


# Premier modèle IA

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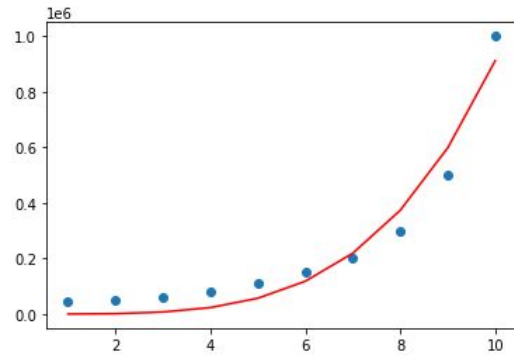
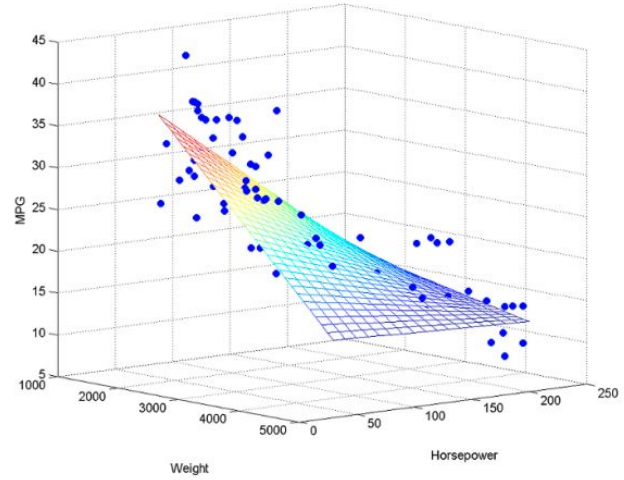
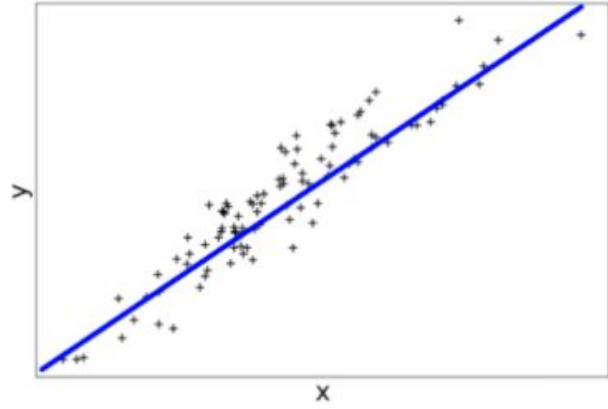
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# Rappel régression linéaire simple, multiple et polynomiale





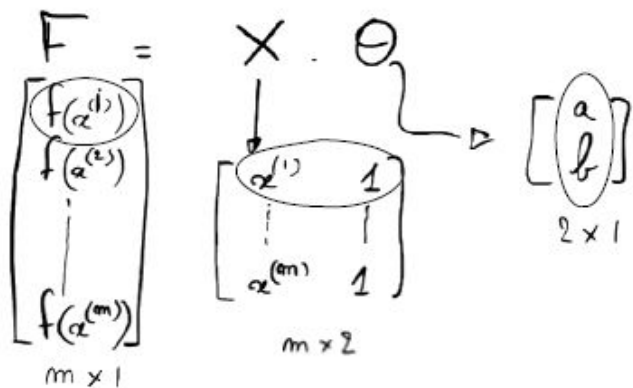


# Les diverses fonctions



## Model

$$f(x) = a x + b$$



```
def model(X, theta):  
    return X.dot(theta)
```

## Fonction coût

$$J(\theta) = \frac{1}{2m} \sum (x\theta - y)^2$$

```
def fonction_cout(X, y, theta):  
    m = len(y)  
    return 1/(2*m) * np.sum((model(X, theta) - y)**2)
```

# Gradient

$$\frac{\partial J(\theta)}{\partial \theta} = \frac{1}{m} X^T (X\theta - y)$$

```
def gradient(X,y,theta):  
    m = len(y)  
    return 1/m * X.T.dot(model(X, theta) - y)
```



# Descente de Gradient

$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$

```
def descente_gradient(X,y,theta,alpha,n_iterations):  
    cost = np.zeros(n_iterations)  
    for i in range(n_iterations):  
        theta = theta - alpha * gradient(X, y, theta)  
        cost[i] = fonction_cout(X, y, theta)  
    return theta, cost
```

## Coefficient de détermination

$$R^2 = 1 - \frac{\sum (y - f(x))^2}{\sum (y - \bar{y})^2}$$

```
def coef_determination(X, y, theta):  
    return 1 - ((y - model(X, theta))**2).sum() / ((y - y.mean())**2).sum()
```

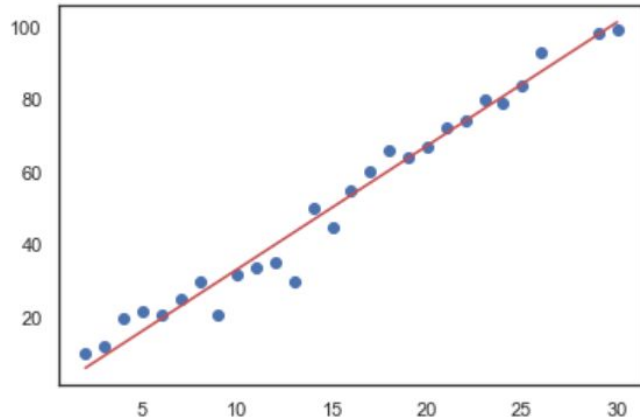


# Résultats des modèles



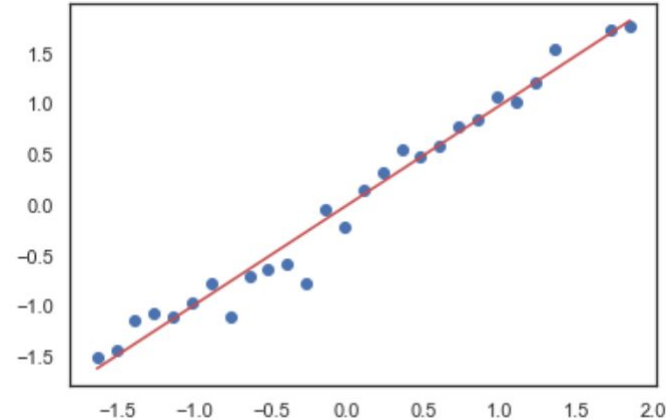
# Régression linéaire

Sans Scikit-Learn



Score: 0.9729

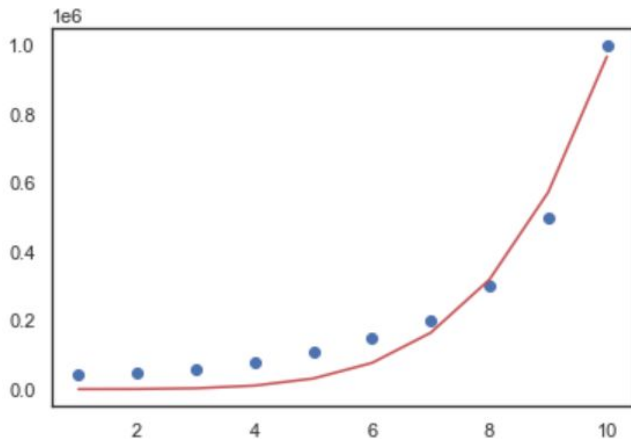
Avec Scikit-Learn



Score: 0.9733

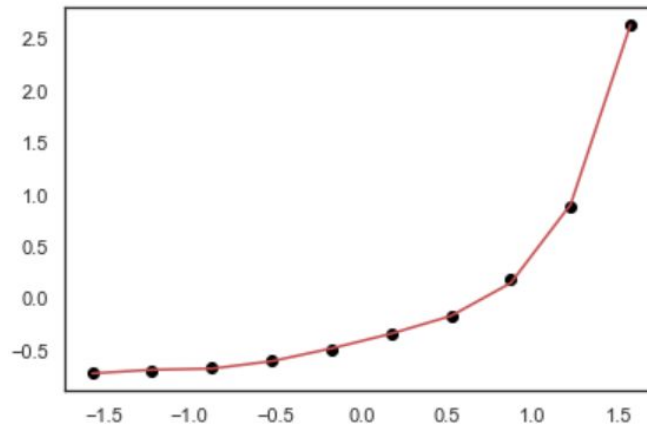
# Régression polynomiale

Sans Scikit-Learn



Score: 0.9598

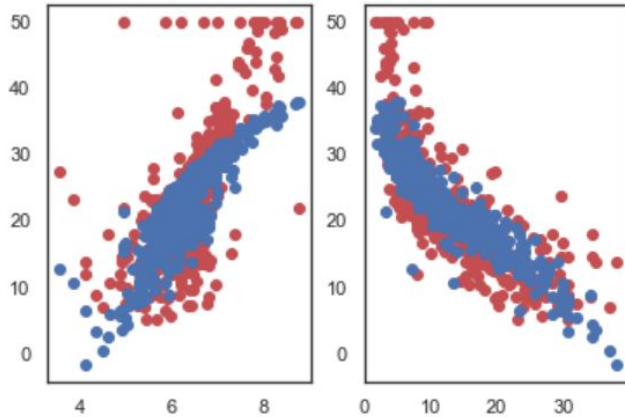
Avec Scikit-Learn



Score: 0.9997

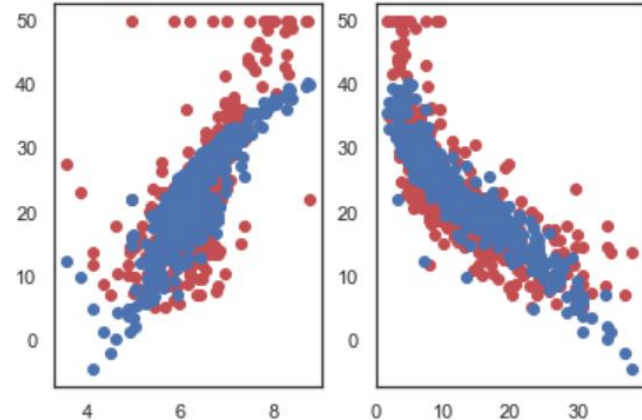
# Régression multiple

Sans Scikit-Learn



Score: 0.6282

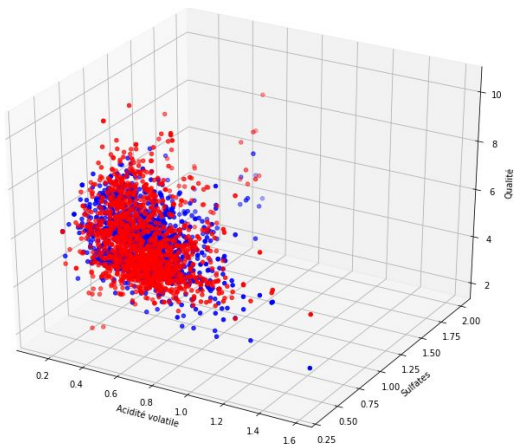
Avec Scikit-Learn



Score: 0.6385

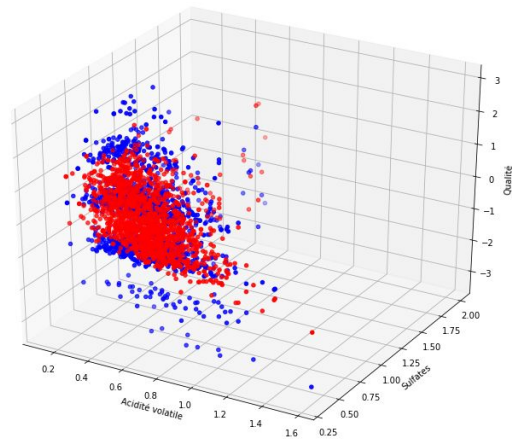
# Régression multiple (vins)

Sans Scikit-Learn



Score: -0.65(?)

Avec Scikit-Learn



Score: 0.36

# Conclusion

