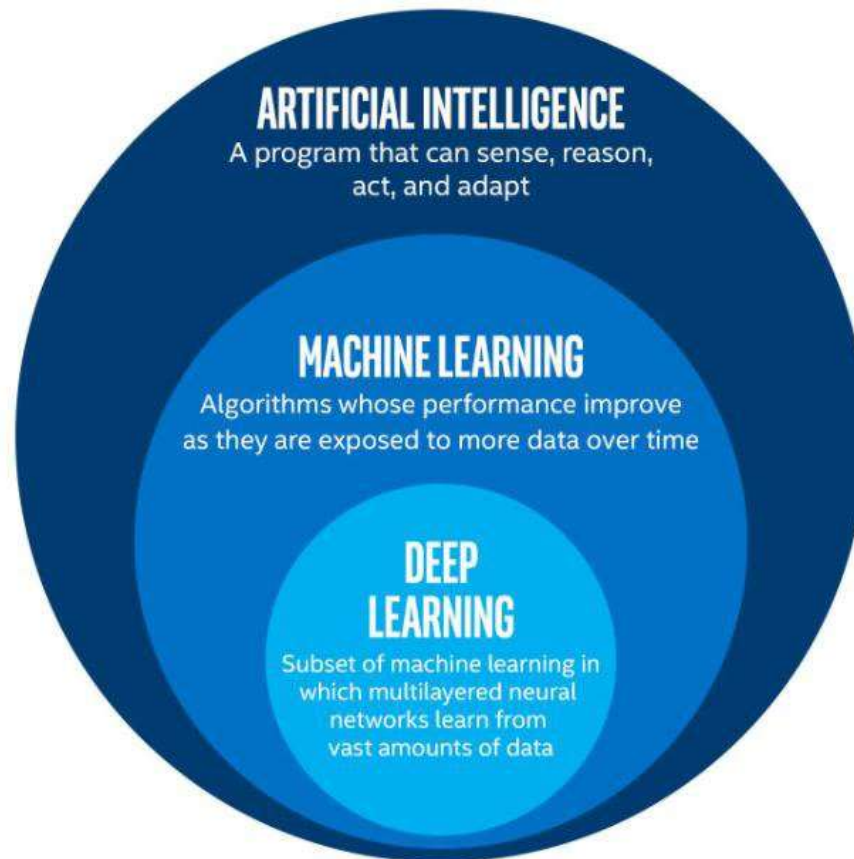


CCR, "An Introduction to Machine Learning, Its Importance, Types, and Applications", FORE School of Management, New Delhi, 31 Aug 2022, url <https://www.fsm.ac.in/blog/an-introduction-to-machine-learning-its-importance-types-and-applications/> [20230410].

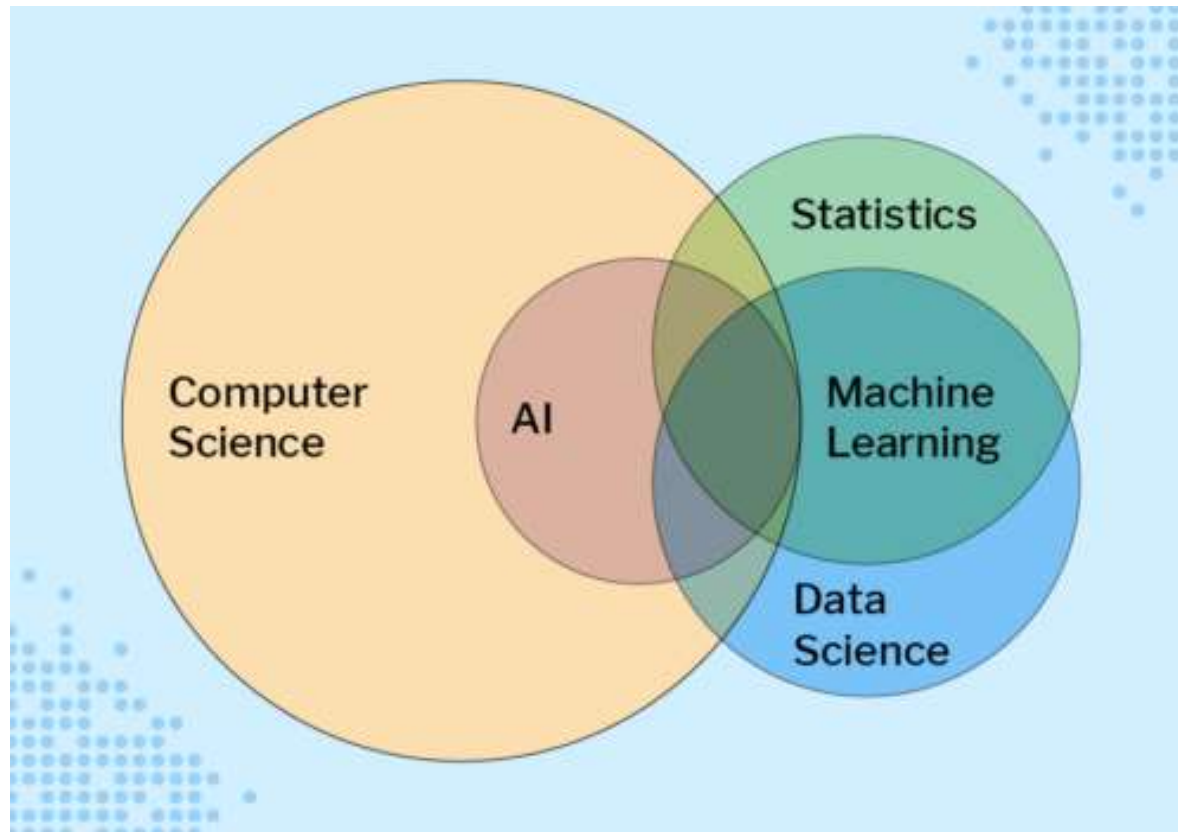


Evolution of AI — Source: <https://www.embedded-vision.com/>

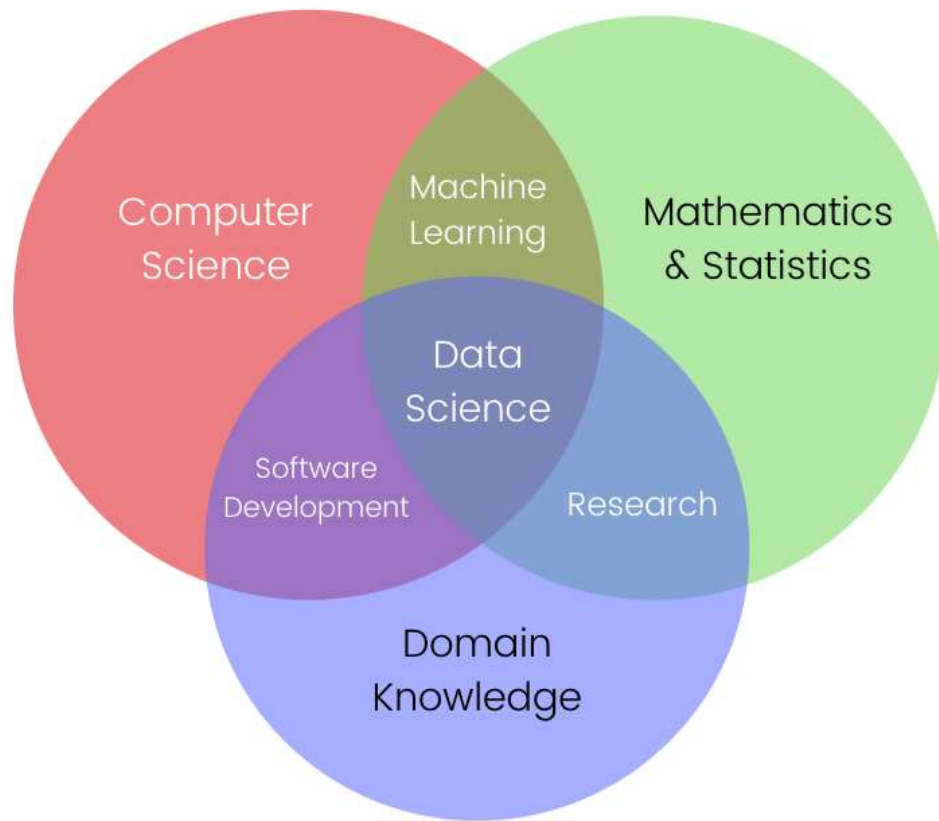
Vikita Padaliya, "Difference between AI, ML and DL", Medium, 25 Sep 2019, url <https://medium.com/decoding-artificial-intelligence/p-f5274d8db2> [20230411].



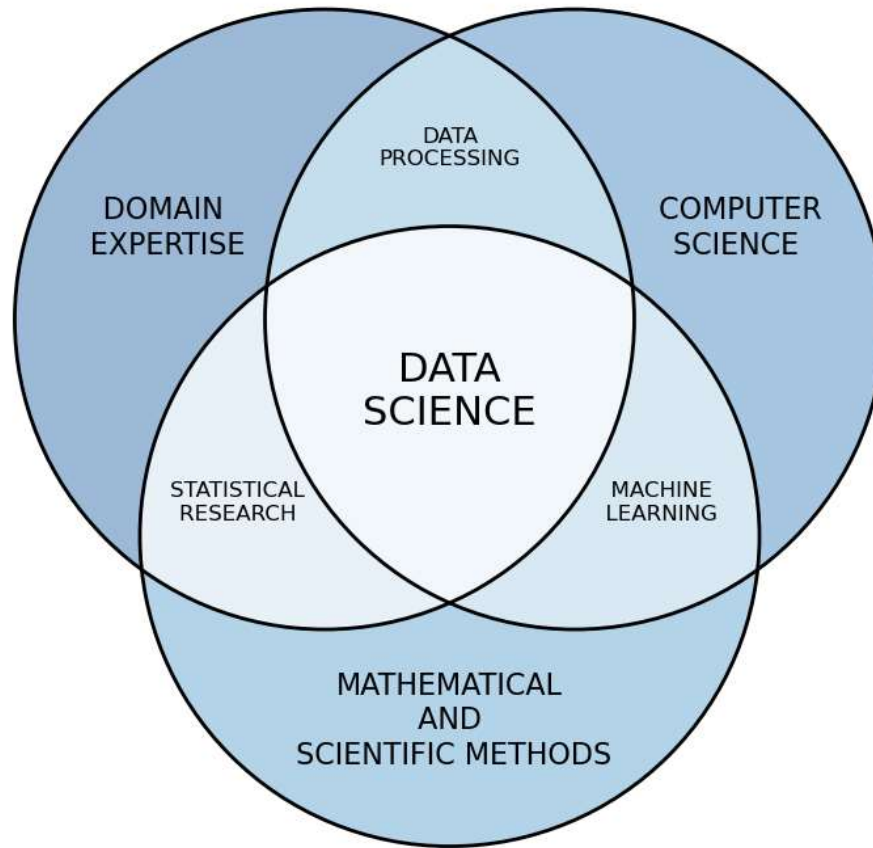
Rohini G. Khalkar, Adarsh Singh Dikhit, Anirudh Goel, Manisha Gupta, “Handwritten Text Recognition using Deep Learning (CNN & RNN)”, IARJSET 8(6):870-881, Jun 2021, url <http://dx.doi.org/10.17148/IARJSET.2021.86148>.



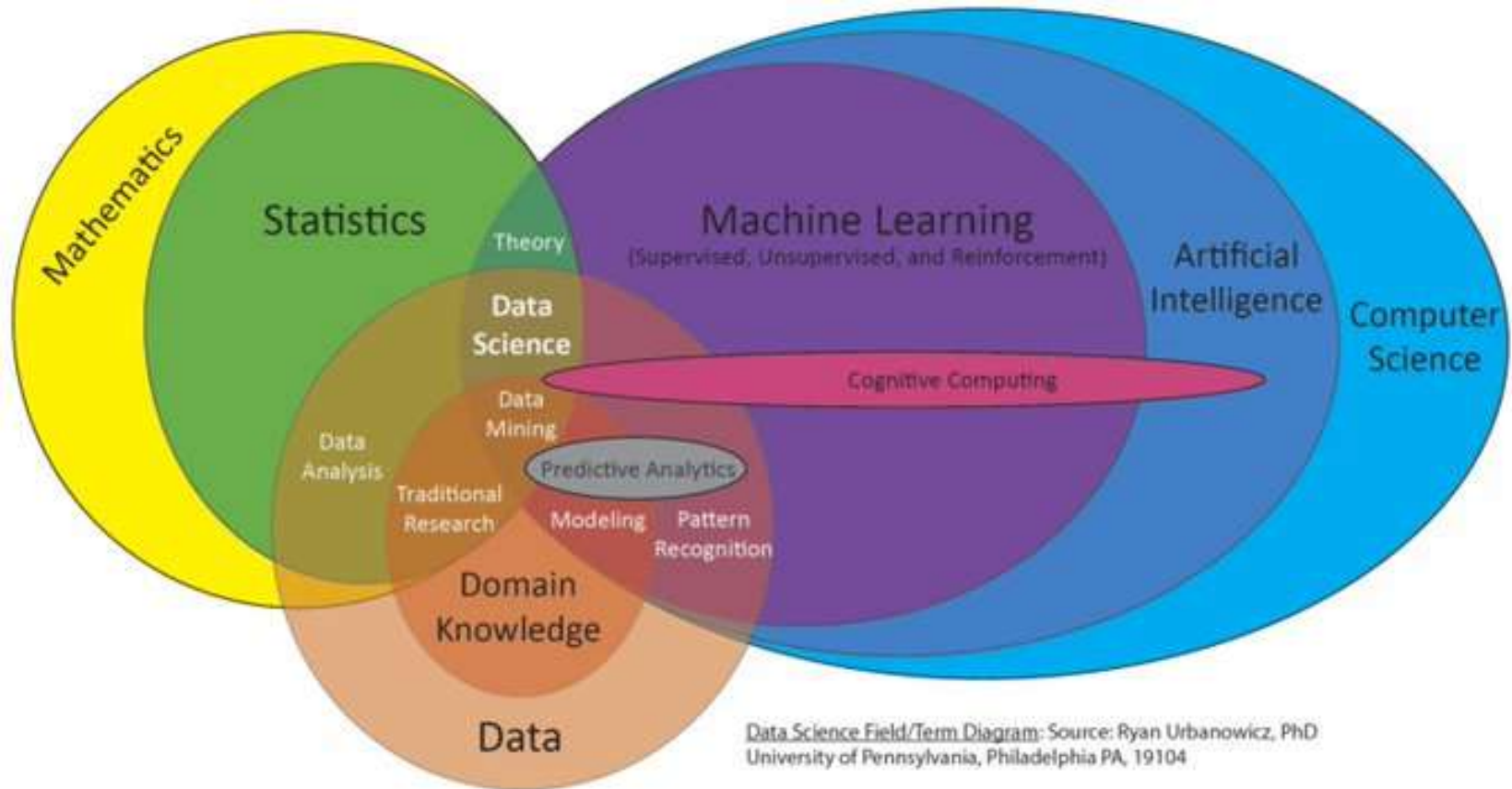
Sue Sentence, “Educating Young People in AI, Machine Learning, and Data Science: New Seminar Series”, Noise, 27 Jul 2021, url <https://noise.getoto.net/2021/07/29/educating-young-people-in-ai-machine-learning-and-data-science-new-seminar-series/> [20230410].



Jon-Ting, Coursera, GitHub, url <https://www.meal2home.top/ProductDetail.aspx?iid=380751683&pr=39.88> [20230410].



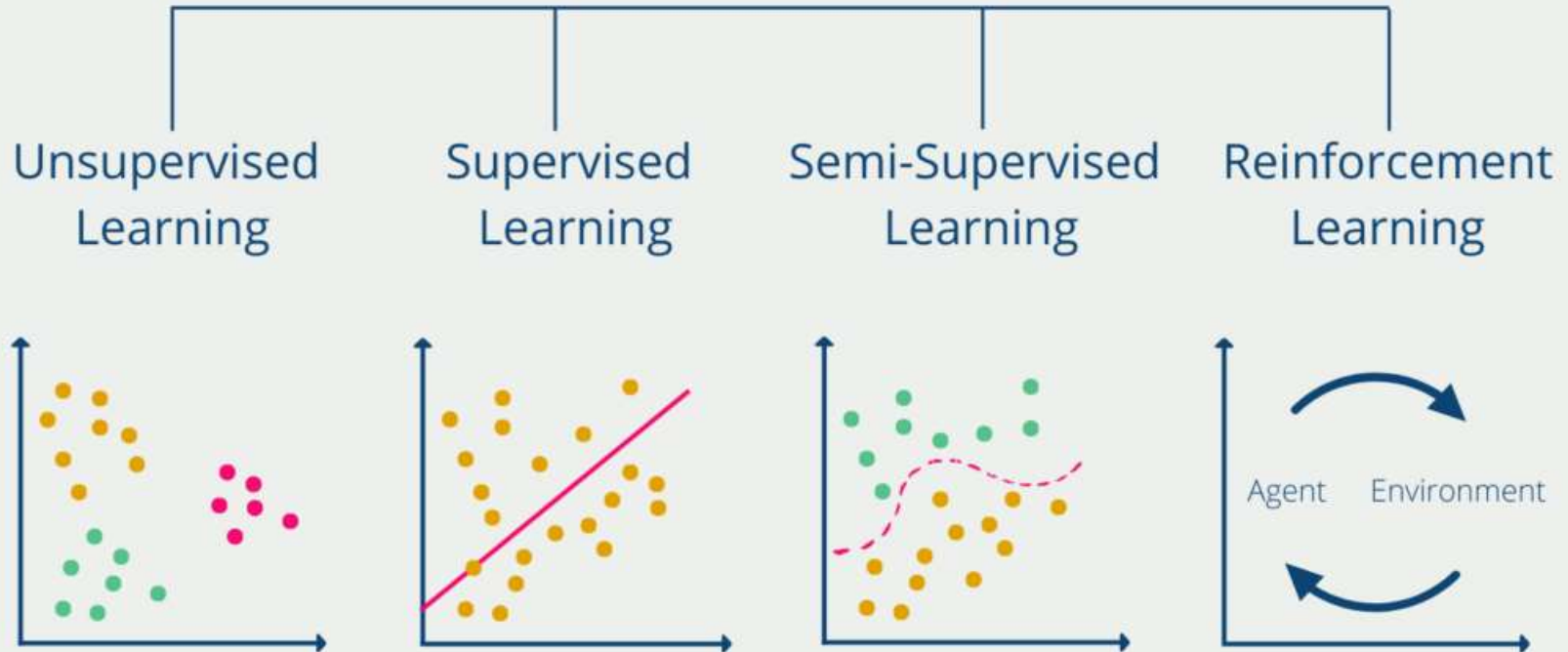
Rob Pascoe, “Data science”, Data Cymru, url <https://www.data.cymru/data-science> [20230410].



Ryan Urbanowicz, “New proposed field/term Venn diagram for an upcoming talk”, Twitter, 15 Jun 2018, url <https://twitter.com/DocUrbs/status/1007375834347376642> [20230410].

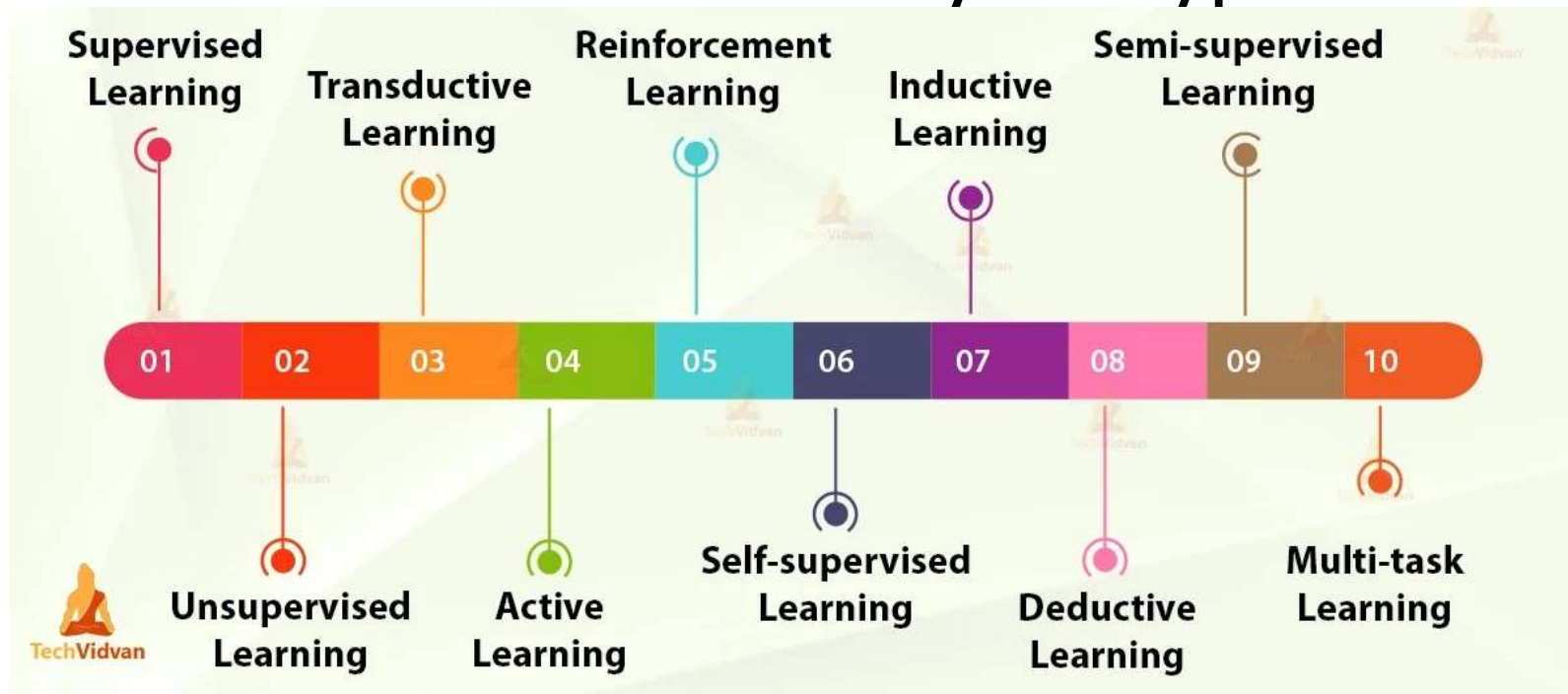
Types

Machine Learning



-, "Reinforcement Learning: Bestärkendes Lernen erklärt!", Data Base Camp, 26 Jan 2022, url <https://databasecamp.de/ki/reinforcement-learning> [20230411].

There is also another way for types of ML



TechVidvan Team, "Types of Machine Learning – Supervised, Unsupervised, Reinforcement", Simplilearn, 10 Mar 2021, url <https://techvidvan.com/tutorials/types-of-machine-learning/> [20230411].

Algorithms

1



In this process, a relationship is established between independent and dependent variables by fitting them to a line. This line is known as the regression line and represented by a linear equation $Y = a * X + b$.

LINEAR REGRESSION

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

2



Logistic Regression is used to estimate discrete values (usually binary values like 0/1) from a set of independent variables. It helps predict the probability of an event by fitting data to a logit function.

LOGISTIC REGRESSION

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

3



DECISION TREE

This is a supervised learning algorithm that is used for classifying problems. In this algorithm, we split the population into two or more homogeneous sets based on the most significant attributes/ independent variables.

Simon Tavasoli, “Top 10 Machine Learning Algorithms For Beginners: Supervised, and More”, Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

4

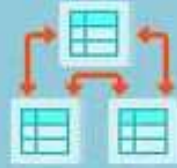


In SVM (Support Vector Machine) algorithm, we plot raw data as points in an n -dimensional space (n = no. of features you have). The value of each feature is then tied to a particular coordinate, making it easy to classify the data.

SVM ALGORITHM

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

5



NAIVE BAYES ALGORITHM

A Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature.

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

6

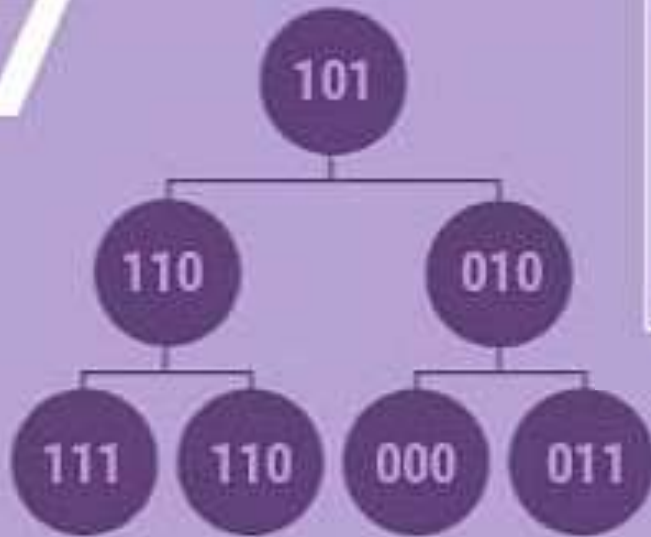
KNN ALGORITHM

This algorithm can be applied to both classification and regression problems. It stores all available cases and classifies any new cases by taking a majority vote of its k neighbors. The case is then assigned to the class with which it has the most in common.



Simon Tavasoli, “Top 10 Machine Learning Algorithms For Beginners: Supervised, and More”, Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

7



In this unsupervised learning algorithm, data sets are classified into a particular number of clusters in such a way that all the data points within a cluster are homogenous and heterogeneous from the data in other clusters.

K-MEANS

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

8



RANDOM FOREST ALGORITHM

A collective of decision trees is called a Random Forest. To classify a new object based on its attributes, each tree is classified, and the tree "votes" for that class. The forest chooses the classification having the most votes.

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

9



DIMENSIONALITY REDUCTION ALGORITHMS

Dimensionality reduction algorithms like Decision Tree, Factor Analysis, Missing Value Ratio, and Random Forest can help you find relevant details.

Simon Tavasoli, "Top 10 Machine Learning Algorithms For Beginners: Supervised, and More", Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

10

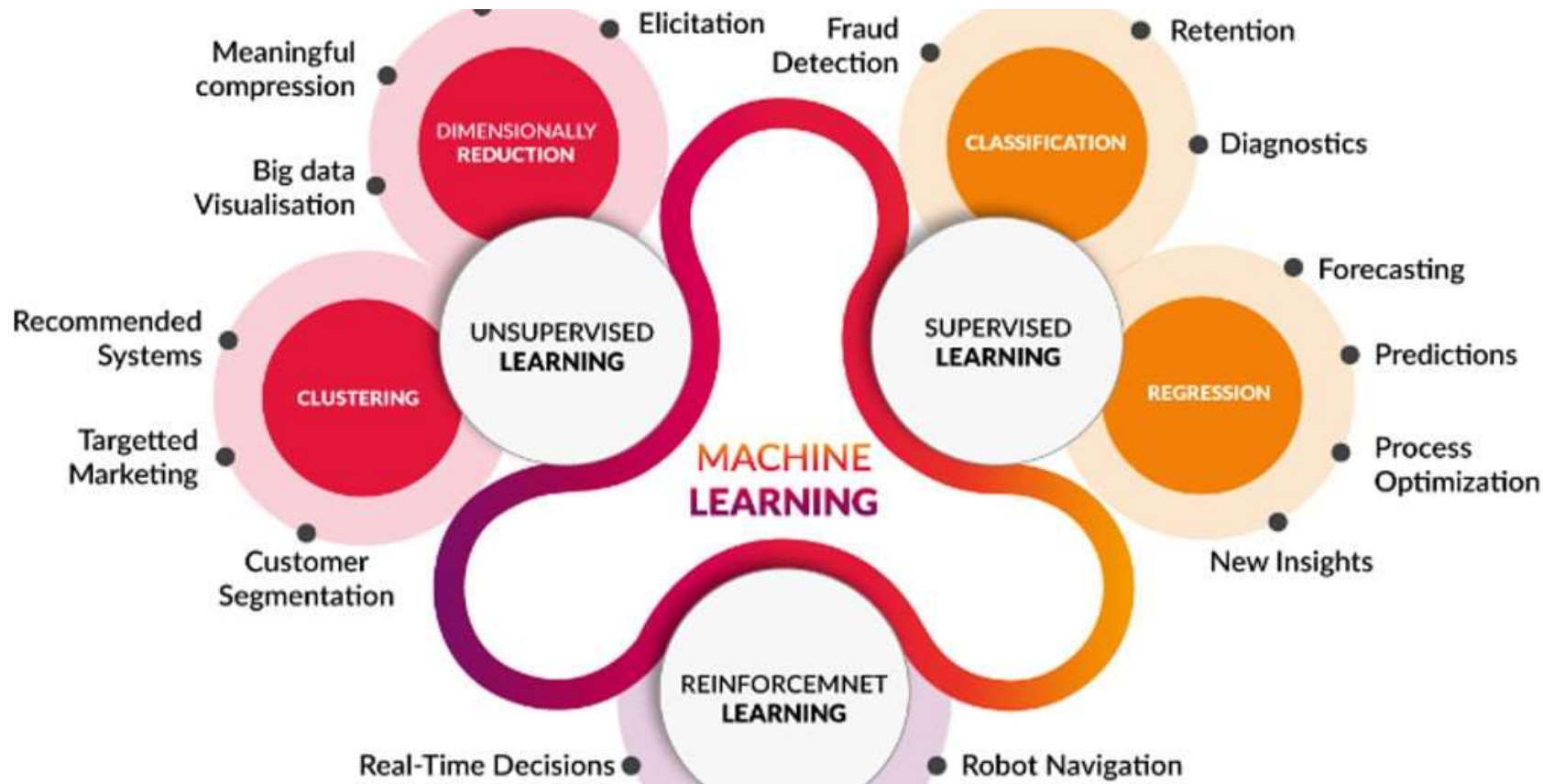


GRADIENT BOOSTING ALGORITHM AND ADABOOSTING ALGORITHM

These are boosting algorithms used when massive loads of data have to be handled to make predictions with high accuracy.

Simon Tavasoli, “Top 10 Machine Learning Algorithms For Beginners: Supervised, and More”, Simplilearn, 30 Mar 2023, url <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [20230410].

Applications



Mohaiminul Islam, "Machine Learning", Kaggle, 6 Nov 2020, url <https://www.kaggle.com/getting-started/195629> [20230411].

10 FASCINATING APPLICATIONS OF DEEP LEARNING



**SELF-DRIVEN
CARS**



**AUTOMATIC
HANDWRITING
GENERATION**



**PIXEL
RESTORATION**



**COLOURISATION OF
BLACK & WHITE
IMAGES**



**DEEP
DREAMING**



**DETECTION OF
GROWTH DELAYS
IN CHILDREN**



**DEMOGRAPHIC
PREDICTION**



**SOUND
ADDITION TO
SILENT FILMS**

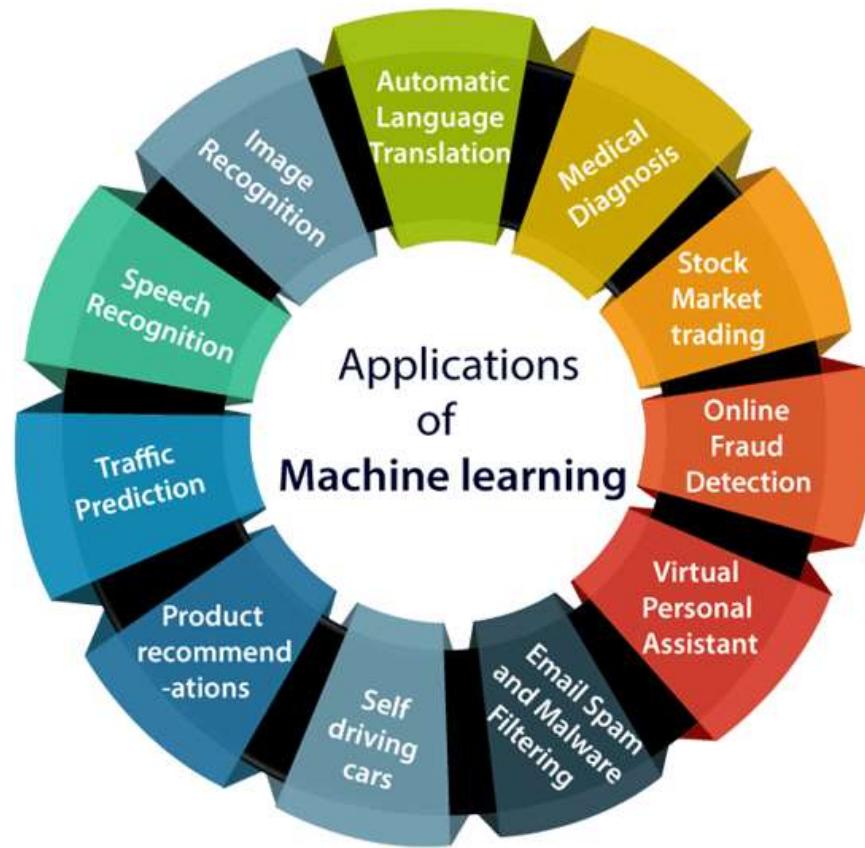


**NEWS
GENERATION**



**AUTOMATIC
MACHINE
TRANSLATION**

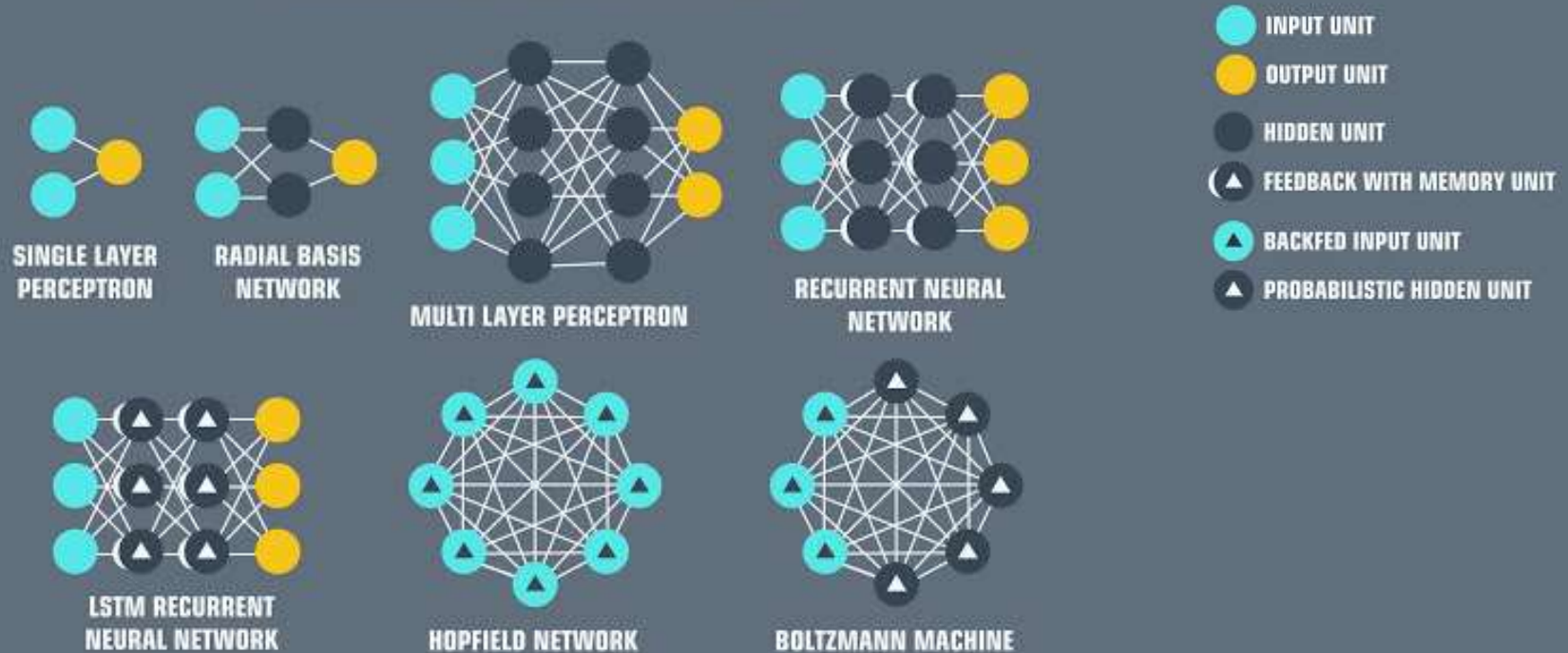
-, "Top Fascinating Application of Deep Learning", Digital Leaders, 11 Oct 2020, url <https://glweb.eu/blog/digital-transformation/155> [20230411].



-, "Applications of Machine learning", JavaTpoint, url <https://www.javatpoint.com/applications-of-machine-learning> [20230411].

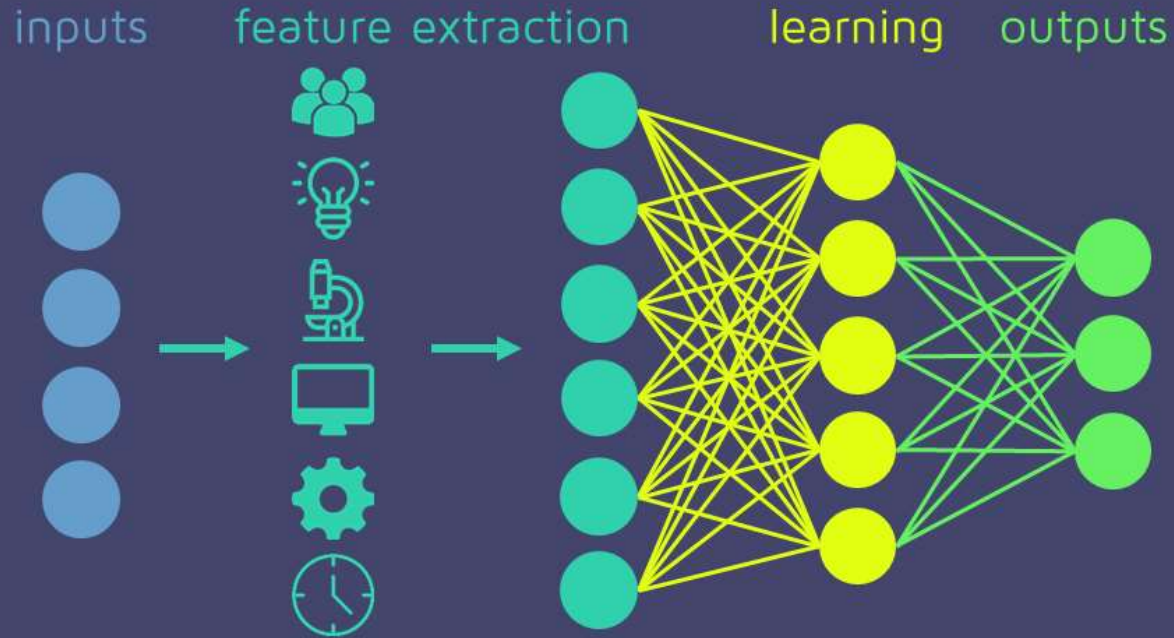
Architectures

NEURAL NETWORK ARCHITECTURE TYPES



Mohaiminul Islam, "Machine Learning", Kaggle, 6 Nov 2020, url <https://www.kaggle.com/getting-started/195629> [20230411].

MACHINE LEARNING



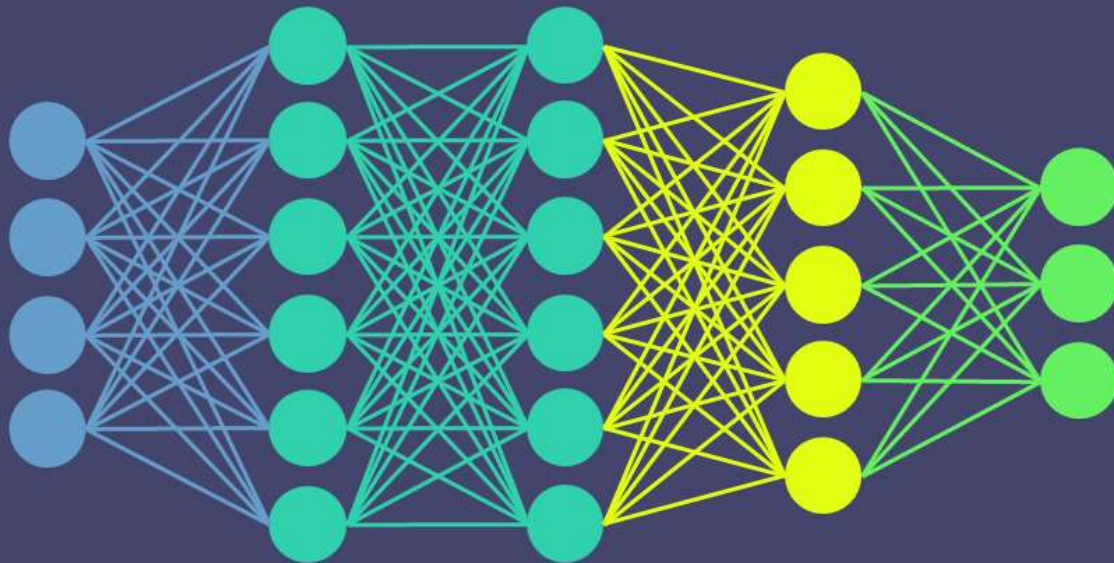
Mohaiminul Islam, "Machine Learning", Kaggle, 6 Nov 2020, url <https://www.kaggle.com/getting-started/195629> [20230411].

DEEP LEARNING

inputs

feature extraction + learning

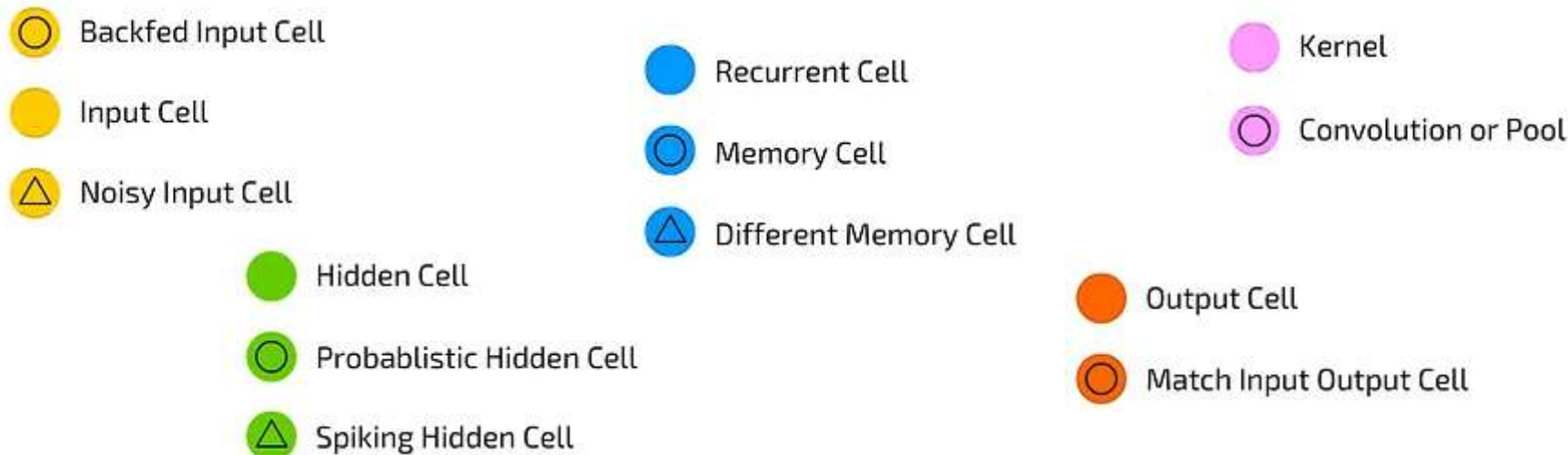
outputs



Mohaiminul Islam, "Machine Learning", Kaggle, 6 Nov 2020, url <https://www.kaggle.com/getting-started/195629> [20230411].

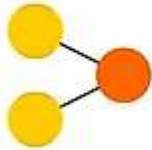
A mostly complete chart of Neural Networks

©2016 Fjodor van Veen - asimovinstitute.org

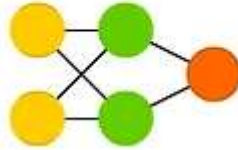


Andrew Tch, "The mostly complete chart of Neural Networks, explained", Towards Data Science, 4 Aug 2017, url <https://towardsdatascience.com/p-3fb6f2367464> [20230411].

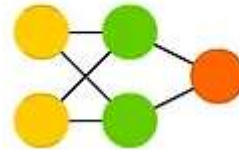
Perceptron (P)



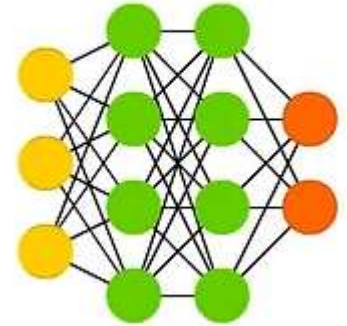
Feed Forward (FF)



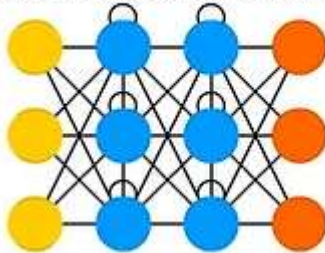
Radial Basis Network (RBF)



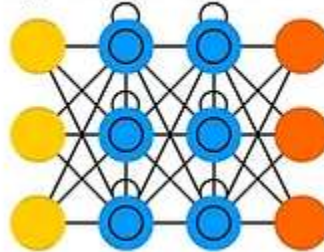
Deep Feed Forward (DFF)



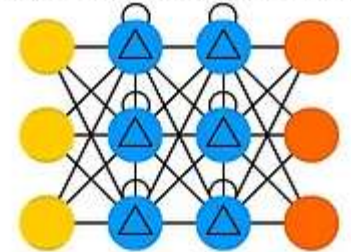
Recurrent Neural Network (RNN)



Long / Short Term Memory (LSTM)

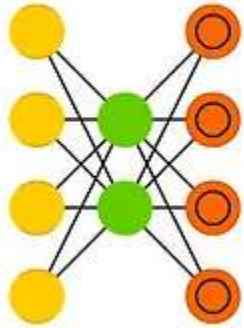


Gated Recurrent Unit (GRU)

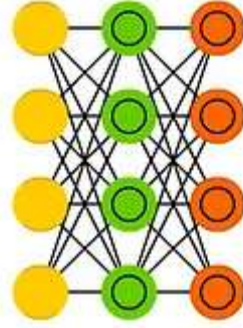


Andrew Tch, "The mostly complete chart of Neural Networks, explained", Towards Data Science, 4 Aug 2017, url <https://towardsdatascience.com/p-3fb6f2367464> [20230411].

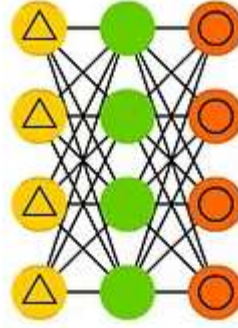
Auto Encoder (AE)



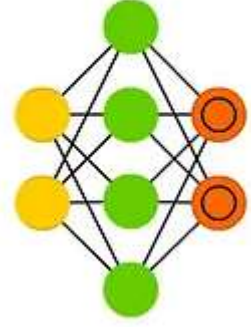
Variational AE (VAE)



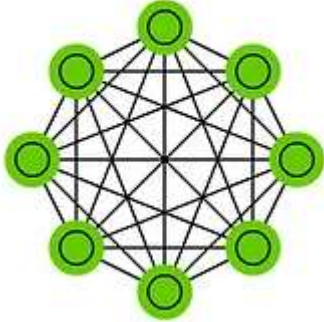
Denosing AE (DAE)



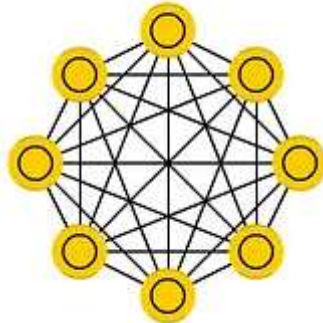
Sparse AE (SAE)



Markov Chain (MC)



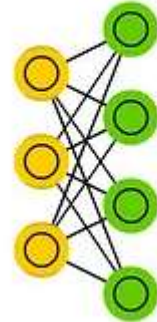
Hopfield Network (HN)



Boltzmann Machine (BM)

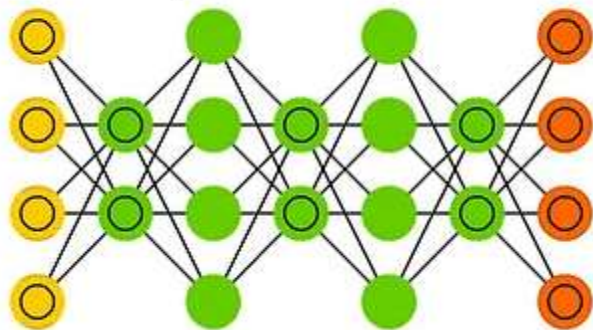


Restricted BM (RBM)

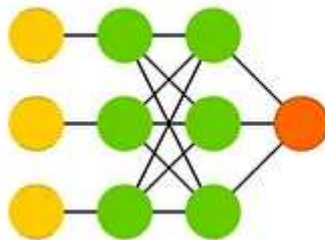


Andrew Tch, "The mostly complete chart of Neural Networks, explained", Towards Data Science, 4 Aug 2017, url <https://towardsdatascience.com/p-3fb6f2367464> [20230411].

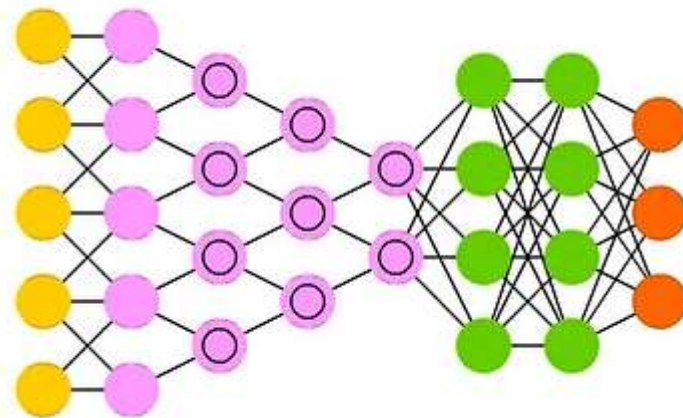
Deep Belief Network (DBN)



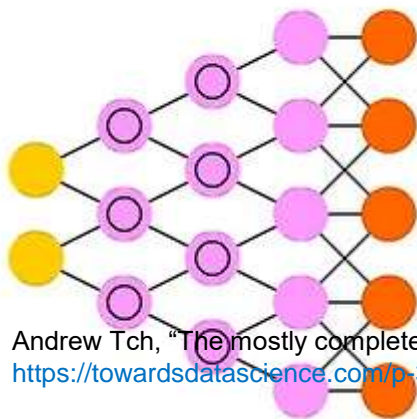
Support Vector Machine (SVM)



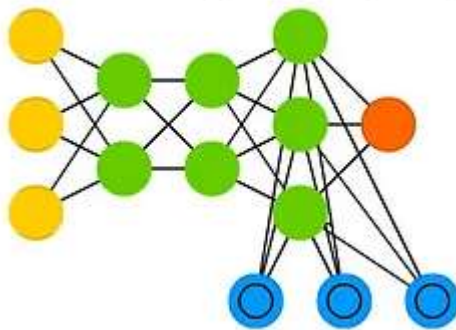
Deep Convolutional Network (DCN)



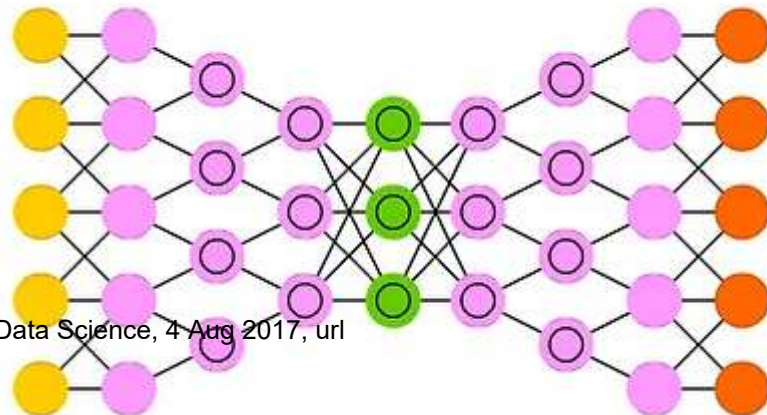
Deconvolutional Network (DN)



Neural Turing Machine (NTM)

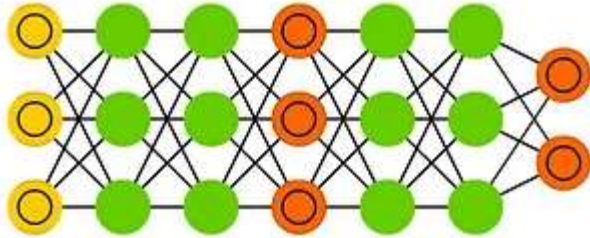


Deep Convolutional Inverse Graphics Network (DCIGN)

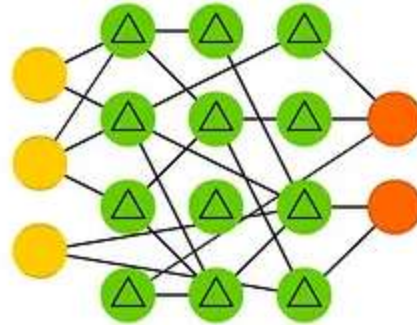


Andrew Tch, "The mostly complete chart of Neural Networks, explained", Towards Data Science, 4 Aug 2017, url <https://towardsdatascience.com/p-3fb6f2367464> [20230411].

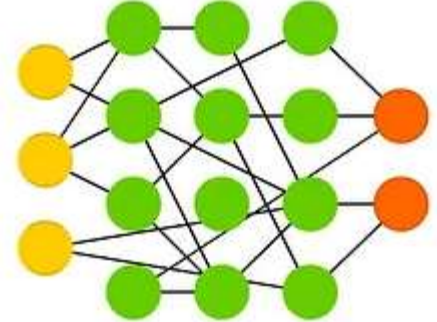
Generative Adversarial Network (GAN)



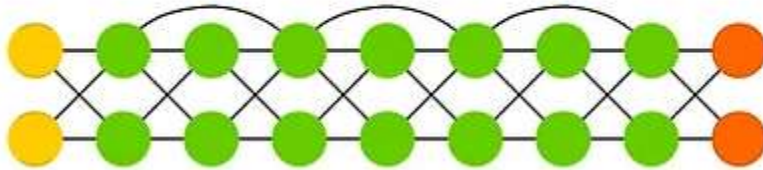
Liquid State Machine (LSM)



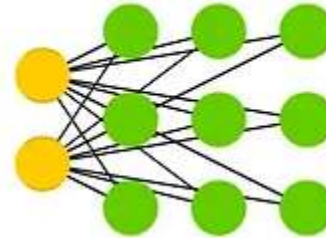
Extreme Learning Machine (ELM)



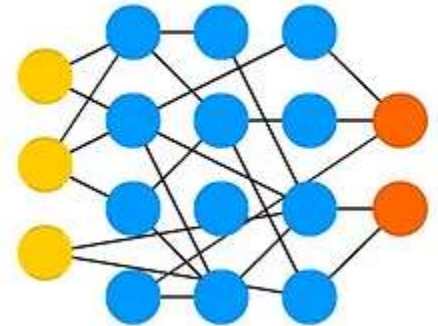
Deep Residual Network (DRN)



Kohonen Network (KN)



Echo State Network (ESN)



Andrew Tch, "The mostly complete chart of Neural Networks, explained", Towards Data Science, 4 Aug 2017, url <https://towardsdatascience.com/p-3fb6f2367464> [20230411].



Thank you