

Gradient Descent Algorithm Implementation

$$SSE = \sum_1^n (\text{observed} - \text{predicted})^2$$

For Airfare Dataset

$$SSE = \sum_1^n (\text{observed prices} - (\text{intercept} + \text{slope}(\text{distance}))^2$$

$$\frac{d}{d \text{intercept}} SSE = \sum_1^n -2(\text{observed Prices} - (\text{intercept} + \text{slope}(\text{distance})))$$

$$\frac{d}{d \text{slope}} SSE = \sum_1^n -2(\text{distance})(\text{observed Prices} - (\text{intercept} + \text{slope}(\text{distance})))$$

$$\text{Step Size}_{\text{intercept}} = \frac{\frac{d}{d \text{intercept}} SSR}{\text{Slope}} \times \text{Learning Rate}$$

$$\text{Step Size}_{\text{slope}} = \frac{\text{Slope}}{\frac{d}{d \text{slope}} SSR} \times \text{Learning rate}$$

Iterative Process

Start at intercept = 0
Slope = 0 or ±1

Get Step Size for iteration

Get new slope and Intercept
(old slope - Step Size
old intercept - Step Size)

Calculate $\frac{d}{d \text{intercept}} SSE$

$\frac{d}{d \text{slope}} SSE$

Repeat until Step Sizes
become very small or
values (intercept/slope) converge
to a value