

# LinearRegression\_v3

February 3, 2019

## 1 Linear Regression

- Regression analysis helps us to understand how much the dependent variable changes with a change in one or more independent variables
- Forecast or impact of changes. Identify the strength of the effect that the independent variable(s) have on a dependent variable.
- Predict trends and future values.

### 1.0.1 Simple Linear Regression

Equation of line:

$$y = w_1x_1 + w_2$$

where,

slope:  $w_1$

y-intercept:  $w_2$

**Error Functions** The two most common error functions for linear regression are: - Mean Absolute Error (MAE) 2. Mean Squared Error (MSE)

#### Mean Absolute Error:

- The vertical distance from the point to the line is the  $y - \hat{y}$ .

Mean Absolute Error is the sum of all the absolute errors divided by the number of points:

$$Error = \frac{1}{m} \sum_{i=1}^m |y - \hat{y}|$$

Using gradient descent we get the best possible fit line with the smallest possible MAE.

**Mean Squared Error:** Mean Squared Error is the sum of all the squared errors divided by the number of points:

$$Error = \frac{1}{2m} \sum_{i=1}^m (y - \hat{y})^2$$

By minimizing the average sum of squared errors, MSE is minimized and we get the best possible fit line.