ASSIGNMENT 2

Domain: Daily Battery Drain Percentage in Electric Vehicles (EVs).

1. Introduction to the Domain

With the rapid growth of electric vehicles (EVs) like Tesla, Inc. and Tata Motors, battery performance analysis has become an important research area.

One important factor studied is:

Daily Battery Drain Percentage

This refers to how much battery percentage reduces in one day under normal usage conditions.

When data is collected from thousands of EV users, the daily battery drain percentage often follows a Normal Distribution.

2. Why It Follows Normal Distribution

In real-world EV usage:

Most users drive average distances daily.

Few users drive extremely long distances.

Few users barely use their vehicle.

Because of these variations, battery drain clusters around a mean value, forming a bell-shaped curve.

3. Assumed Data for Analysis

Let us assume

Mean battery drain (μ) = 20% per day

Standard deviation (σ) = 5%

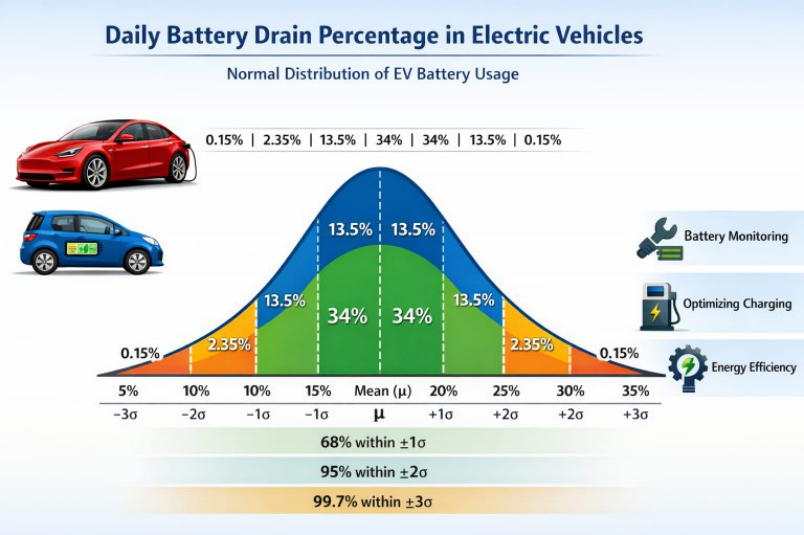
This means:

On average, EV users consume 20% battery daily.

Most users' battery drain varies by 5% above or below the mean.

4. Normal Distribution Graph

Draw a bell- shaped curve like this:



μ = 20%

- 1σ = 15%

+1σ = 25%

- 2σ = 10%

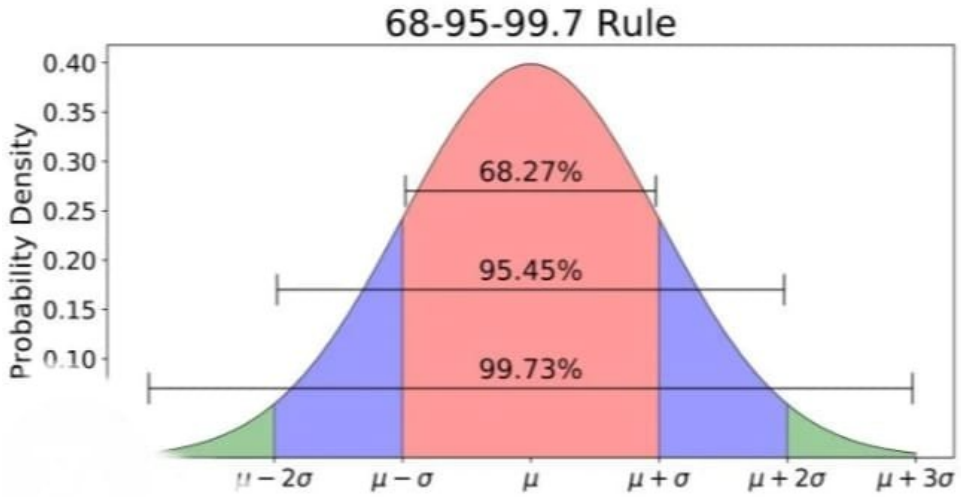
+2σ = 30

- 3σ = 5%

+3σ = 35%

5. Empirical Rule (68–95–99.7 Rule)

The empirical formula is an important concept in chemistry as it provides the simplest representation of the elemental composition of a compound. It forms the foundation for determining the molecular formula and understanding chemical reactions.In many compounds, the molecular formula (actual number of atoms) can be reduced to a simpler ratio. That simplest ratio is called the empirical formula.



The Empirical Rule explains how the battery drain values are distributed.

1 Within ±1σ (68%)

Range: 20% ± 5%

= 15% to 25%

About 68% of EV users consume between 15% and 25% battery daily.

2 Within ±2σ (95%)

Range: 20% ± 10%

= 10% to 30%

About 95% of users consume between 10% and 30%.

3 Within ±3σ (99.7%)

Range: 20% ± 15%

= 5% to 35%

Almost all users (99.7%) fall between 5% and 35%.

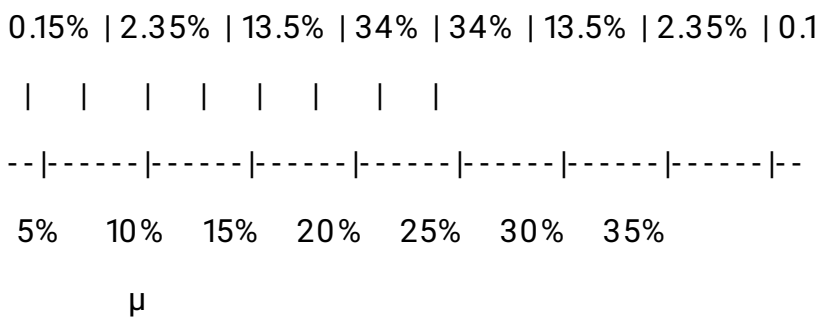
users outside this range may indicate:

Battery malfunction

Excessive driving

Charging issues

6. Graphical Representation of Empirical Rule



7. Practical Importance

In the EV domain, Normal Distribution helps to:

Predict battery usage patterns

Detect abnormal battery behavior

Improve battery management systems

Optimize charging infrastructure

Enhance energy efficiency strategies

Manufacturers like Tesla, Inc. use such statistical models for improving battery analytics.

8. Conclusion

The daily battery drain percentage in Electric Vehicles is a realistic and modern domain where Normal Distribution can be applied effectively.Thus, Normal Distribution plays a significant role in EV battery performance analysis and smart mobility systems. Thus, Normal Distribution plays a significant role in EV battery performance analysis and smart mobility systems