In [2]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

Loading Dataset - Titanic

In [3]:
```
X_train = pd.read_csv("train_X.csv")
Y_train = pd.read_csv("train_Y.csv")

X_test = pd.read_csv("test_X.csv")
Y_test = pd.read_csv("test_Y.csv")
```

In [4]:
```
X_train.head()
```

Out[4]:

	Id	Pclass	Sex	Age	SibSp	Parch	Fare	Embarked
0	0	3	0	22.0	1	0	7.2500	1
1	1	1	1	38.0	1	0	71.2833	0
2	2	3	1	26.0	0	0	7.9250	1
3	3	1	1	35.0	1	0	53.1000	1
4	4	3	0	35.0	0	0	8.0500	1

In [5]:
```
X_train = X_train.drop("Id", axis = 1)
Y_train = Y_train.drop("Id", axis = 1)
X_test = X_test.drop("Id", axis = 1)
Y_test = Y_test.drop("Id", axis = 1)
```

In [6]:
```
X_train = X_train.values
Y_train = Y_train.values
X_test = X_test.values
Y_test = Y_test.values
```

In [7]:
```
X_train = X_train.T
Y_train = Y_train.reshape(1, X_train.shape[1])

X_test = X_test.T
Y_test = Y_test.reshape(1, X_test.shape[1])
```

In [8]:
```
print("Shape of X_train : ", X_train.shape)
print("Shape of Y_train : ", Y_train.shape)
print("Shape of X_test : ", X_test.shape)
print("Shape of Y_test : ", Y_test.shape)
```

```
Shape of X_train :  (7, 891)
Shape of Y_train :  (1, 891)
Shape of X_test :  (7, 418)
Shape of Y_test :  (1, 418)
```

Logistic Regression Overview :

Equations :

$W = \begin{bmatrix} w_1 \\ w_2 \\ . \\ . \\ w_n \end{bmatrix}_{nx1}$ .... initialize with zeros

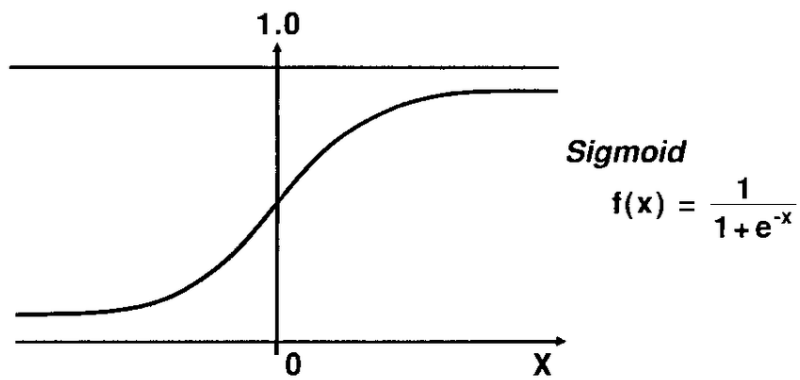
$B = single\ weight/parameter$

$X = \begin{bmatrix} . & . & . \\ . & . & . \\ . & . & . \\ . & . & . \end{bmatrix}_{nxm}$

$Y = \begin{bmatrix} . & . & . & . & . \end{bmatrix}_{1xm}$

$\sigma = \frac{1}{(1+e^{-x})}$ .... (sigmoid function)

A = $\sigma(W^T * X + b)$ .... (probabilistic predictions of shape (1 x m))



Cost function :

$cost = -\frac{1}{m}\sum_{i=1}^{m}[y * log(a) + (1-y) * log(1-a)]$

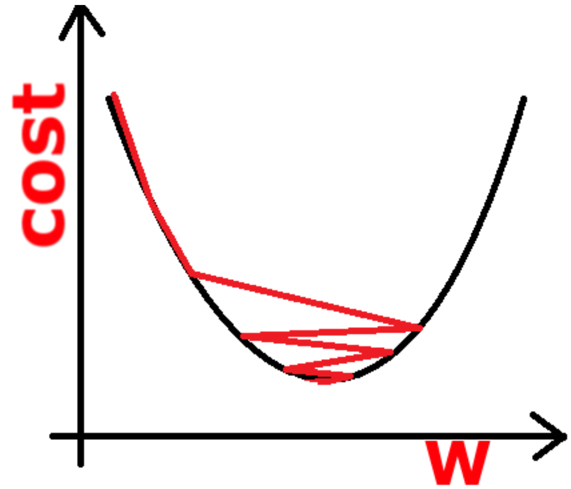
Gradient Descent

$dW = \frac{\partial COST}{\partial W} = (A - Y) * X^T$ ...... shape (1 x n)

$dB = \frac{\partial COST}{\partial B} = (A - Y)$

$W = W - \alpha * dW^T$

$B = B - \alpha * dB$



Model

In [9]:
```
def sigmoid(x):
    return 1/(1 + np.exp(-x))
```

In [10]:
```
def model(X, Y, learning_rate, iterations):

    m = X_train.shape[1]
    n = X_train.shape[0]

    W = np.zeros((n,1))
    B = 0

    cost_list = []

    for i in range(iterations):

        Z = np.dot(W.T, X) + B
        A = sigmoid(Z)

        # cost function
        cost = -(1/m)*np.sum( Y*np.log(A) + (1-Y)*np.log(1-A))

        # Gradient Descent
        dW = (1/m)*np.dot(A-Y, X.T)
        dB = (1/m)*np.sum(A - Y)

        W = W - learning_rate*dW.T
        B = B - learning_rate*dB

        # Keeping track of our cost function value
        cost_list.append(cost)

        if(i%(iterations/10) == 0):
            print("cost after ", i, "iteration is : ", cost)

    return W, B, cost_list
```

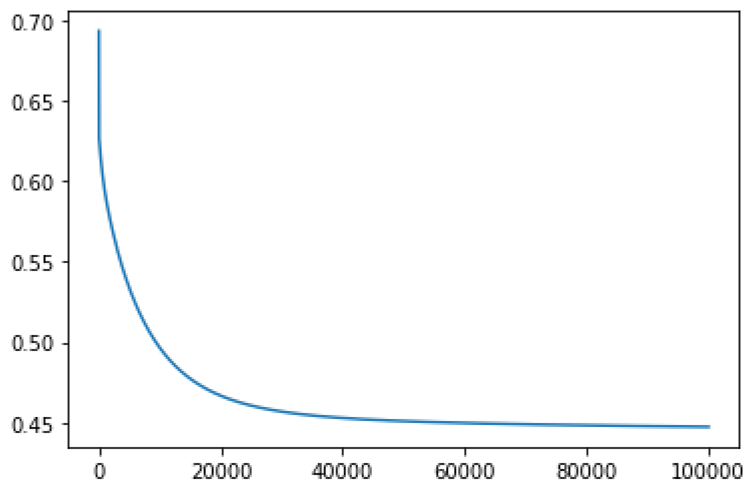
In [11]:
```
iterations = 100000
learning_rate = 0.0015
W, B, cost_list = model(X_train, Y_train, learning_rate = learning_rate, iteratio
```

```
cost after  0 iteration is :  0.6931471805599454
cost after  10000 iteration is :  0.4965277769389531
cost after  20000 iteration is :  0.46674868550665993
cost after  30000 iteration is :  0.45687787762434423
cost after  40000 iteration is :  0.45288994293089646
cost after  50000 iteration is :  0.4509326025222643
cost after  60000 iteration is :  0.44977087490094686
cost after  70000 iteration is :  0.4489640829216279
cost after  80000 iteration is :  0.44834126966124827
cost after  90000 iteration is :  0.44783045246935776
```

Cost vs Iteration

Plotting graph to see if Cost Function is decreasing or not

In [12]:
```
plt.plot(np.arange(iterations), cost_list)
plt.show()
```



Testing Model Accuracy

In [15]:
```
def accuracy(X, Y, W, B):

    Z = np.dot(W.T, X) + B
    A = sigmoid(Z)

    A = A > 0.5

    A = np.array(A, dtype = 'int64')

    acc = (1 - np.sum(np.absolute(A - Y))/Y.shape[1])*100

    print("Accuracy of the model is : ", round(acc, 2), "%")
```

In [16]:
```
accuracy(X_test, Y_test, W, B)
```

```
Accuracy of the model is :  91.39 %
```

Our model accuracy is 91 % on Test dataset. Which is pretty good. !

Subscribe to Coding Lane : [https://www.youtube.com/channel/UCJFAF6IsaMkzHBDdfriY yQ?sub_confirmation=1 (https://www.youtube.com/channel/UCJFAF6IsaMkzHBDdfri yQ?sub_confirmation=1)](https://www.youtube.com/channel/UCJFAF6IsaMkzHBDdfri)

In [ ]: