

What is Loss Function and Cost Function?

In machine learning, both loss functions and cost functions are important components used to measure how well a model's predictions match the actual target values in the training data. While these terms are related, they are not exactly the same, and their usage can vary depending on the context. Here's an explanation of both terms:

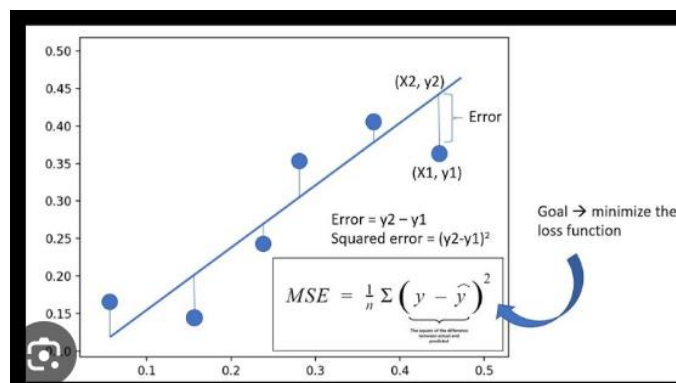
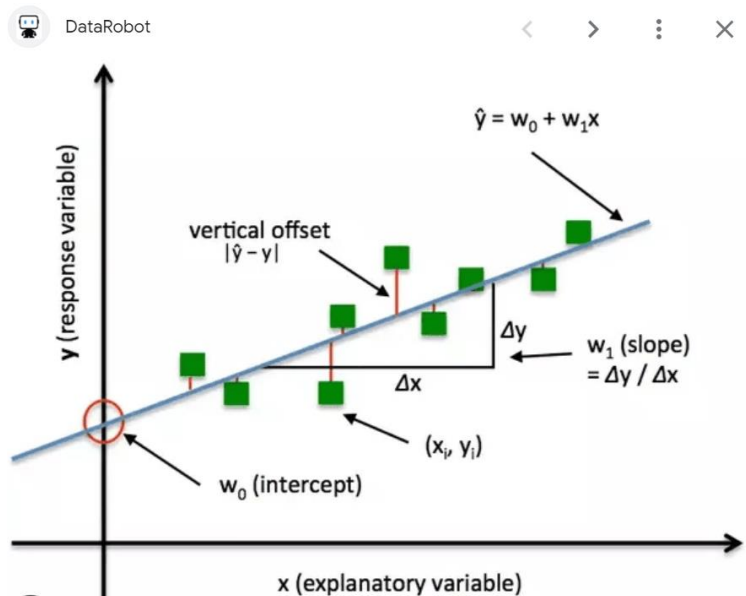
Loss Function (or Objective Function):

- A loss function, also known as an objective function or error function, is a mathematical function that quantifies the difference between a model's predicted values and the actual target values for a single data point.
- The loss function computes a single numerical value that represents how "wrong" the model's prediction is for that specific data point.
- Common loss functions include mean squared error (MSE) for regression tasks and cross-entropy loss (log loss) for classification tasks.
- The goal during the training process is to minimize the average loss across all data points in the training dataset. This optimization process is typically achieved using gradient descent or other optimization techniques.

Cost Function (or Objective Function):

- The term "cost function" is often used interchangeably with "loss function." In many contexts, they refer to the same thing: a function that measures the error or cost associated with a model's predictions.

- However, sometimes "cost function" is used in a broader sense to refer to the overall objective that a machine learning algorithm seeks to minimize or maximize. This objective can include the loss term as well as additional regularization terms, if applicable.
- For example, in regularized linear regression, the cost function might include both the mean squared error (MSE) loss term and a regularization term (e.g., L2 regularization), which penalizes overly complex models.



In summary, a loss function is a specific mathematical function that quantifies the error between predictions and actual values for a single data point. The cost function, on the other hand, can refer to the broader objective function that encompasses the loss term and potentially other terms used to guide the

optimization process, such as regularization. In practice, the terms are often used interchangeably, and their usage can depend on the specific context and convention within a particular machine learning framework or problem.