

Exercise 1: Linear Regression — Predicting Projectile Range

Problem:

Given initial velocity and launch angle, predict the horizontal range of a projectile (ignoring air resistance).

Tasks:

- load the given dataset with features:
 - Initial velocity (m/s)
 - Launch angle (degrees)
- Target variable: horizontal range (meters), calculated via physics formula:
- $\text{range} = \frac{v^2 \sin(2\theta)}{g}$ where
- $g = 9.8, \text{ m/s}^2$
- Train a **linear regression** model to predict range.
- Visualize predicted vs. true ranges.

Exercise 2: Linear Regression — Predicting Spring Extension

dataset based on Hooke's Law

$$x = \frac{F}{k}$$

Problem:

Given the applied force on a spring, predict the extension length.

Tasks:

- Generate data points with:
 - Force applied (N)
 - Extension length (m), calculated as
where k is spring constant.
- Train a **linear regression** model.
- Plot the regression line with data points.