**Skewness**

**What is Skewness?** Skewness measures the asymmetry of the data distribution. It tells us whether the data tends to be skewed to the left (negative skew) or right (positive skew) compared to a normal distribution.

**Types of Skewness:**

1. **Positive Skew (Right Skew)**
   * **Description:** The right tail (higher values) is longer or fatter than the left tail.
   * **Visual Indicator:** Most data points are concentrated on the left side, with a few larger values stretching out to the right.
   * **Skewness Value:** Positive (e.g., 1.5)
   * **Example:** Income distribution where most people earn average salaries but a few people earn very high salaries.
2. **Negative Skew (Left Skew)**
   * **Description:** The left tail (lower values) is longer or fatter than the right tail.
   * **Visual Indicator:** Most data points are concentrated on the right side, with a few smaller values stretching out to the left.
   * **Skewness Value:** Negative (e.g., -1.5)
   * **Example:** Age at retirement where most people retire around the average age, but a few retire much earlier.
3. **No Skew (Symmetrical Distribution)**
   * **Description:** The distribution is symmetric with equal tails on both sides.
   * **Visual Indicator:** The data is evenly distributed around the center.
   * **Skewness Value:** Close to 0 (e.g., 0.1)
   * **Example:** Scores on a well-designed test that measure a balanced range of abilities.

**Kurtosis**

**What is Kurtosis?** Kurtosis measures the "tailedness" of the data distribution. It indicates whether the data has heavy or light tails compared to a normal distribution.

**Types of Kurtosis:**

1. **Leptokurtic (High Kurtosis)**
   * **Description:** Distribution has heavy tails and a sharp peak.
   * **Visual Indicator:** More extreme values (outliers) and a pronounced peak at the center.
   * **Kurtosis Value:** Greater than 3 (e.g., 4.5)
   * **Example:** Stock market returns, which often have extreme gains or losses.
2. **Platykurtic (Low Kurtosis)**
   * **Description:** Distribution has light tails and a flatter peak.
   * **Visual Indicator:** Fewer extreme values and a flatter peak compared to a normal distribution.
   * **Kurtosis Value:** Less than 3 (e.g., 2.0)
   * **Example:** Scores on a standardized test where most students perform around the average with fewer extreme scores.
3. **Mesokurtic (Normal Kurtosis)**
   * **Description:** Distribution has tails and a peak similar to a normal distribution.
   * **Visual Indicator:** The distribution is similar to the normal curve.
   * **Kurtosis Value:** Around 3 (e.g., 3.0)
   * **Example:** Heights of adults in a large population, which often follow a normal distribution.

**Summary**

* **Skewness** tells us about the asymmetry of the distribution (left or right skew).
* **Kurtosis** tells us about the shape of the tails (heavy or light tails).

Understanding skewness and kurtosis helps in interpreting data distributions and identifying potential outliers or unusual patterns.