
Algorithm 1 Linear Regression (Least Squares Method)

Require: Dataset D , containing inputs X and outputs Y

Ensure: Linear regression model parameters θ

- 1: Initialize parameters θ to a zero vector
 - 2: **repeat**
 - 3: Compute predicted values $\hat{Y} = X\theta$
 - 4: Compute errors $E = Y - \hat{Y}$
 - 5: Compute gradient $\nabla_{\theta} = -2X^T E$
 - 6: Update parameters $\theta \leftarrow \theta + \alpha \nabla_{\theta}$, where α is the learning rate
 - 7: **until** convergence or maximum number of iterations reached
 - 8: **return** θ
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