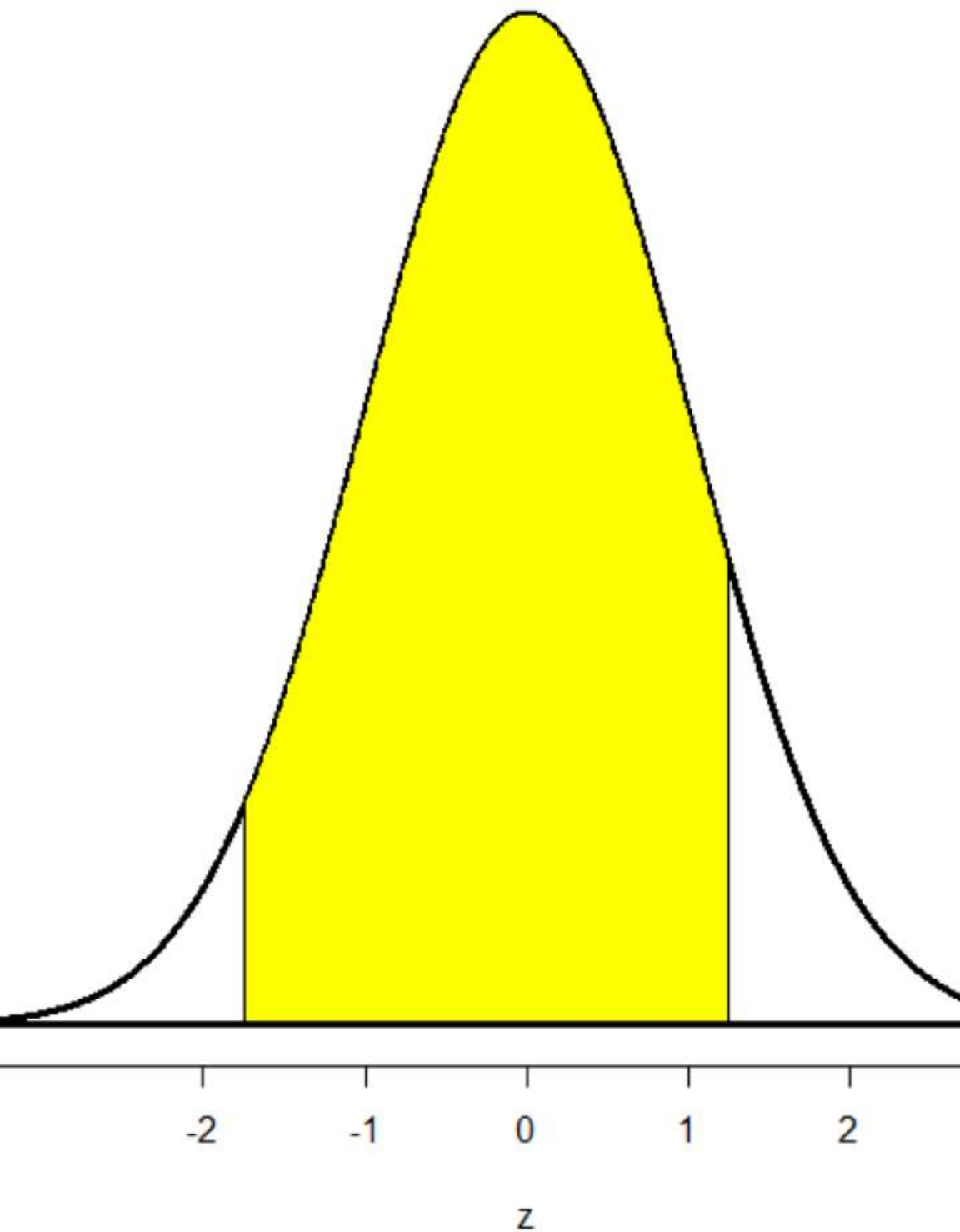


$$P(-1.75 < z < 1.25) = A(1.25) - A(-1.75) = 0.8944 - 0.0470 = 0.8474$$

z is $N(0, 1)$



Understanding Normal Distribution

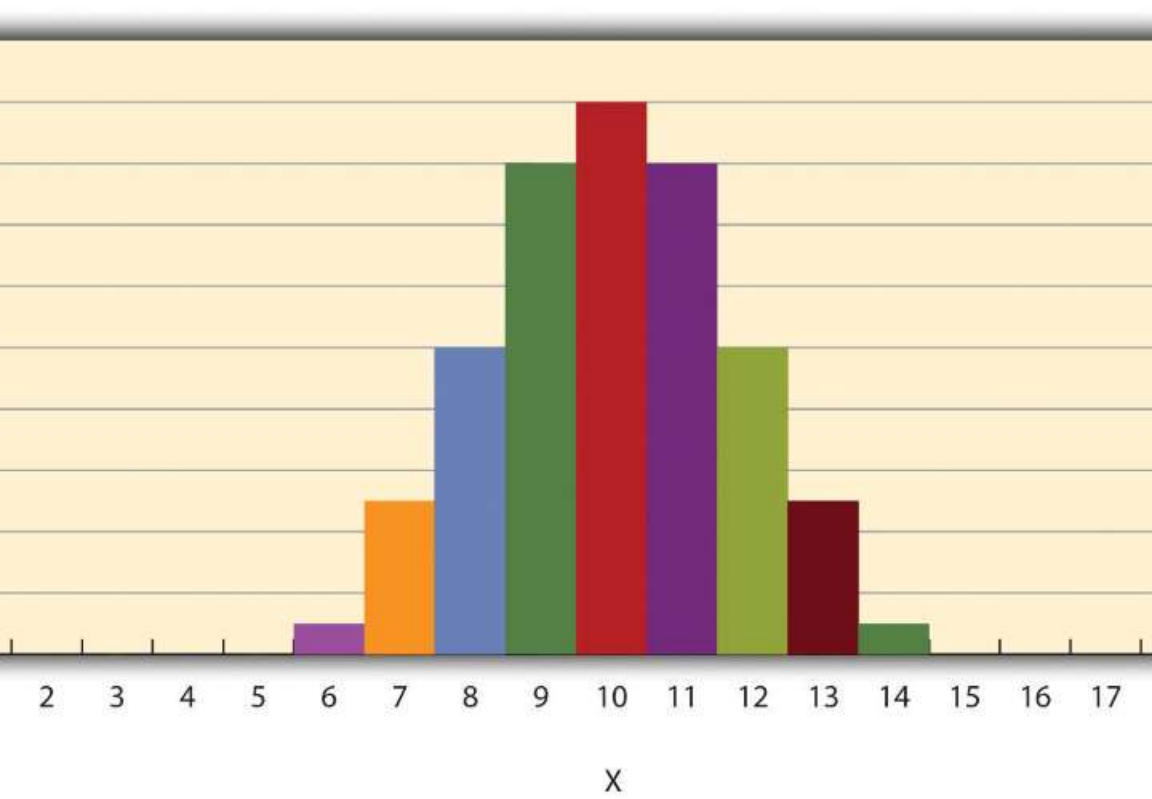
Normal Distribution, also known as the Gaussian distribution, is a continuous probability distribution widely used in statistics and research. It is characterized by its mean (μ) and standard deviation (σ), and is often used to model data that is continuous and symmetric.



by Akshith Ch

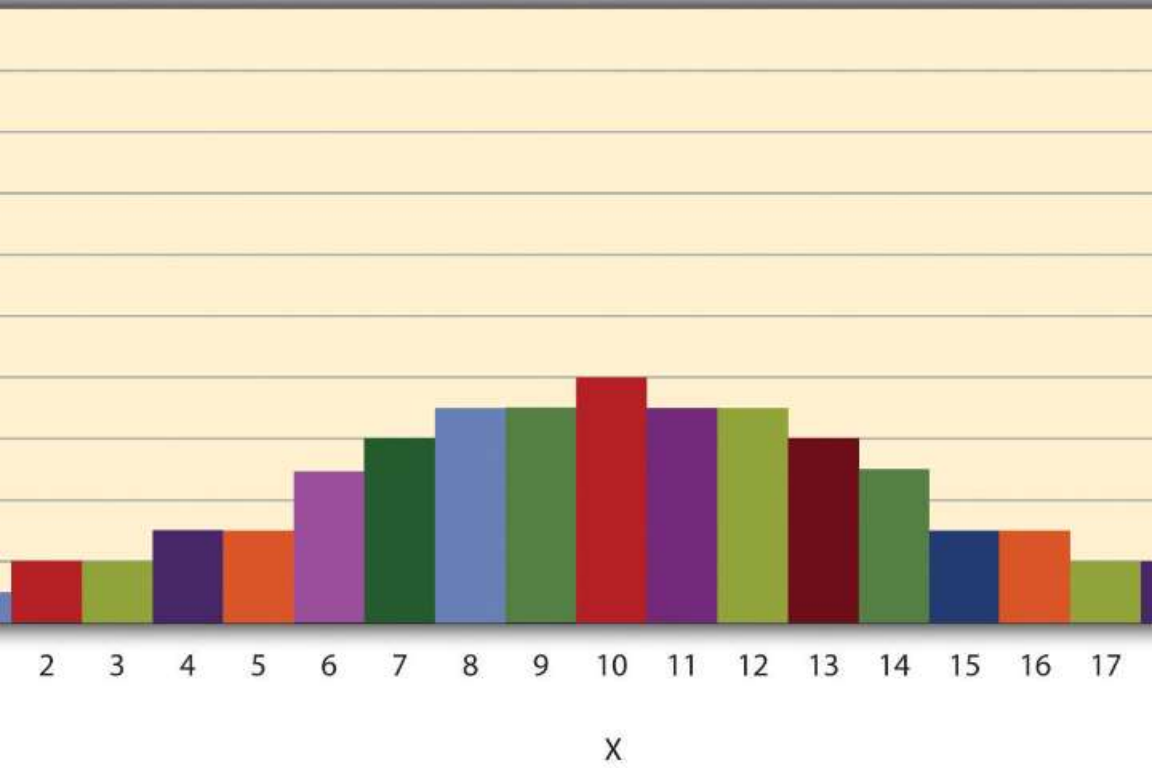
The Characteristics of Normal Distribution

- It is a continuous probability distribution.
- The probability density function is given by the bell-shaped curve.
- The mean, median, and mode are all equal and located at the center of the distribution.
- The total area under the curve is equal to 1, making it a valid probability distribution.
- It extends to infinity in both directions.
- Many statistical tests and analyses assume that the data follows a normal distribution.



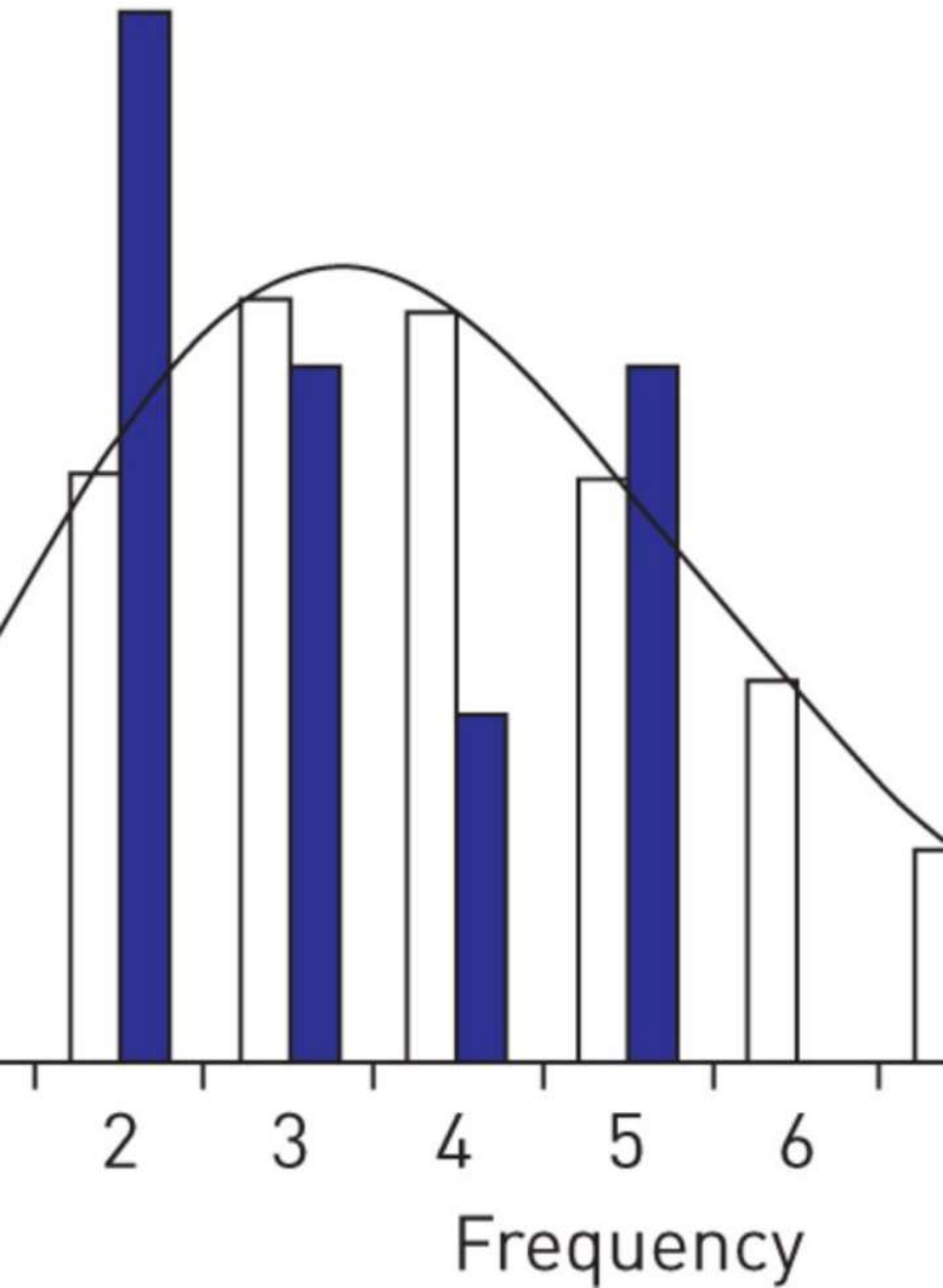
Application of Normal Distribution

- Modeling data that is continuous and symmetric, such as heights, weights, and IQ scores.
- Making inferences about data using the empirical rule (68-95-99.7 rule).
- Standardizing data to obtain the standard normal distribution (z-distribution).



The Poisson Distribution: Modeling Rare Events

- The Poisson distribution is a discrete probability distribution used to model the number of events occurring in a fixed interval of time or space.
- It is characterized by a single parameter, lambda (λ), which represents the average rate of event occurrences.
- The distribution is skewed to the right, and its mean is equal to its variance ($\mu = \sigma^2 = \lambda$).
- It is defined for non-negative integer values.
- Common applications include counting customer arrivals, phone calls, accidents, or defects in a given time period.



Key Features of Poisson Distribution

- The probability mass function describes the likelihood of observing a specific number of events in a given interval.
- It is used for modeling rare events, where events are independent and the average rate of occurrence is known.
- The sum of a large number of independent and identically distributed Poisson random variables can be approximated by a normal distribution under certain conditions (Central Limit Theorem).



Applying the Poisson Distribution

1 Predicting Rare Events

Modeling situations where rare events need to be predicted, such as accidents or failures.

2 Quality Control

Determining the likelihood of a certain number of defects occurring during production.

3 Queueing Theory

Analyzing waiting times and queue lengths in scenarios like call centers and customer service.

Comparing Normal Distribution and Poisson Distribution

Normal Distribution

- Continuous probability distribution
- Bell-shaped curve
- Used for continuous and symmetric data

Poisson Distribution

- Discrete probability distribution
- Used for modeling rare events
- Skewed to the right

Conclusion

Understanding the characteristics and applications of both the normal distribution and Poisson distribution is essential for analyzing and interpreting data in various fields. While the normal distribution is suitable for modeling continuous and symmetric data, the Poisson distribution is widely used when dealing with rare events. By utilizing these distributions effectively, researchers and statisticians can make accurate predictions and draw meaningful insights from their data.

