

Artificial Intelligence:

Artificial intelligence is the ability of a computer or a robot controlled by a computer to do tasks that are usually done by humans because they require human intelligence and discernment.

Machine Learning:

Machine learning is a branch of artificial intelligence and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

Deep Learning:

Deep learning is a method in artificial intelligence that teaches computers to process data in a way that is inspired by the human brain.

Deep learning refers to the neural networks having many layers that enable learning.

: Automatic feature extraction.

Scalar:

Scalar is just a single number, in contrast to most of the other objects like vectors, which are usually arrays of multiple numbers.

Vector:

A vector is a tuple of one or more values called scalars.

Vectors are usually represented as arrays or lists of numbers, and each number in the list represents a specific feature or attribute of the data.

We want to create a data structure called a vector via process called vectorization. The number of elements in the vector is called the order of a vector.

Matrices:

A matrix to be a group of vectors that all have the same dimension. A matrix is a two-dimensional array for which we have rows and columns.

Tensor:

A tensor is a generalization of vectors and matrices and is easily understood as a multidimensional array. An array of numbers arranged on a regular grid with a variable number of axes is known as tensor.

Hyperplane:

Hyperplane is a plane of dimension one less than the dimension of data space, which divides the classes of data.

Population:

Population refers to the entire group or set of individuals, objects, or events being studied.

Sample:

Sample is a subset of the population that is used for analysis.

Regression:

Regression is a method for understanding the relationship between independent variables or features and a dependent variable or outcome.

Classification:

Classification is a supervised machine learning process of categorizing a given set of input data into classes based on one or more variables.

Clustering:

Clustering is an unsupervised learning technique that involves using a distance measure and iteratively moving similar items more closely together.

- Underfitting means that your model makes accurate, but initially incorrect predictions.
- Overfitting means that your model makes not accurate predictions.

Optimization:

Optimization is the process where we train the model iteratively that results in a maximum and minimum function evaluation.

Convex Optimization:

Convex optimization can be used to optimize algorithms by improving the speed at which they converge to a solution.

Gradient Descent:

Gradient descent is an optimization algorithm which is commonly used to train machine learning models and neural networks.

Stochastic Gradient Descent:

Stochastic gradient descent is a variant of the gradient descent algorithm that is used for optimizing machine learning models.
: Updating the parameter vectors.

Mini-Batch Gradient Descent:

Mini-batch gradient descent is considered to be the cross-over between GD and SGD. In this approach instead of iterating through the entire dataset or one observation, we split the dataset into small subsets (batches) and compute the gradients for each batch.

Quasi-Newton Optimization Methods:

Quasi-Newton methods are methods used to either find zeroes or local maxima and minima of functions, as an alternative to Newton's method. They can be used if the Jacobian or Hessian is unavailable or is too expensive to compute at every iteration.

Logistic Regression:

It is used for predicting the categorical dependent variable using a given set of independent variables

Logistic Function:

$$f(x) = \frac{1}{1 + e^{-\theta x}}$$

Confusion Matrix:

		Predicted		
		-ive	+ive	
Actual	TN -ive	4	4	FP
	FN +ive	3	4	TP

Sensitivity:

$$\text{Sensitivity} = \frac{TP}{TP + FN}$$

Specificity:

$$\text{Specificity} = \frac{TN}{TN + FP}$$

Accuracy:

$$\text{Accuracy} = \frac{TP + TN}{TP + FP + FN + TN}$$

Accuracy is the degree of closeness of measurements of a quantity to that quantity's true value.

Precision:

$$\text{Precision} = \frac{TP}{TP + FP}$$

The degree to which repeated measurements under the same conditions give us the same results is called precision.

Recall :

$$\text{Recall} = \frac{\text{TP}}{\text{TP} + \text{FN}}$$

F₁ score:

$$F_1 = \frac{2}{\frac{1}{\text{Precision}} \times \frac{1}{\text{Recall}}}$$

$$F_1 = \frac{2 \times \text{precision} \times \text{recall}}{\text{precision} + \text{recall}}$$

$$F_1 = \frac{2\text{TP}}{2\text{TP} + \text{FP} + \text{FN}}$$