Least square

* A form of mathematical regression analysis used to determine the line of best fit for a set of data, providing a visual demonstration of the relationship between the data points.
* each point represents the relationship between a known independent variable and unknown dependent variable.

① relationship between PCA and least square
② PCA and PLS

$y = mx + b$ $\quad m = \frac{n \Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2}$ $\quad b = \frac{\Sigma y - m \Sigma x}{n}$

(n: number of values we have in our data)

* it tries to minimize the sum of the offsets from the plotted curve.
* used to predict the behavior of dependent variables.
* create a straight line that minimizes the sum of the squares of the error, that are generated by the results of the associated equations such as squared residuals resulting from differences in the observed value and the value anticipated.
* if the data shows a linear relationship between two variables the line that best fits is least square regression line.
* it help to quantify the relationship between two or more variables.
* independent plotted on horizontal (x-axis).
* used in finance, economics and investing.
* prediction about related but unobserved values from the same group or system.
* instead of solving an equation exactly, mathematicians use the least square method to arrive at a close approximation. maximum likelihood estimate

③ Difference between linear least square and linear regression

the adj linear refers to different things.

* linear least square ⇝ a fit that is linear in the parameter
* linear regression ⇝ fitting a model that is a linear function of independent variable.