Linear Regression

15 December 2023 07:52

→ model is linear → linear relationship between Y & x_i's

↳ continuous / ~~categorical~~

Supervised Learning Algorithm

IntelliPaat

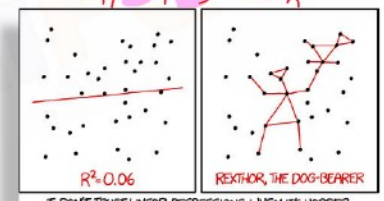
Linear Regression using Python

IntelliPaat

What is Regression?

- A technique of finding the relationship between two or more variables
- Change in dependent variable is associated with a change in one or more independent variables.

$x_1, x_2, x_3 \cdots x_n$

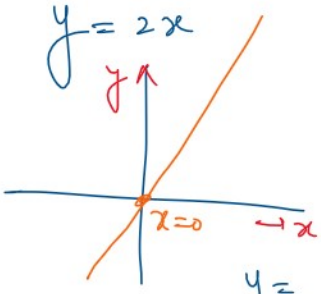


I DON'T TRUST LINEAR REGRESSIONS WHEN IT'S HARDER TO GUESS THE DIRECTION OF THE CORRELATION FROM THE SCATTER PLOT THAN TO FIND NEW CONSTELLATIONS ON IT.

www.intellipaat.com

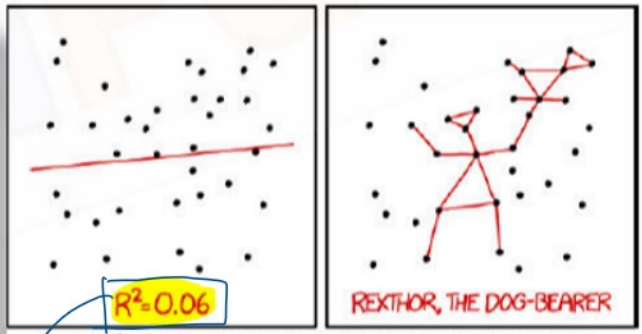
a function in 'x'

$y = 2x$ $\quad y = mx$



$y = 2x$

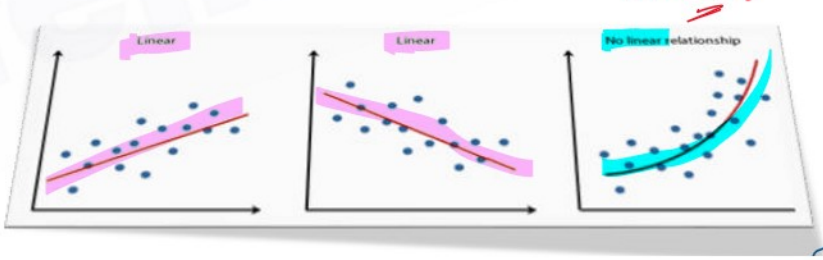
y	x
0	0
−2	−1
2	+1



I DON'T TRUST LINEAR REGRESSIONS WHEN IT'S HARDER TO GUESS THE DIRECTION OF THE CORRELATION FROM THE SCATTER PLOT THAN TO FIND NEW CONSTELLATIONS ON IT.

6%

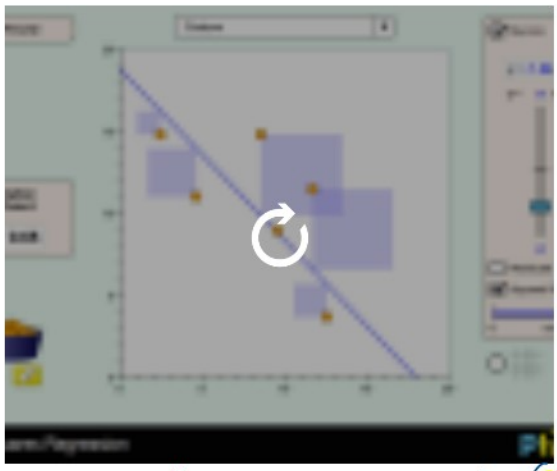
Non-linear



1. Intuitive Approach
2. Mathematical Approach
3. Python hands-on

- Calculus → Function → Limits → Continuity → Differentiability → Maxima & Minima (Global Optimization)
- Linear Algebra
- Probability and Random Variables + Probability distribution — Normal distribution
- statistics

[Least-Squares Regression]



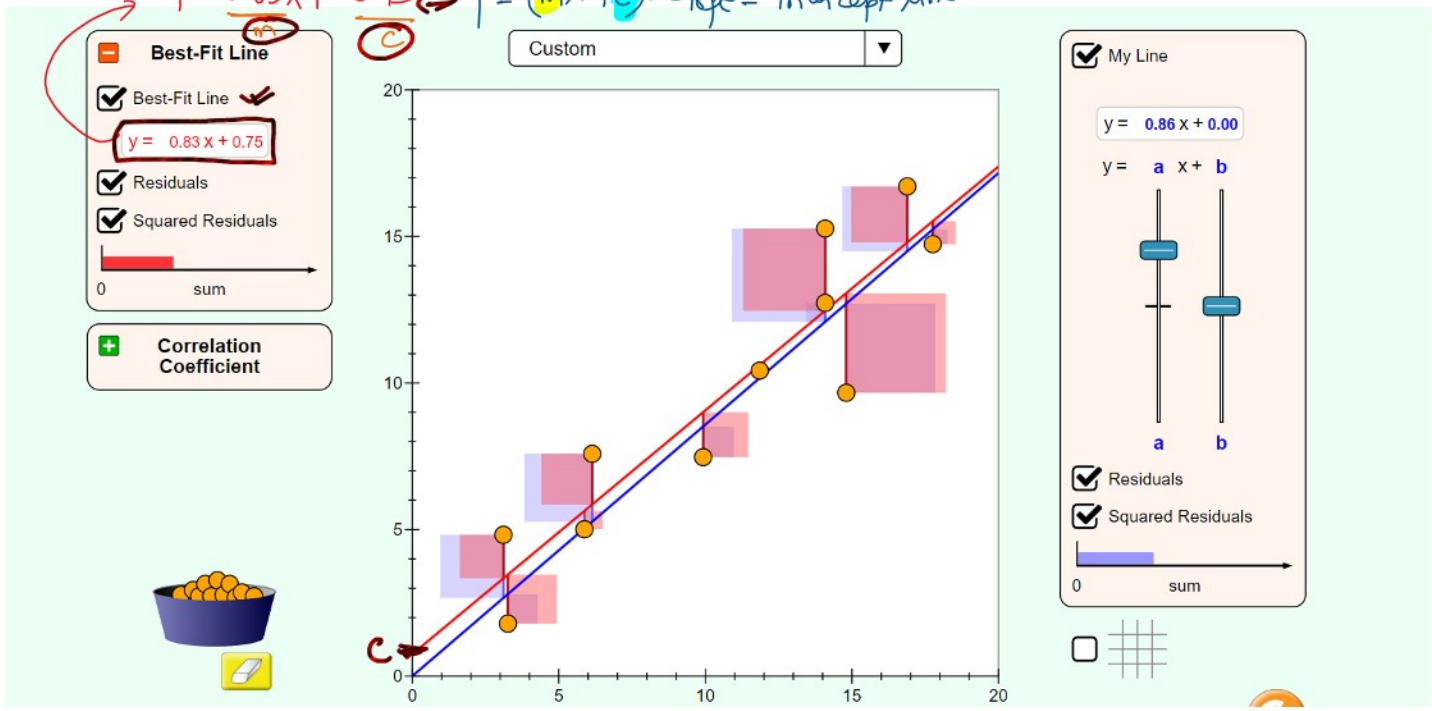
mathematical equation

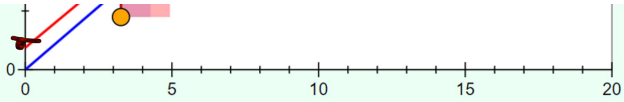
$Y = 0.83X + 0.75$

$Y = \hat{\beta}_1 x + \hat{\beta}_0$

$\hat{\beta}_1$: slope, $\hat{\beta}_0$: intercept

$Y = 0.83X + 0.75 \Leftrightarrow Y = mx + c$: slope - intercept line.



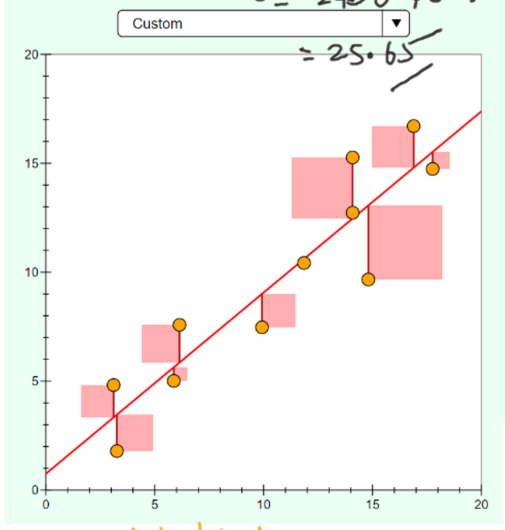


$y = 0.83x + 0.075$

$y_{\text{Predicted value}} = 0.83 \times 30 + 0.075$ at $x = 30$

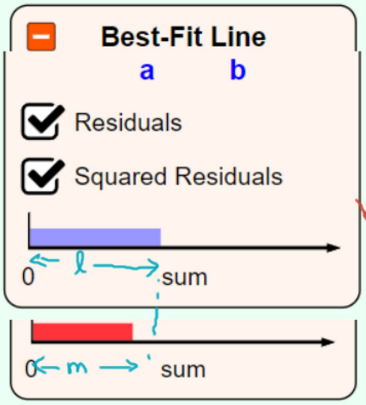
$= 24.90 + 0.075$

$= 25.65$



● : data points

— : Linear Regression Line



l: intuitive best fit line

m: LR model best fit line

a) $l > m$

b) $l < m$

c) $l = m$

d) Not sure