 # MODULE 2 : MACHINE LEARNING

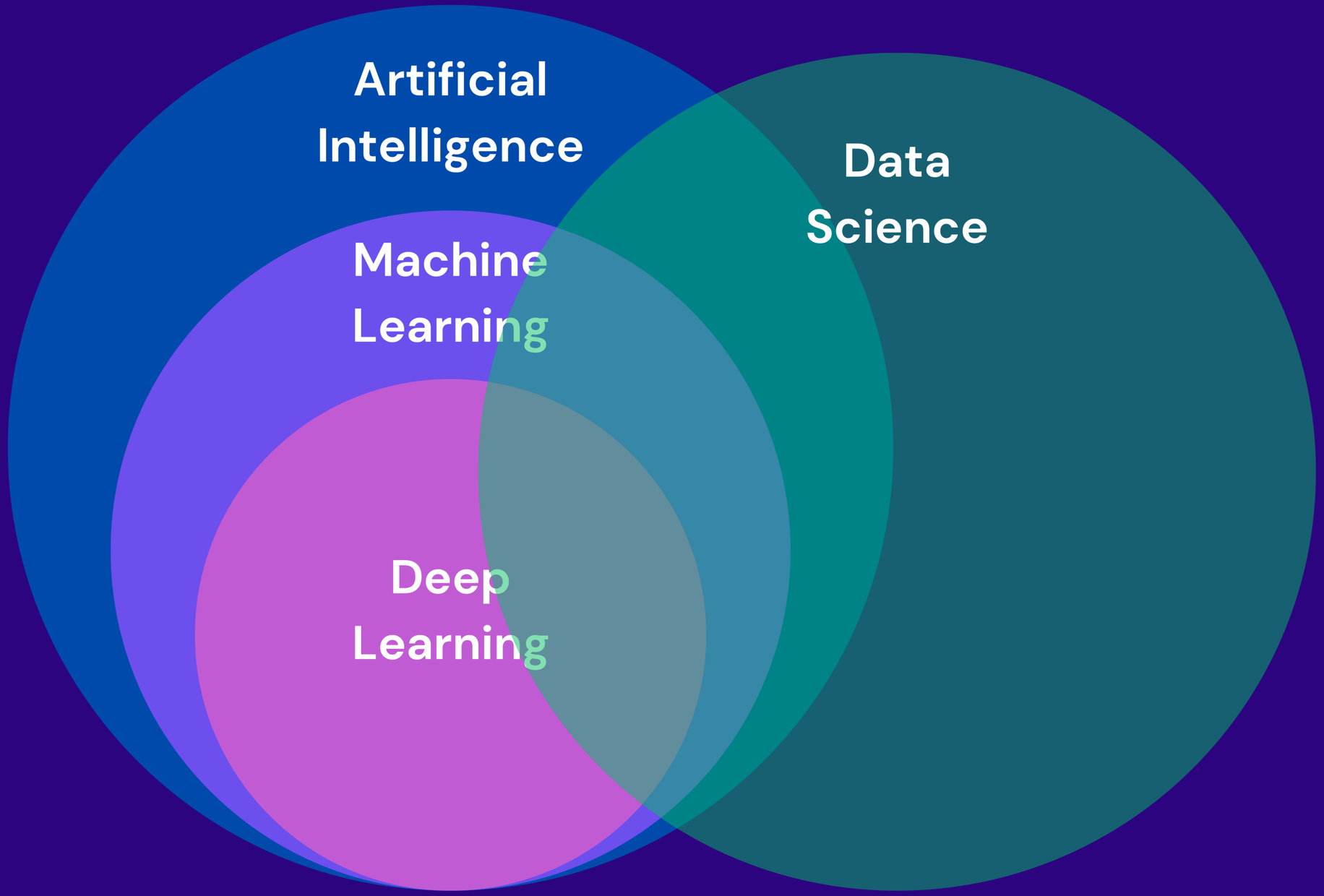
INTRO-TO-MACHINE-LEARNING

Unveiling the mysteries behind today’s AI

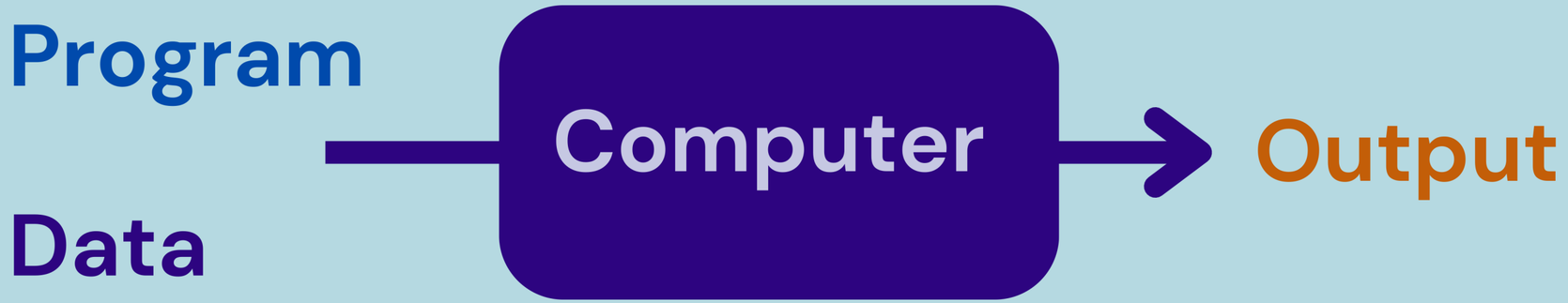
Club Informatique & Télécom
Data Cell

Introduction to Machine Learning

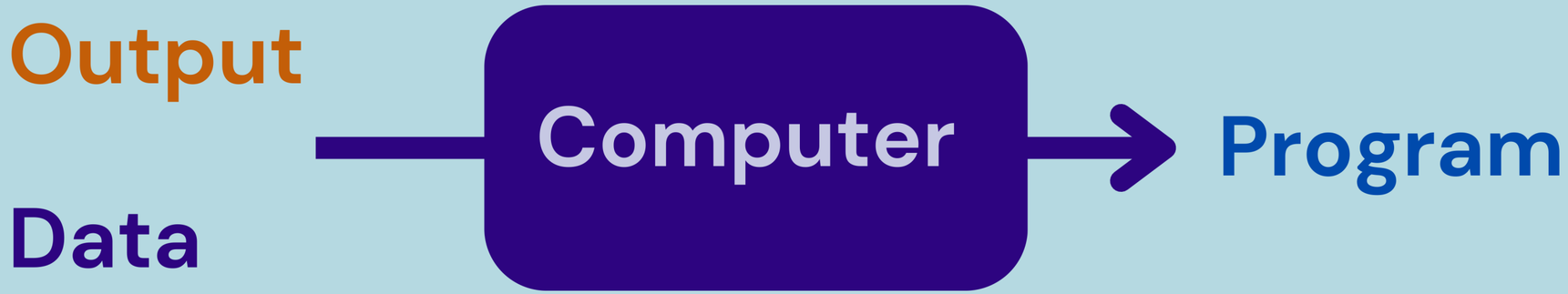
- Overview of ML
- Linear Regression (Univariate)
- Code along


Artificial
Intelligence
Machine
Learning
Deep
Learning
Data
Science

This is traditional programming



This is Machine Learning



Main ML types

Supervised Learning

Learning by examples

Unsupervised Learning

Learning by observation

Reinforcement Learning

Learning by mistakes

Main ML subdivisions

Supervised Learning

Regression

Output is a quantity (number)

Classification

Output is a category

Main ML subdivisions

Unsupervised Learning

Clustering

Group unknown data into groups with similar characteristics

Anomaly Detection

Identifying data points that fall outside the normal range

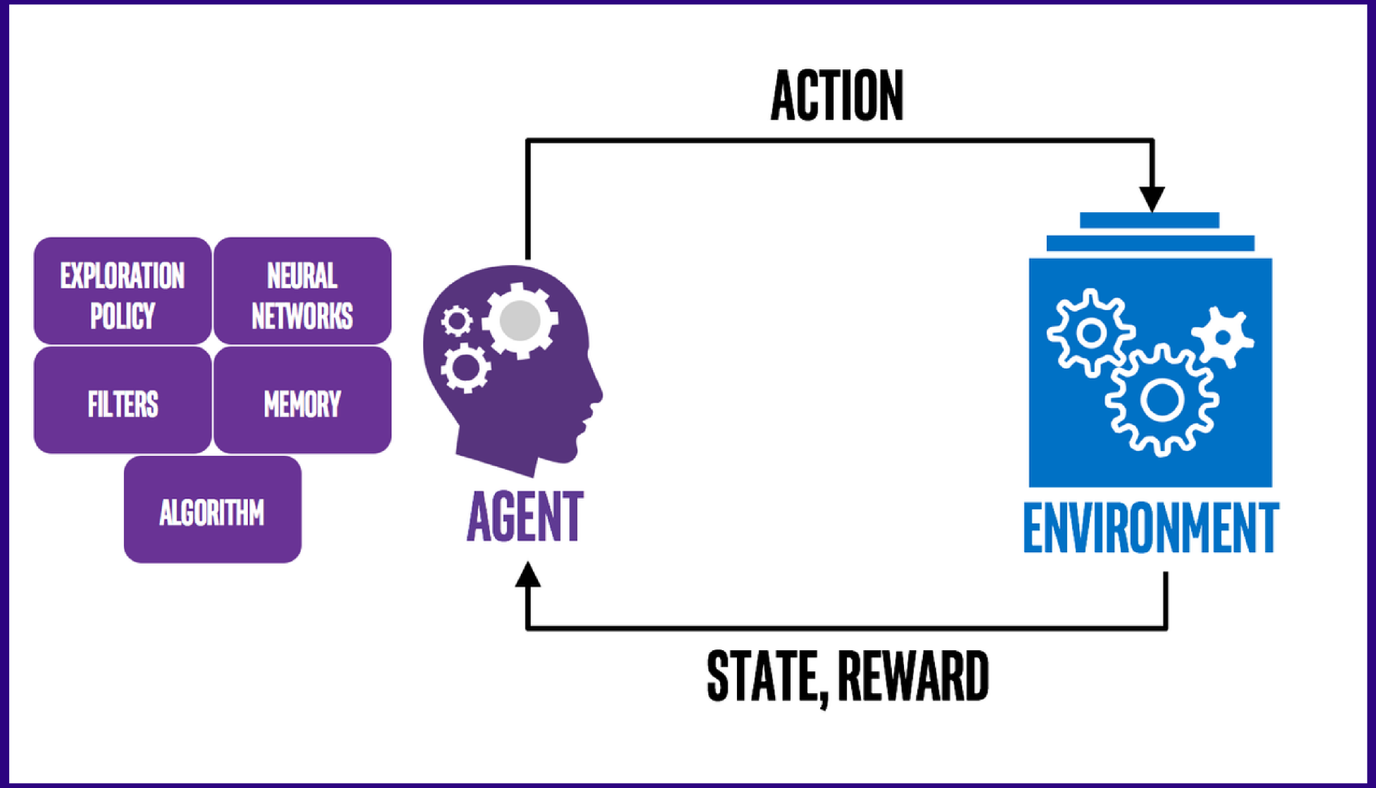
Dimensionality Reduction

Reduce dimensions while keeping maximum information

and more...

Main ML subdivisions

Reinforcement Learning



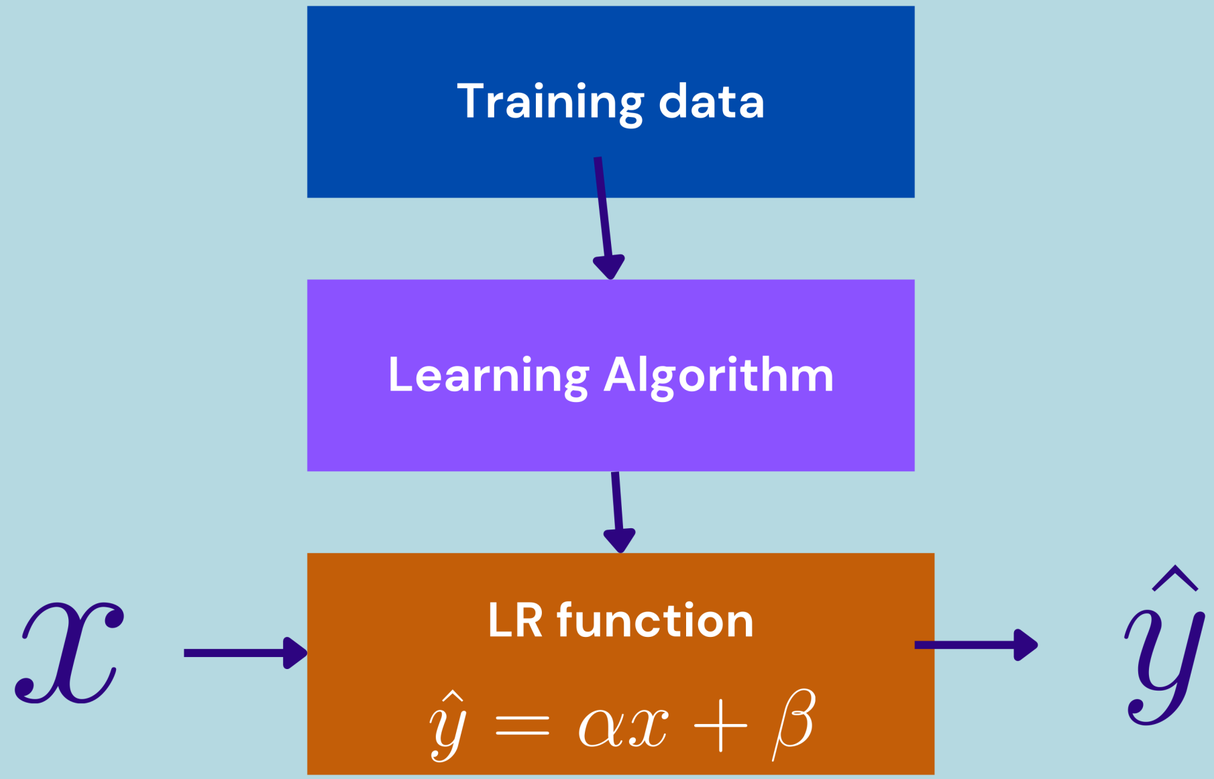
There’s more to learn about

Linear Regression

Linear Regressor model means fitting a straight line to your data.

~ Andrew Ng

Intro to Linear Regression



Linear Regression

$$f_{\alpha,\beta}(x^{(i)}) = \alpha x^{(i)} + \beta$$

Cost Function

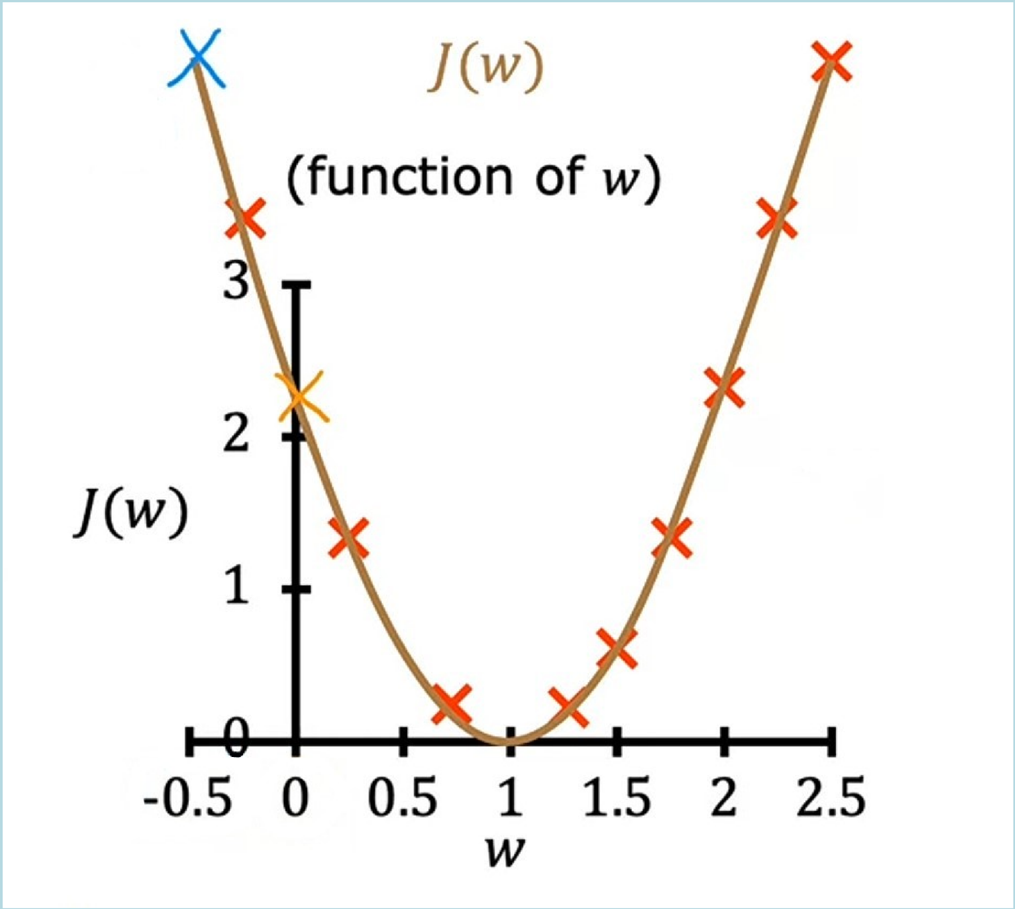
The cost function tells us how well the model is doing.

$$J(w,b) = \frac{1}{2m}\sum_{i=1}^{n} L(f_{w,b}(x^{(i)}), y^{(i)})$$

Cost

Loss

Cost Function



Gradient Descent Algorithm

Initialize:

$w_0 \leftarrow$ initial guess for w

$b_0 \leftarrow$ initial guess for b

$\alpha \leftarrow$ learning rate

Repeat until convergence:

Compute predictions: $\hat{y}^{(i)} = w \cdot x^{(i)} + b$

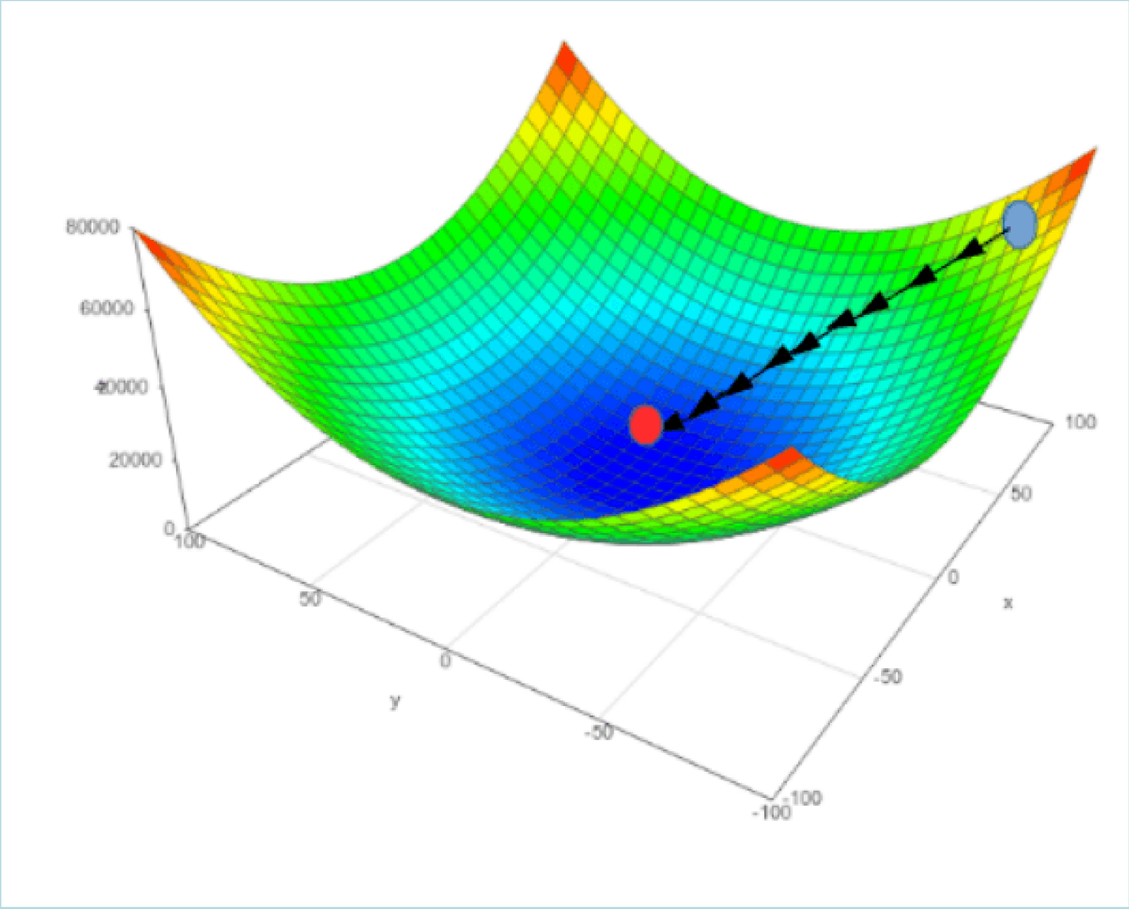
Compute the cost function: $J(w, b) = \frac{1}{2m} \sum_{i=1}^{m} (\hat{y}^{(i)} - y^{(i)})^2$

Update weights:

$$w \leftarrow w - \alpha \frac{1}{m} \sum_{i=1}^{m} (\hat{y}^{(i)} - y^{(i)}) \cdot x^{(i)}$$

$$b \leftarrow b - \alpha \frac{1}{m} \sum_{i=1}^{m} (\hat{y}^{(i)} - y^{(i)})$$

Gradient Descent Algorithm



Code along