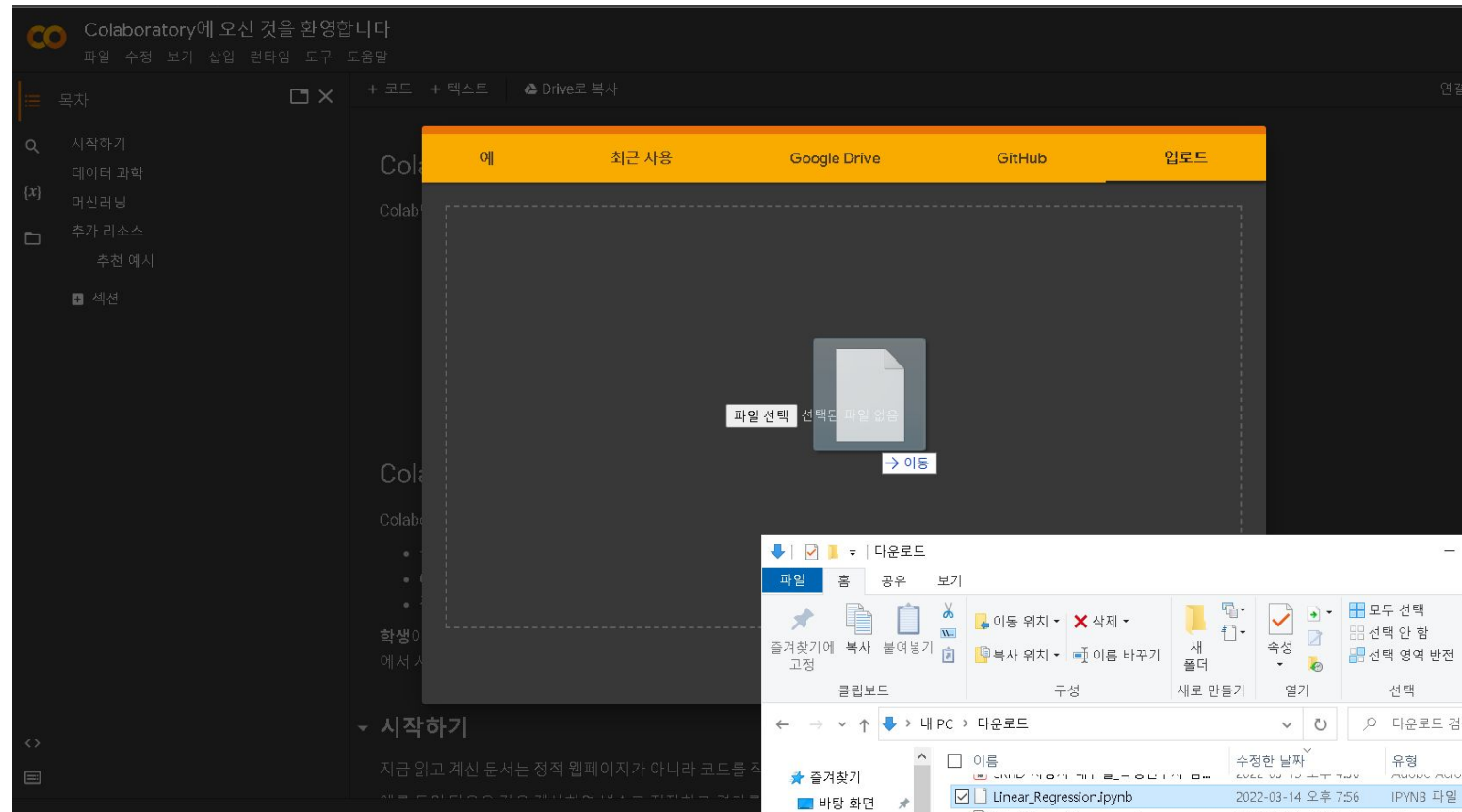# Linear regression

RLLAB

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Setup

- Download zip file from etl.

- Open "Linear_Regression.ipynb" on colab.

(Review) Linear Regression

- 1D inputs $\{(x_i, y_i) : 1 \leq i \leq N\}$

  model : y = h(x) = ax + b

- Multi-dimensional inputs $\{(x_i, y_i) : 1 \leq i \leq N\}, x_j = [1, x_{j1}, x_{j2}, \ldots, x_{jd}]^T$

  model : y = h(x) = $w^T x$

- General linear regression $\phi(x) = [1, \phi_1(x), \phi_2(x), \ldots, \phi_k(x)]^T$

  model : y = h(x) = $w^T \phi(x)$

LOSS = $\sum_{i=1}^{N} (y_i - h(x_i))^2$ => use gradient descent!

Overview

- Define the true model h(x)

- Generate random data using Gaussian noise ($y_i = h(x_i) + \epsilon, \epsilon \sim N(0, \sigma^2)$))

- Generate torch model (model = torch.nn.Linear(input_size, output_size))

- Minimize MSE Loss using gradient descent

- Visualize the result