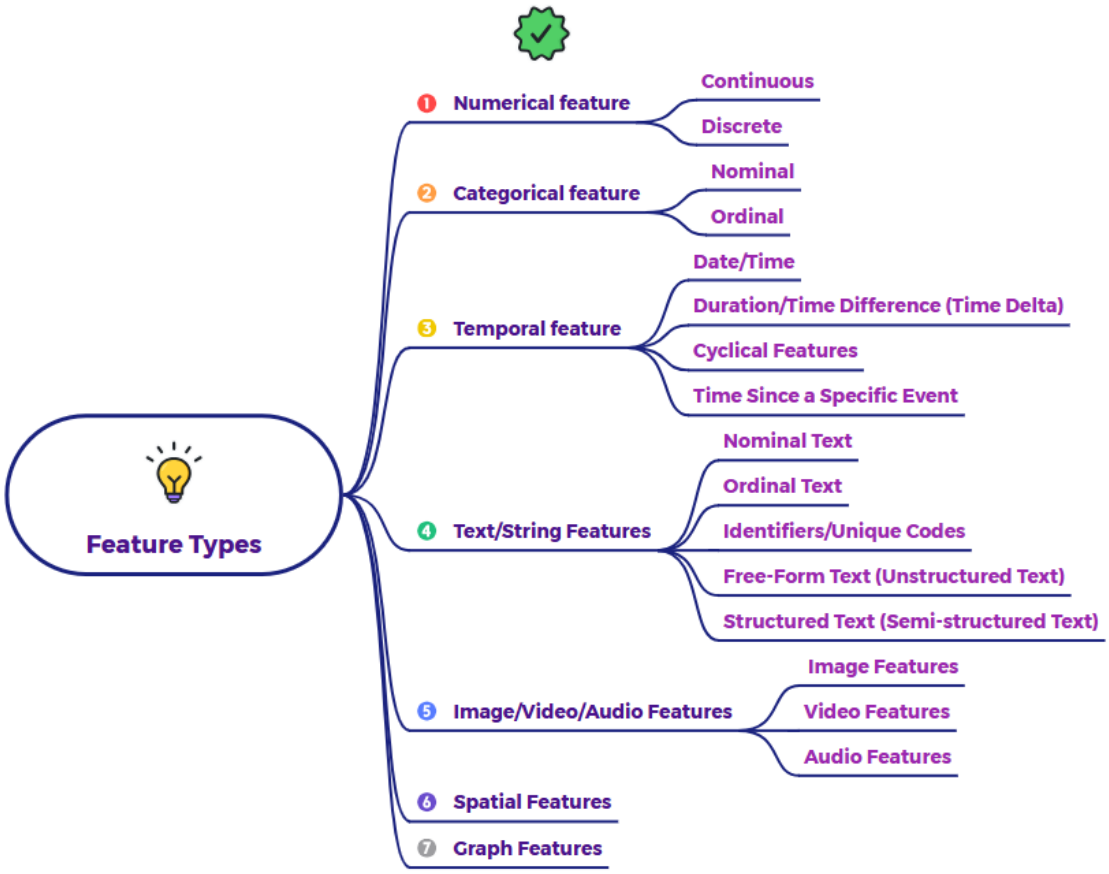
What are numerical features in data science?



There are two main types of numerical features in data science:

1. Continuous Features:

- **Definition:** Continuous features are numerical variables that can take on any value within a given range. The values can be integers or floating-point numbers, and there are theoretically an infinite number of possible values between any two given values.
- **Key Characteristic:** They can be measured with a high degree of precision.
- **Examples:**
    - **Height:** A person's height can be 1.75 meters, 1.803 meters, 1.6255 meters, and so on, within a plausible range.

- **Weight:** Similarly, weight can take on a wide range of values with decimal precision.
- **Temperature:** Temperature (in Celsius or Fahrenheit) can be any value within a certain range, including fractions.
- **Stock Price:** The price of a stock can fluctuate continuously within market hours.
- **Time Elapsed:** The duration of an event can be measured with high precision (e.g., 3.5 seconds, 10.78 minutes).
- **Blood Pressure:** Systolic and diastolic blood pressure readings are continuous values.
- **Latitude and Longitude:** Representing geographical coordinates as precise decimal values.

2. Discrete Features:

- **Definition:** Discrete features are numerical variables that can only take on specific, separate values. These values are usually integers, and there are a finite or countably infinite number of possible values.
- **Key Characteristic:** They are typically obtained by counting.
- **Examples:**
  - **Number of Cars:** The number of cars a person owns can be 0, 1, 2, 3, etc., but not 1.5.
  - **Number of Customers:** The count of customers visiting a store in a day will be a whole number.
  - **Number of Coin Flips Resulting in Heads:** This will always be an integer (0, 1, 2, ... for a given number of flips).
  - **Number of Children:** A family can have 0, 1, 2, etc., children.
  - **Number of Products Purchased:** The number of items bought in a single transaction is a discrete value.
  - **Rating on a Scale (e.g., 1 to 5 stars):** While seemingly ordinal, if we treat the rating as a specific count of stars, it can be

considered discrete. However, the *interpretation* of the difference between ratings might not be strictly numerical.

- **Number of Errors in a Code:** The count of errors found during a code review.

Key Differences Summarized:

Feature Type	Values	How Obtained	Examples
Continuous	Any value within a range	Measurement	Height, Weight, Temperature, Stock Price
Discrete	Specific, separate values	Counting	Number of cars, Number of customers

Understanding whether a numerical feature is continuous or discrete is important for choosing appropriate statistical methods, visualization techniques, and machine learning models. For example, some models might handle continuous and discrete features differently, and the way you bin or discretize continuous features can impact model performance.