Numerical Integration Challenge: Car in Traffic

Problem Statement

A car travels through heavy traffic, where the speed changes irregularly due to stop-and-go conditions. A sensor records the car's **speed (in m/s)** at **1-second intervals** over 16 seconds. Some readings contain **noise spikes** or abrupt changes.

Your task:

1. Compute the **total distance travelled** by the car using:
    - **Trapezoidal Rule**
    - **Simpson's 1/3 Rule**
    - **Simpson's 3/8 Rule**
2. Compare the results and discuss **accuracy and differences** among the methods.
3. Identify intervals where **sensor noise or irregular speed changes** significantly affect the distance calculation.
4. Suggest possible improvements (e.g., smoothing, smaller step size, or hybrid methods) to increase accuracy.

Dataset Link :

https://www.kaggle.com/datasets/theludway/vehicle-speed