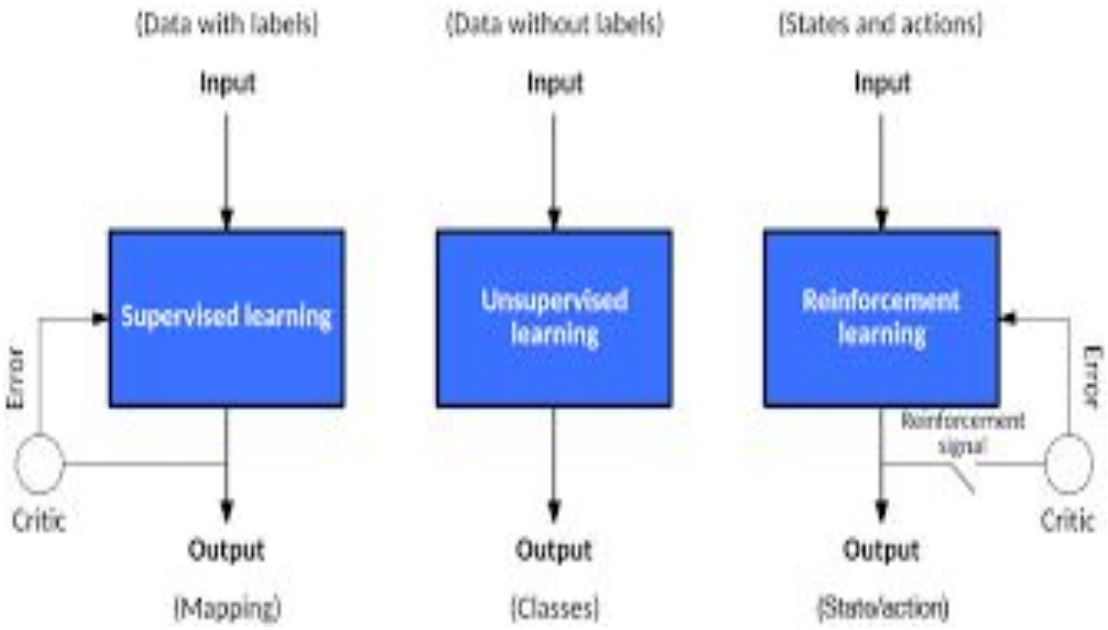
Machine Learning

Types of Learning

Types of Learning

- Supervised
  - (x, y) available training data set
  - For a new data x (input), predict the label of y (output)
  - This is applicable for labeled data
- Unsupervised
  - x is only given
  - Cluster the data based on x
  - This is applicable for unlabeled data
- Reinforcement
  - Learning made by rewards or penalty
- Semi-supervised
  - Combination of supervised and unsupervised learning
  - Applicable when partial data is labeled and remaining data is unlabeled

Types of Learning



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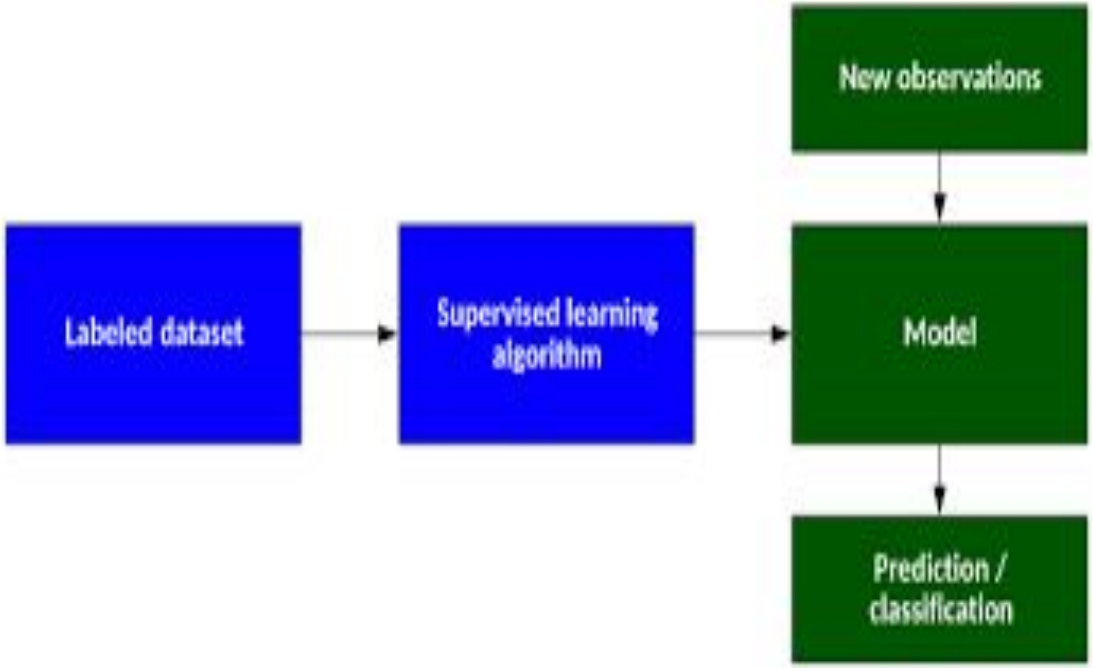
Supervised learning



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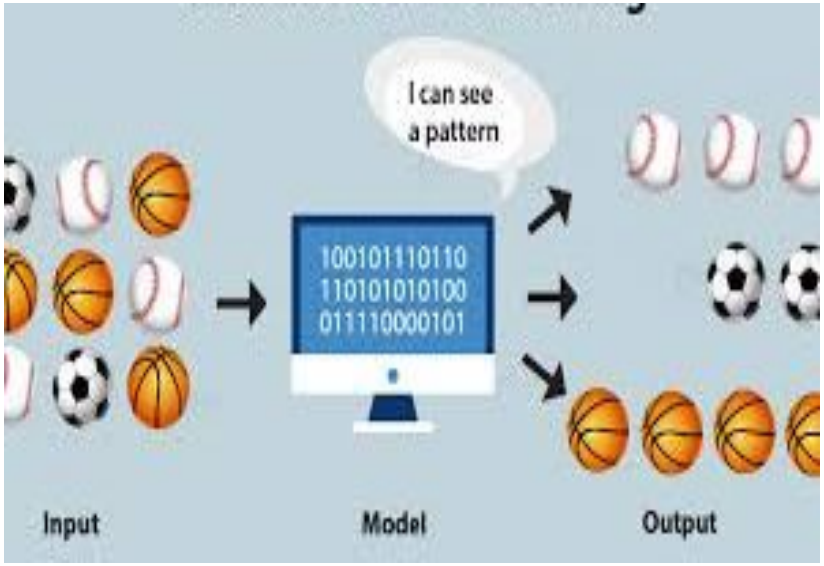
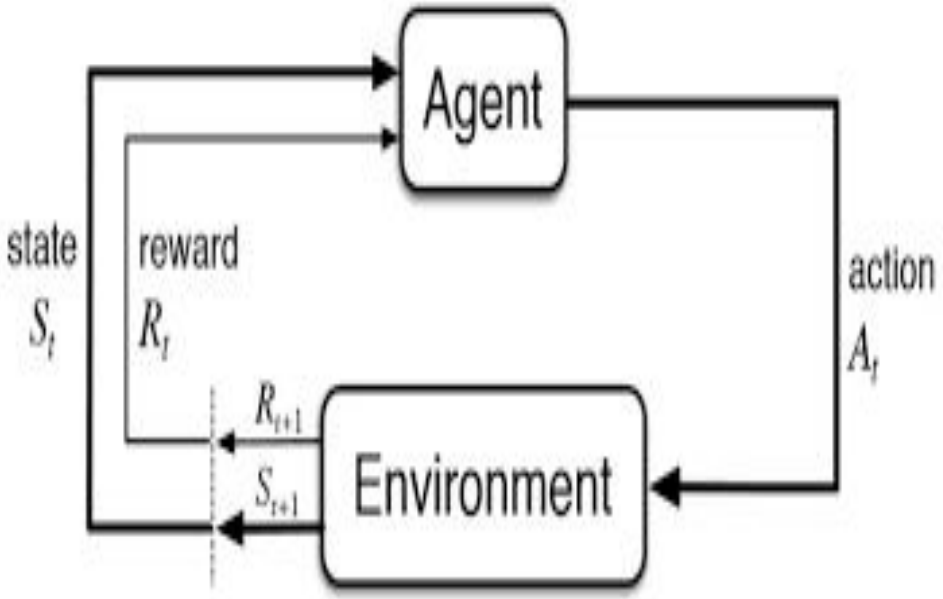
Unsupervised learning



data-flair.training

Reinforcement learning



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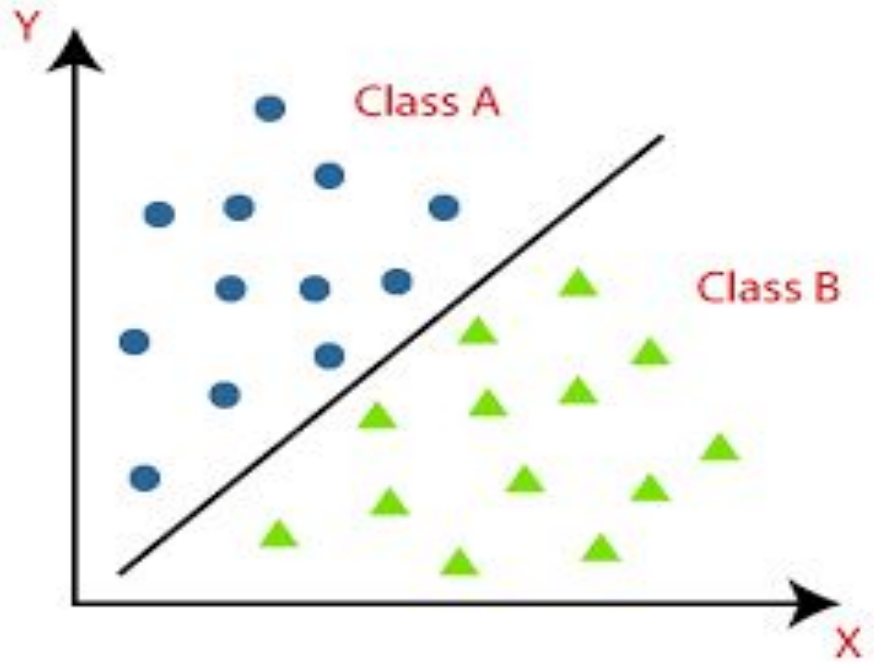
Discussion: Supervised learning

- A set of input features is given x1, x2,…, xn
- A target feature y
- For a set of new examples, x along with corresponding y values are given
- Predict the value y for the given x
  - Classification: discrete data
  - Regression: continuous data

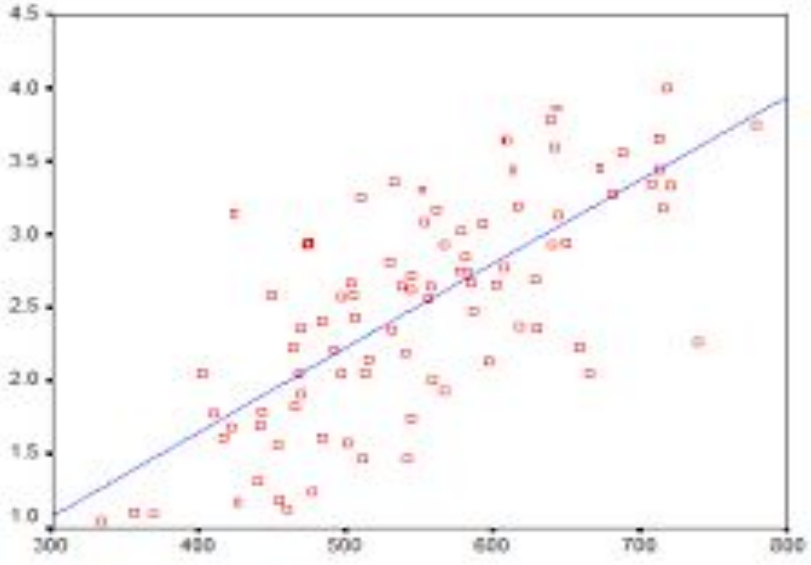
	X1	X2	.	-	Xn	Y
I1	A11	A12	.	.	A1n	Y1
I2	A21	A22	.	.	A2n	Y2
.	.	.	.	.	.	.
.	.	.	.	.	.	.
Im	Am1	Am2	.	.	Amn	Ym

Supervised learning: classification



javapoint.com

Supervised learning: Regression

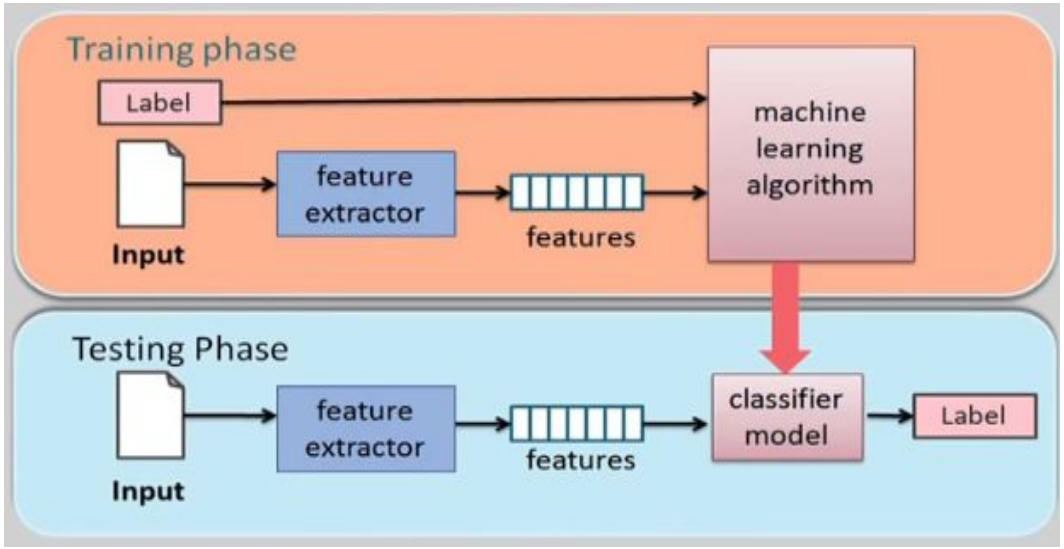


theanalysisfactor.com

- Predict CGPA of an semester with respect to marks
- X: marks
- Y: CGPA
- Y=f(X)
- If there are multiple parameters in X, then, function would be
  - Y=f(X,a), where a represents parameters/features of X

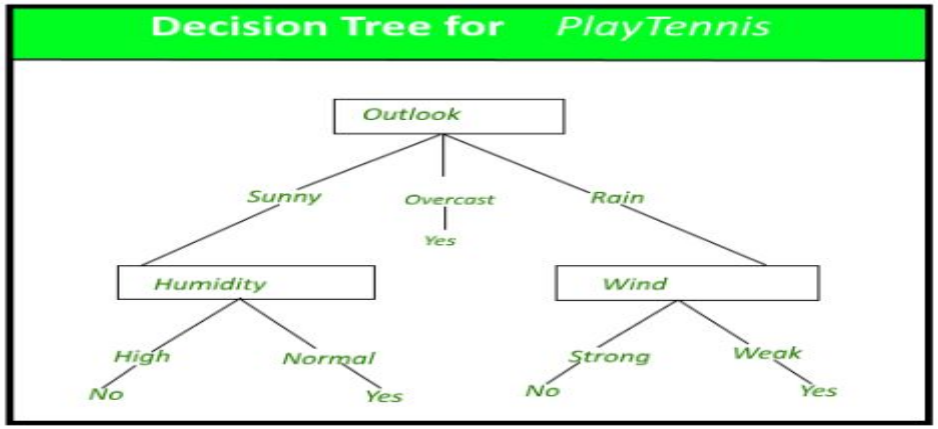
Features

- Types:
  - Categorical: Blood group
  - Real valued: Height, weight
  - Integer valued: No. of stocks, no. of words in a document
  - Ordinal: High, Medium, Low



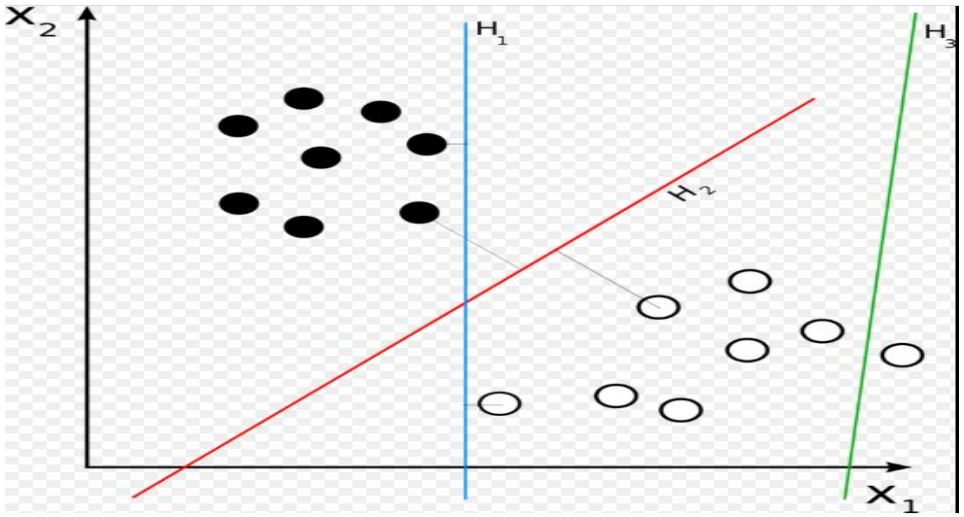
Representation

- Decision Tree



greeksforgreeks.com

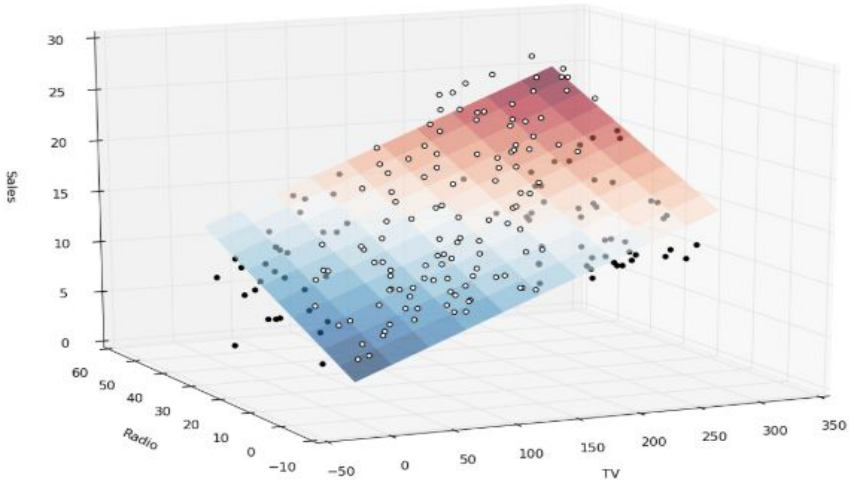
- Linear function



Google images

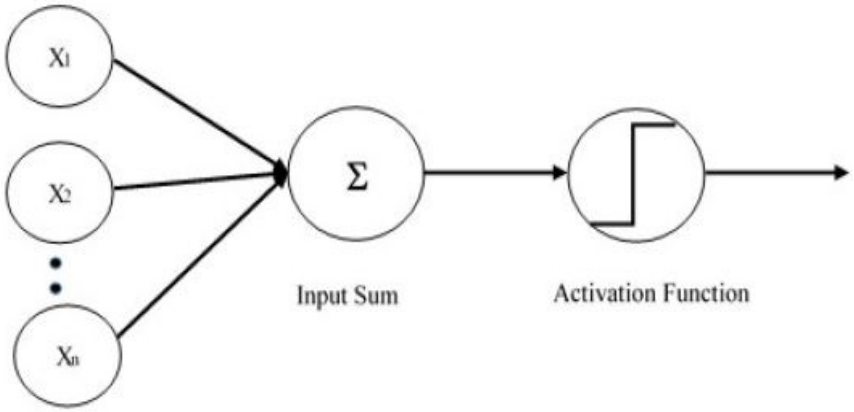
Representation

- Multivariate linear function



stackoverflow.com

- Single layer perceptron



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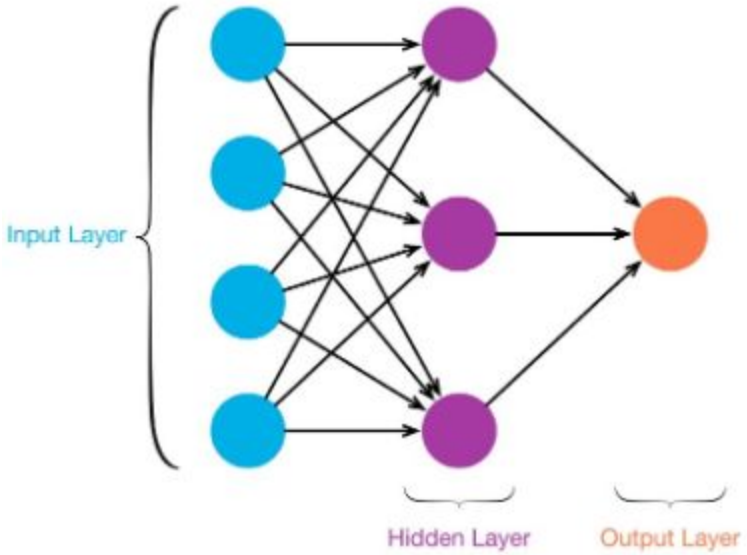
Representation

- Multi-layer neural network



towardsdatascience.com

Terminology

- Features
- Feature vector
- Instance space
- Examples
- Target function
- Training data