# Classification

In the context of artificial intelligence (AI), classification refers to the task of categorizing input data into predefined classes or categories. It is a type of supervised learning, where the algorithm is trained on a labeled dataset, meaning that each input is associated with a corresponding output label.

The goal of a classification algorithm is to learn a mapping from input features to the correct output class so that it can make accurate predictions on new, unseen data. The process typically involves two main steps: training and testing.

1. \*Training:\*

- During the training phase, the algorithm is provided with a dataset in which each example is paired with the correct class label. The algorithm learns the patterns and relationships within the features of the data and their corresponding labels.

- The training process involves adjusting the parameters of the model to minimize the difference between the predicted output and the actual labels.

2. \*Testing (or Inference):\*

- Once the model is trained, it is tested on new, unseen data to evaluate its performance. The model predicts the class labels for the test data, and the predictions are compared to the actual labels to assess the accuracy of the model.

Common algorithms used for classification tasks include:

- \*Decision Trees:\* These are tree-like structures where each node represents a decision based on a specific feature, leading to different branches and ultimately resulting in a class label.

- \*K-Nearest Neighbors (KNN):\* KNN classifies data points based on the majority class among their k-nearest neighbors in the feature space.

- \*Random Forests:\* Random forests are ensembles of decision trees, combining the predictions of multiple trees to improve accuracy and robustness.

Classification is a fundamental concept in machine learning and AI, and it finds applications in various domains, such as image recognition, spam detection, medical diagnosis, and more.