**Statistics** mein **variable** wo characteristic ya attribute hota hai jo **change kar sakta hai** ya **different values** le sakta hai. Variables data ko categorize, measure, aur analyze karne mein madadgar hote hain. Har variable ki ek specific type hoti hai jo define karti hai ke usse kaise measure kiya jaye aur uska analysis kaise hoga.

### **Variables ki Types (Statistics mein)**

#### **1. Based on Nature of Data**

1. **Quantitative Variables**
   * **Definition:** Numeric values jo measure ya count kiya ja sakta hai.
   * **Sub-types:** a. **Discrete Variables**
     + **Explanation:** Sirf specific whole number values le sakte hain.
     + **Example:** Students ki count in a class (e.g., 30, 31).
   * b. **Continuous Variables**
     + **Explanation:** Kisi range mein koi bhi value le sakte hain, including decimals.
     + **Example:** Temperature (e.g., 36.5°C, 37.8°C).
2. **Qualitative Variables**
   * **Definition:** Non-numeric values jo kisi characteristic ya category ko define karte hain.
   * **Sub-types:** a. **Nominal Variables**
     + **Explanation:** Categories ko represent karte hain, jisme order ka koi meaning nahi hota.
     + **Example:** Gender (Male, Female), Blood group (A, B, AB, O).
   * b. **Ordinal Variables**
     + **Explanation:** Categories mein order hota hai, lekin difference measure nahi kiya ja sakta.
     + **Example:** Satisfaction level (Low, Medium, High).

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#### **2. Based on Role in Analysis**

1. **Independent Variables**
   * **Definition:** Wo variable jo kisi aur variable ko influence ya determine karta hai.
   * **Example:** Age (independent variable) ka effect blood pressure (dependent variable) par.
2. **Dependent Variables**
   * **Definition:** Wo variable jo independent variable ki wajah se change hota hai.
   * **Example:** Blood pressure (dependent variable) jo age (independent variable) ke saath change karta hai.

#### **3. Based on Measurement Scale**

1. **Nominal Scale Variables**
   * Categories without any order or ranking.
   * **Example:** Colors (Red, Blue, Green).
2. **Ordinal Scale Variables**
   * Categories with a meaningful order.
   * **Example:** Educational level (Primary, Secondary, University).
3. **Interval Scale Variables**
   * Numeric values with equal intervals but no true zero point.
   * **Example:** Temperature in Celsius or Fahrenheit.
4. **Ratio Scale Variables**
   * Numeric values with equal intervals and a true zero point.
   * **Example:** Weight, Height, Income.

### **Summary Table**

| **Type** | **Sub-Type** | **Example** |
| --- | --- | --- |
| **Quantitative Variables** | Discrete | Number of cars (1, 2, 3). |
|  | Continuous | Height (5.7 ft, 6.2 ft). |
| **Qualitative Variables** | Nominal | Eye color (Brown, Blue, Green). |
|  | Ordinal | Ratings (Poor, Average, Excellent). |
| **Based on Role** | Independent | Exercise routine. |
|  | Dependent | Weight loss. |
| **Measurement Scale** | Nominal | Gender (Male, Female). |
|  | Ordinal | Education (High School, College). |
|  | Interval | IQ Scores, Temperature. |
|  | Ratio | Age, Salary. |

**Note:** Har variable ki type aur scale ko samajhna zaroori hai, kyunki isse data ko analyze karne ke liye suitable statistical tests ka selection hota hai.

**True zero point** ka matlab hota hai ek aisa reference point jo **absolute absence** ya **complete nonexistence** of a quantity ko represent kare. Jab kisi variable mein true zero point ho, to iska matlab hai ke value **zero hone ka ek real aur meaningful significance hai**.

### **True Zero Point Explained**

* Agar kisi measurement scale mein zero ka matlab **kisi cheez ka bilkul na hona (absence)** ho, to us scale ko **true zero point** kaha jata hai.
* Yeh concept **Ratio Scale** variables ke sath associated hota hai.

### **Examples of True Zero Point**

1. **Weight**
   * **Zero weight** ka matlab hai ke object ka koi weight hi nahi hai (absolute absence of weight).
   * Example: 0 kg ka matlab hai koi mass nahi hai.
2. **Height**
   * **Zero height** ka matlab hai ke object ki koi height nahi hai.
   * Example: 0 cm ka matlab hai object bilkul exist nahi karta.
3. **Income**
   * **Zero income** ka matlab hai ke ek person ke paas bilkul bhi paisa nahi hai (absence of earnings).
4. **Distance**
   * **Zero distance** ka matlab hai ke starting point aur ending point ek hi hai (no distance covered).

### **Contrast with No True Zero Point (Interval Scale)**

Kuch scales mein **zero** sirf ek arbitrary reference point hota hai, na ke absolute absence ka indicator.

* Example: **Temperature in Celsius or Fahrenheit.**
  + **0°C** ka matlab yeh nahi hai ke temperature ki koi existence nahi hai; balki yeh ek arbitrary point hai.
  + Celsius aur Fahrenheit scales mein temperatures negative bhi ho sakte hain, is liye true zero point nahi hota.

Lekin, **Kelvin Scale** mein **0 K** (absolute zero) ek true zero point hai kyunki yeh **complete absence of thermal energy** ko represent karta hai.

### **Summary**

* **True Zero Point:** Jab zero ka matlab **absence** ho.
  + Example: Weight, Height, Income, Distance.
* **No True Zero Point:** Jab zero ka matlab sirf ek reference point ho, na ke absence.
  + Example: Temperature in Celsius or Fahrenheit.

True zero point ke saath measurements ka use **ratios** aur **comparisons** ke liye karna meaningful hota hai, jaise "10 kg is double of 5 kg."