

Introduction to Machine Learning

- Harshith Mohan Kumar

Week 1 - Setup & Linear Regression



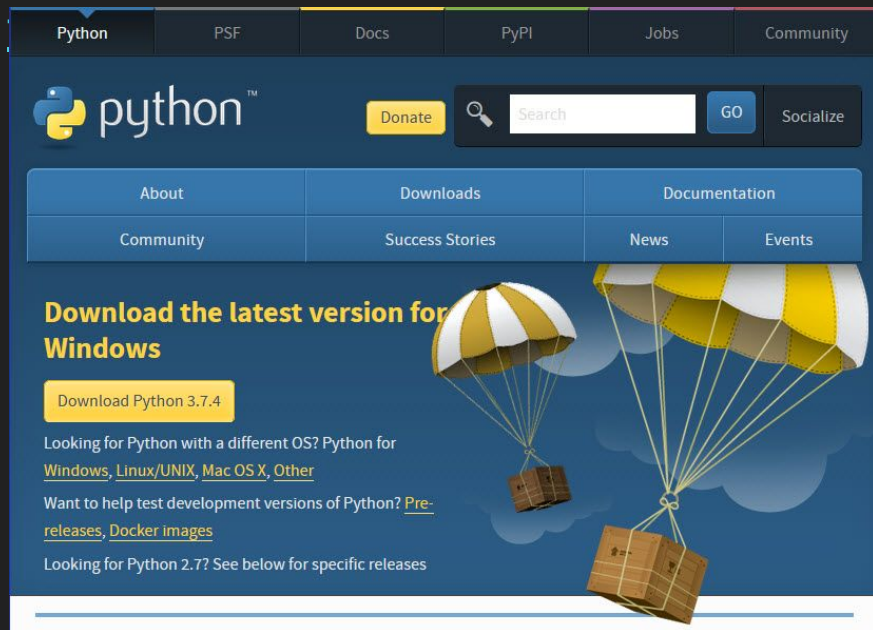
Outline

- Setting up Python
- Pip
- Simple Linear Regression
- Making Predictions
- Cost Function
- Gradient Descent

Setting up Python

For mac and windows:

[Python Tutorial for Beginners 1: Install and Setup](#)



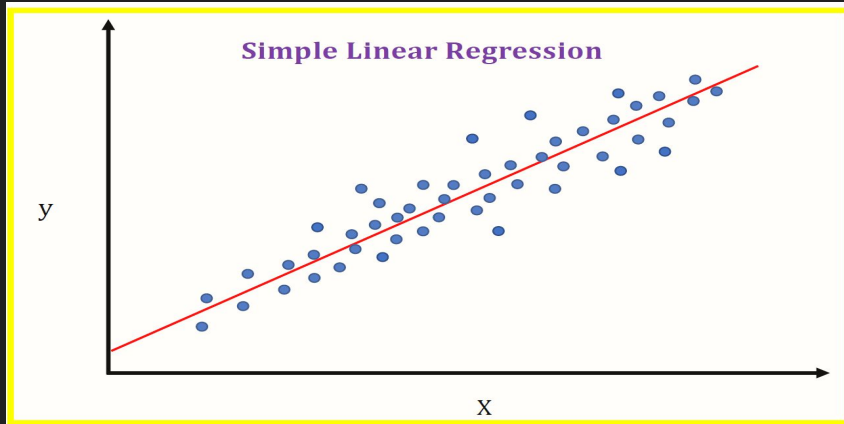
Pip

pip is the package installer for Python.



Simple Regression

- Uses traditional slope-intercept form, where m and b are the variables.
- We will try to “**learn**” to produce the most accurate predictions.
- X represents our input data and y represents our prediction



Simple Regression

Given a dataset:

Company	Radio (\$)	Sales
Amazon	37.8	22.1
Google	39.3	10.4
Facebook	45.9	18.3
Apple	41.3	18.5

We are trying to **find an equation** that will let us **predict** units sold based on how much a company spends on radio advertising.

Making Predictions

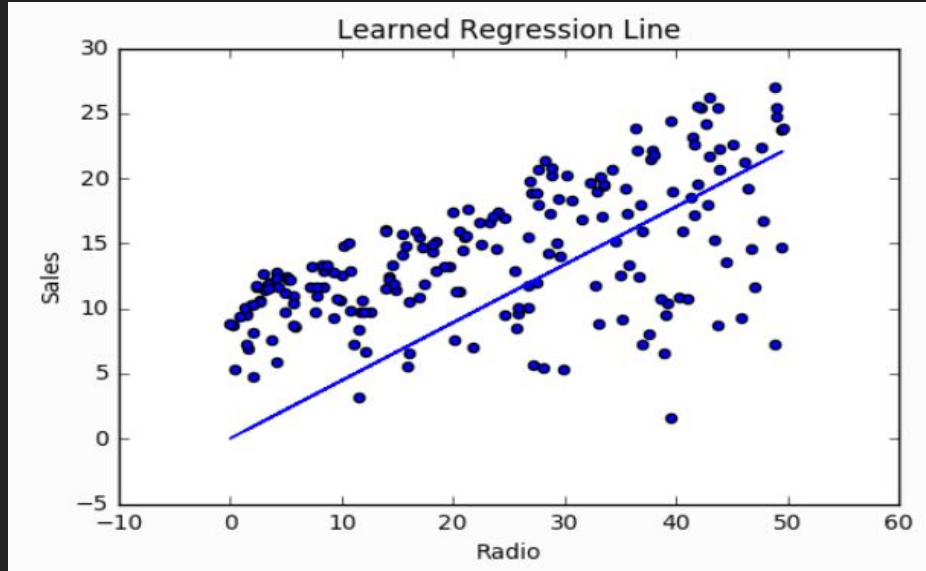
We have to create the best version of our equation $y = mx + b$

Sales = Weight * Radio + Bias

- Weight: the coefficient for the radio independent variable.
- Radio: the independent variable
- Bias: the y-intercept

Making Predictions

Our algorithm will try to **learn the best possible values for weight and bias**. The equation after learning should be the line of best fit.



Cost Function

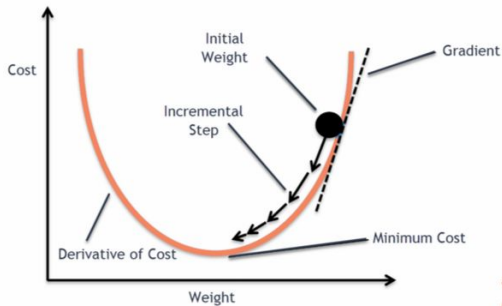
- To optimize our weights we need a mathematical function. We call this the mean squared error function [**MSE**].
- MSE measures the average squared differences between an observations actual and predicted values.
- Our goal is to **minimize MSE** to improve the accuracy of our model.

$$MSE = \frac{1}{N} \sum_{i=1}^n (y_i - (mx_i + b))^2$$

Gradient Descent

To minimize MSE we use Gradient Descent to calculate the gradient of our cost function.

- By finding the gradient we know that we need to **move in the opposite direction of the gradient** to decrease our error.



#MLmuse
CLAIRVOYANT

Tasks

- Setup python environment.
- Write pseudocode for the algorithm behind linear regression
- Write 5 examples/scenarios where simple linear regression could be used.
- Code Linear Regression in python using any dataset (optional)

References

- [\[1\] Linear Regression](#)
- [\[2\] Linear Regression in Machine Learning](#)
- [\[3\] Introduction to Machine Learning Algorithms: Linear Regression](#)
- [\[4\] Linear Regression for Machine Learning](#)
- [\[5\] Python Tutorial for Beginners 1: Install and Setup for Mac and Windows](#)

Thank You