**Clustering vs. Classification**

**Clustering:**

* **Objective**: Clustering is an **unsupervised learning** technique that groups data points based on similarities without predefined class labels.
* **Process**: It identifies patterns and groups instances into clusters based on common characteristics.
* **Use Cases**:
  + Customer segmentation based on purchasing behavior.
  + Image segmentation for object detection.
  + Anomaly detection.
* [**Example**: Imagine grouping similar flowers based on petal length and width without knowing their species1](https://www.datacamp.com/blog/classification-vs-clustering-in-machine-learning).

!Clustering Example

**Classification:**

* **Objective**: Classification is a **supervised learning** technique that predicts discrete class labels for given data points.
* **Process**: It learns from historical data to map input features to specific output classes.
* **Use Cases**:
  + Spam filtering (categorizing emails as spam or not).
  + Face recognition (identifying individuals based on facial features).
  + Customer churn prediction.
  + Loan approval decision.
* [**Example**: Predicting whether an image contains a cat or a dog based on features like color, texture, and shape](https://www.datacamp.com/blog/classification-vs-clustering-in-machine-learning)[1](https://www.datacamp.com/blog/classification-vs-clustering-in-machine-learning).

**Regression vs. Classification**

**Regression:**

* **Objective**: Regression predicts **continuous real-values** instead of discrete classes.
* **Process**: It finds a model to estimate continuous target variables using independent features.
* **Use Cases**:
  + Predicting house prices based on features like area, location, and number of bedrooms.
  + Forecasting stock prices.
  + Estimating rainfall based on historical weather data.
* [**Example**: Predicting the amount of rainfall (in millimeters) based on the day of the year](https://www.datacamp.com/blog/classification-vs-clustering-in-machine-learning)[2](https://www.geeksforgeeks.org/ml-classification-vs-regression/).

!Regression Example

**Classification (Recap):**

* **Objective**: Predicting discrete class labels.
* **Process**: Finding decision boundaries to separate different classes.
* [**Example**: Determining whether a team will win a match based on recorded parameters (e.g., team strength, player performance)](https://www.datacamp.com/blog/classification-vs-clustering-in-machine-learning)[2](https://www.geeksforgeeks.org/ml-classification-vs-regression/).

Remember, **classification** involves discrete categories, while **regression** predicts continuous quantities.

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