Introduction to Machine Learning. Lec.3 Simple Linear Regression

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Regression is…

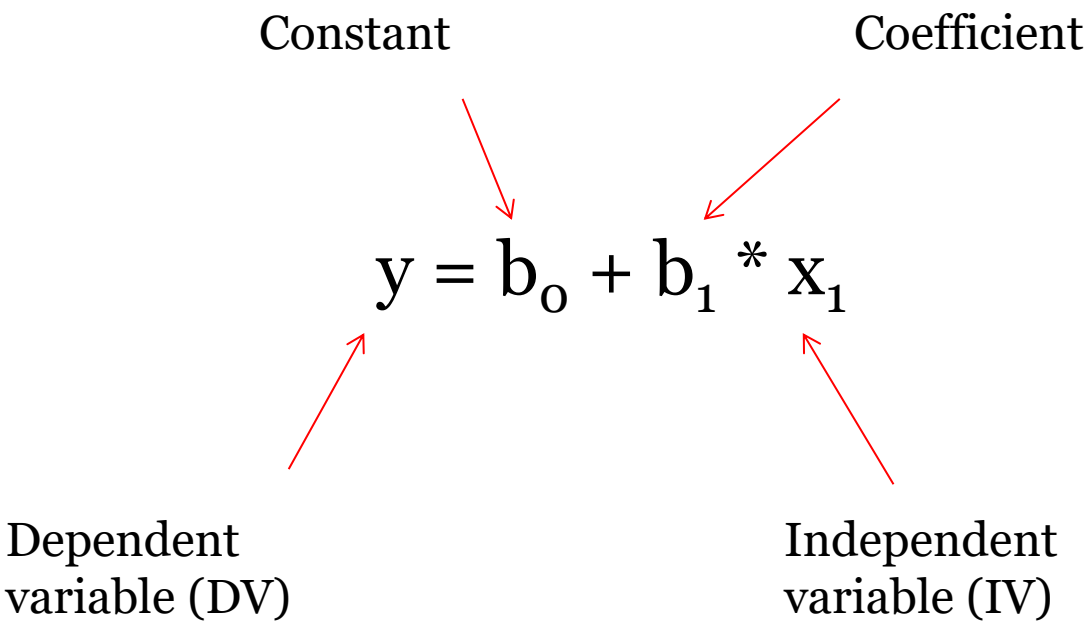
- a technique for determining the statistical **relationship between** two or more variables where a change in a dependent variable is associated with, and depends on, a change in one or more independent variables.

http://www.businessdictionary.com/definition/regression.html

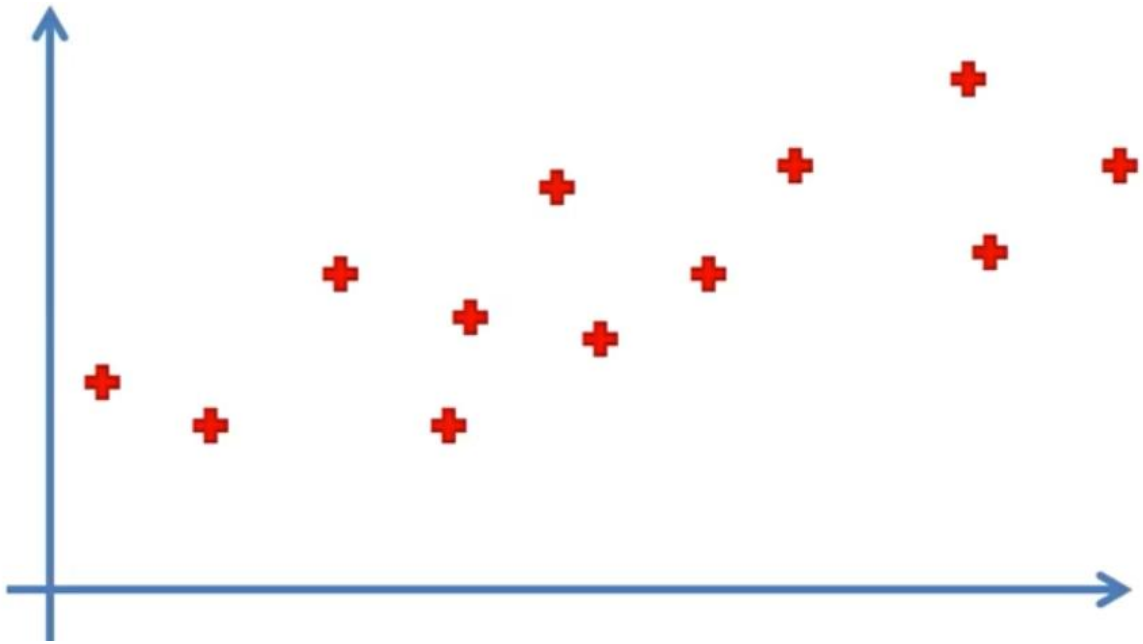
Types of regression models

- **Simple Linear Regression**
- Multiple Linear Regression
- Polynomial Regression
- Support Vector Regression (SVR)
- Decision Tree Regression
- Random Forest Regression

SLR. Formula

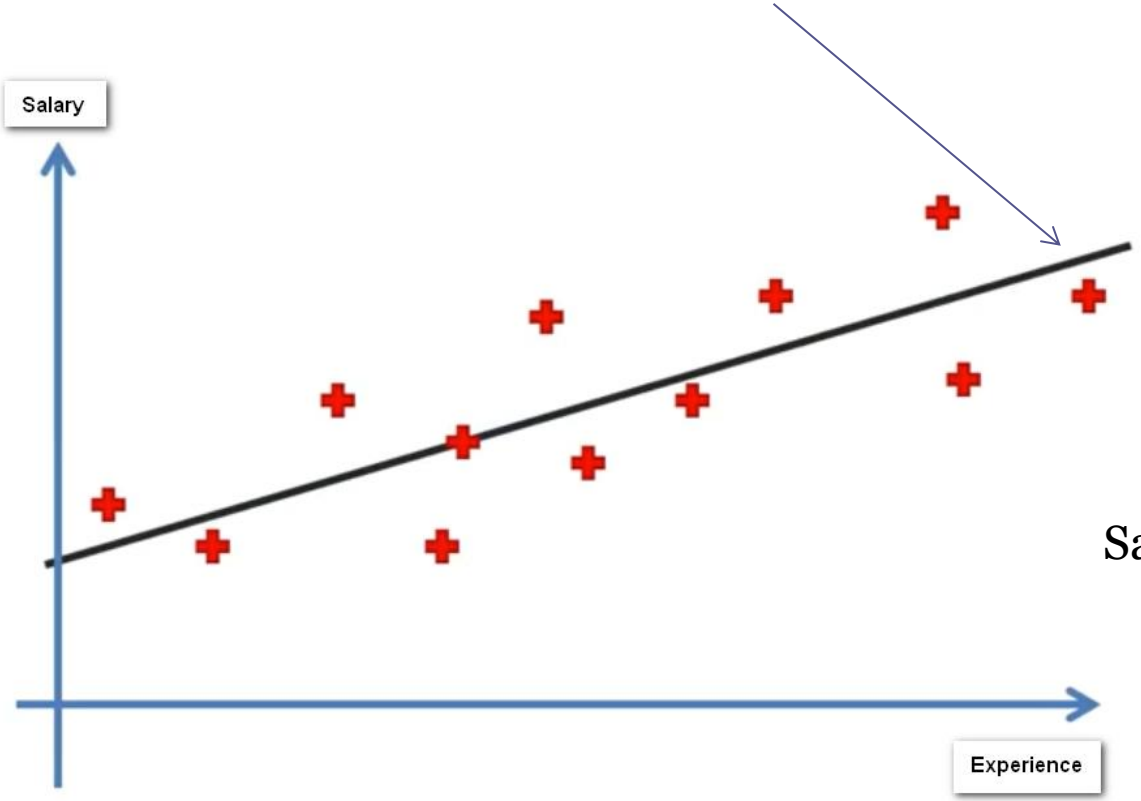

Constant
Coefficient
$y = b_0 + b_1 * x_1$
Dependent variable (DV)
Independent variable (IV)

SLR



SLR

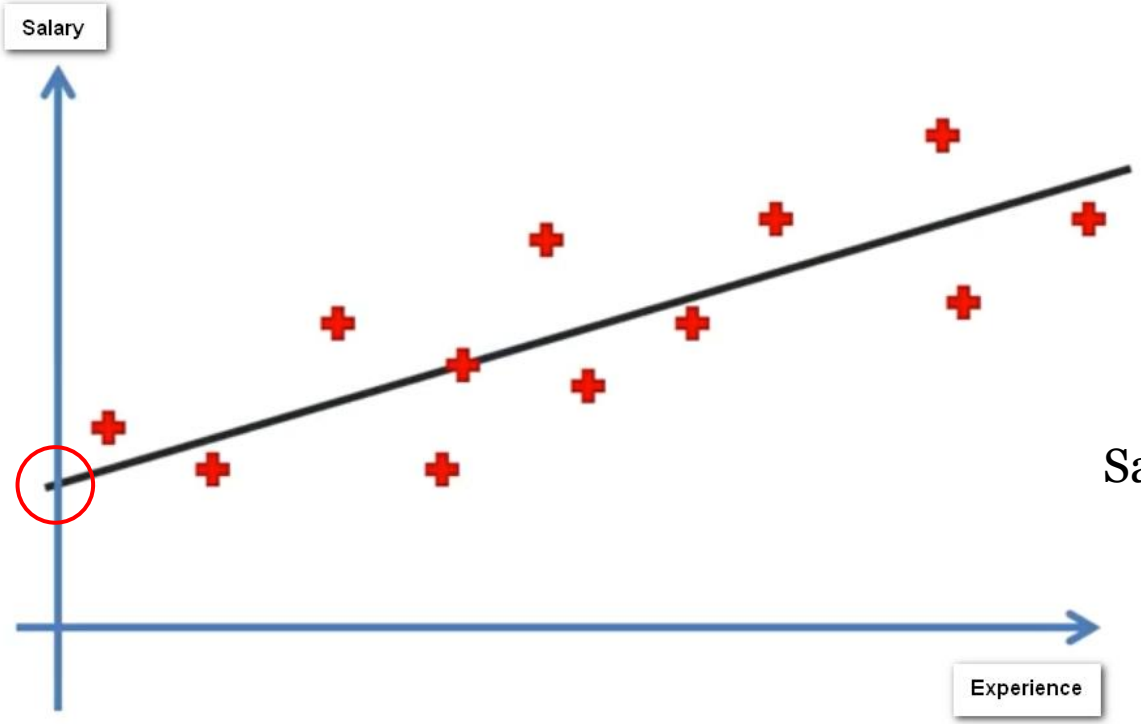
The best **fitting line**



$$y = b_0 + b_1 * x_1$$

Salary = b_0 + b_1 * Experience

SLR

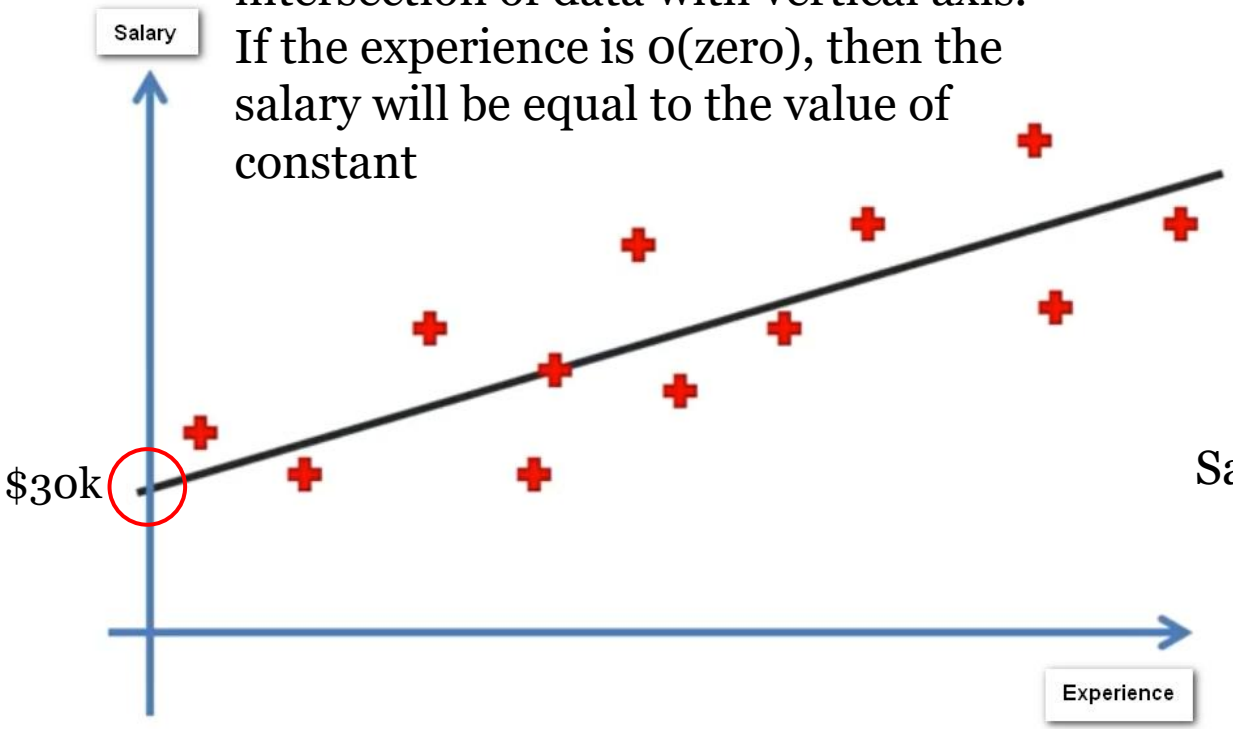


$$y = b_0 + b_1 * x_1$$

Salary = b_0 + b_1 * Experience

SLR

b_0 – is a constant which determines the intersection of data with vertical axis. If the experience is 0(zero), then the salary will be equal to the value of constant



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SLR

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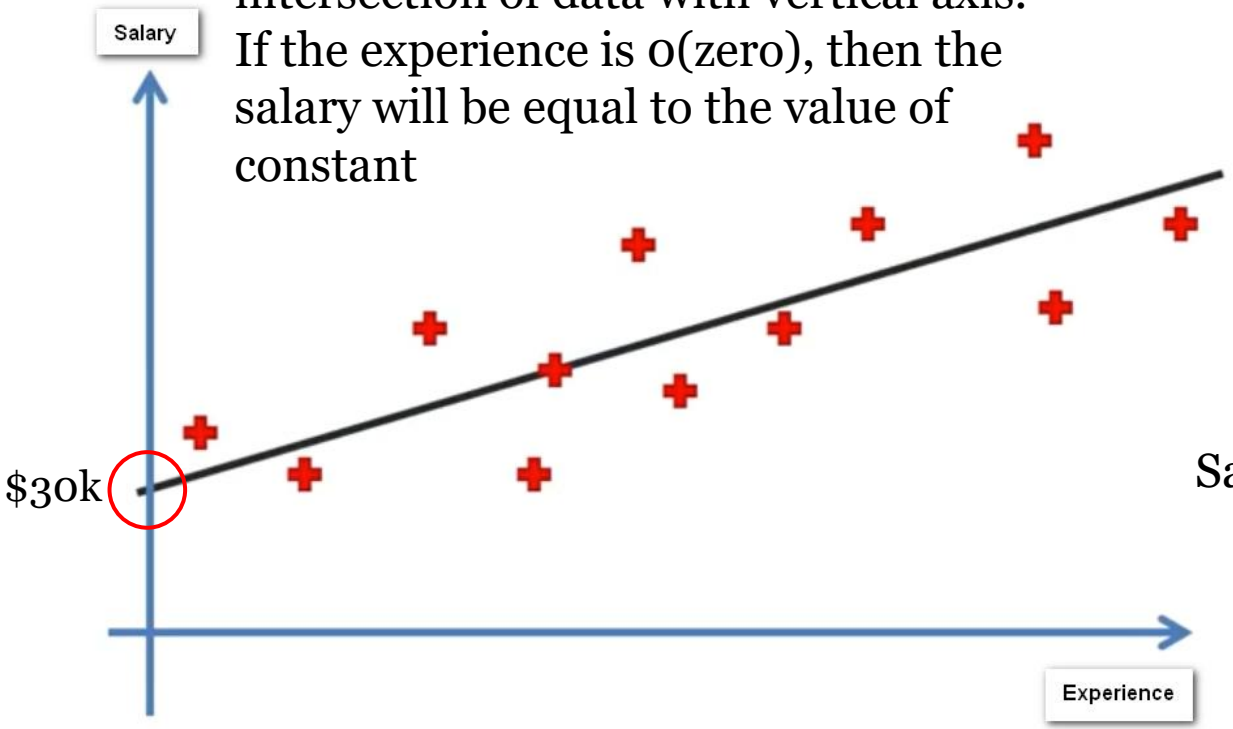


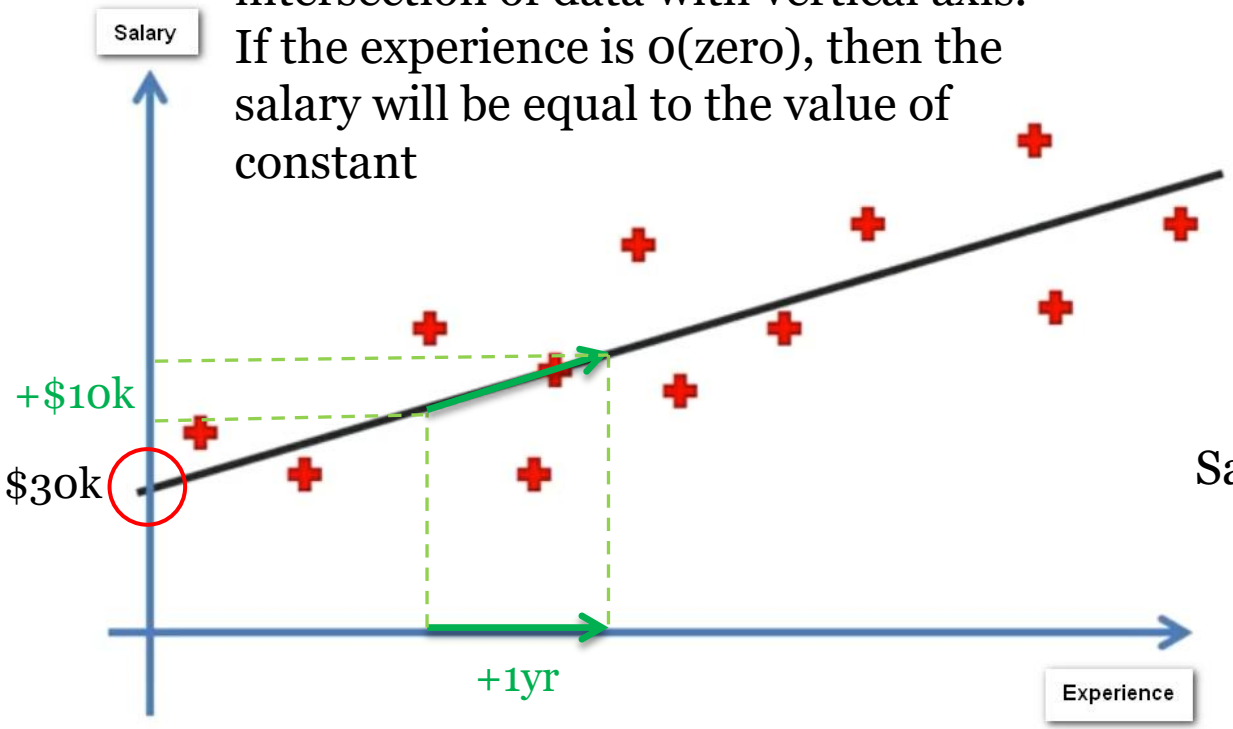
$$y = b_0 + b_1 * x_1$$

Salary = b_0 + b_1 * Experience

b_1 – is a slope of the line

SLR

b_0 – is a constant which determines the intersection of data with vertical axis. If the experience is 0(zero), then the salary will be equal to the value of constant



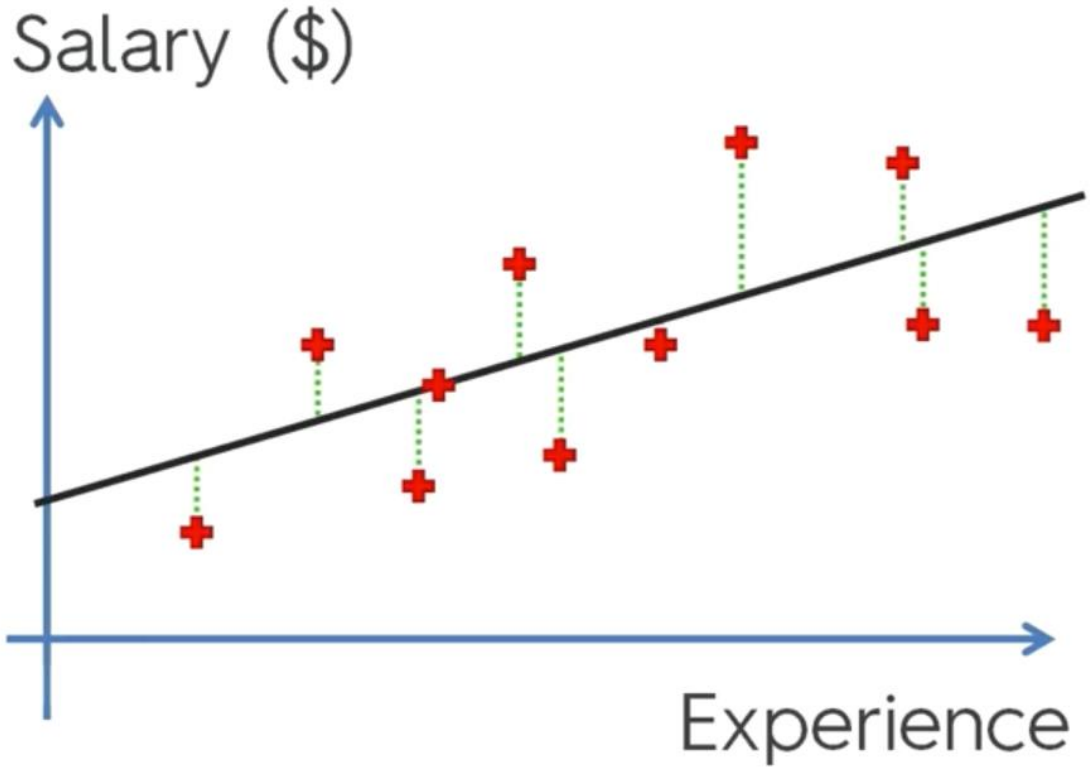
$$y = b_0 + b_1 * x_1$$

Salary = b_0 + b_1 * Experience

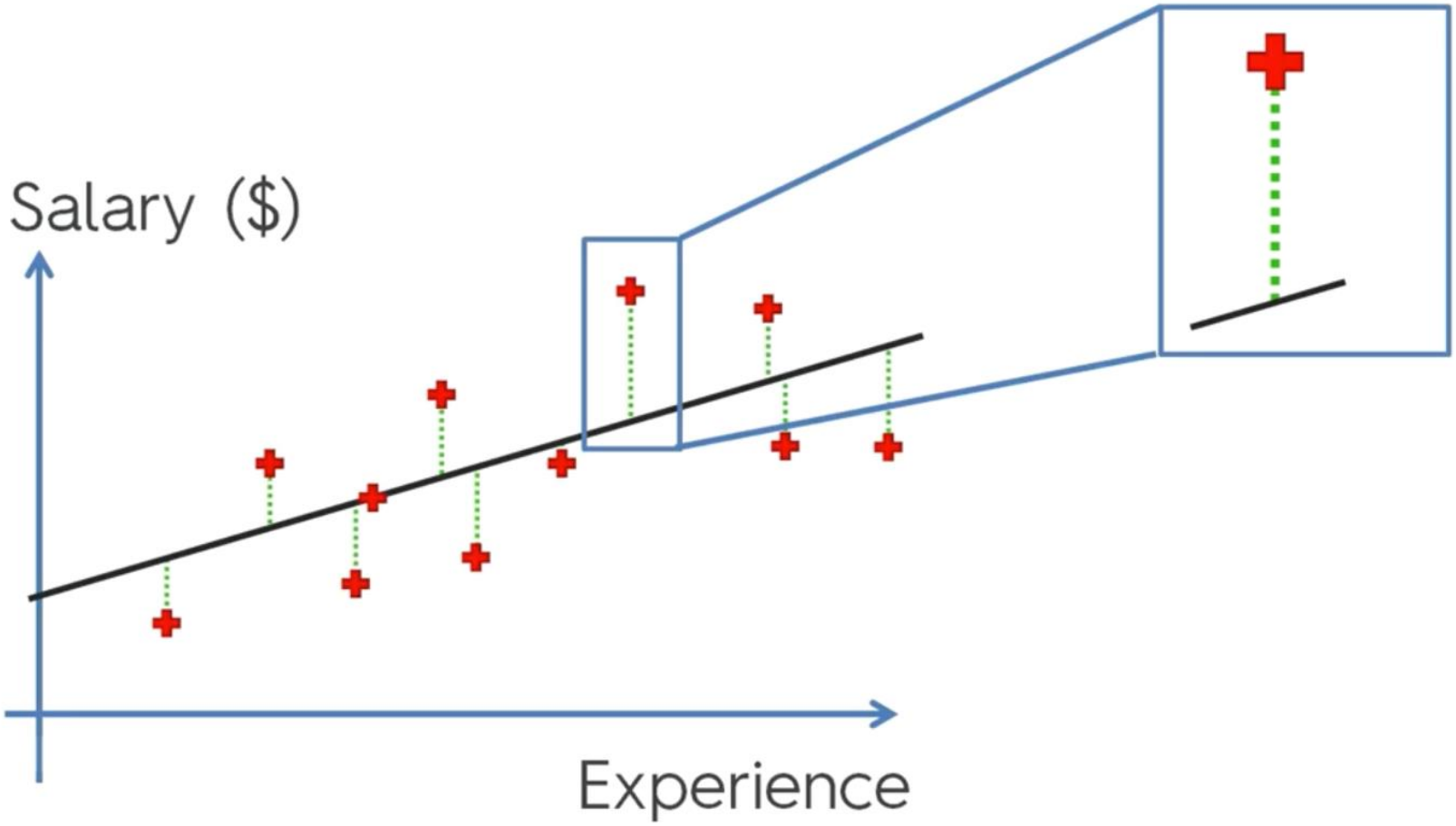
SLR

- The goal of SLR is to find the best fitting line

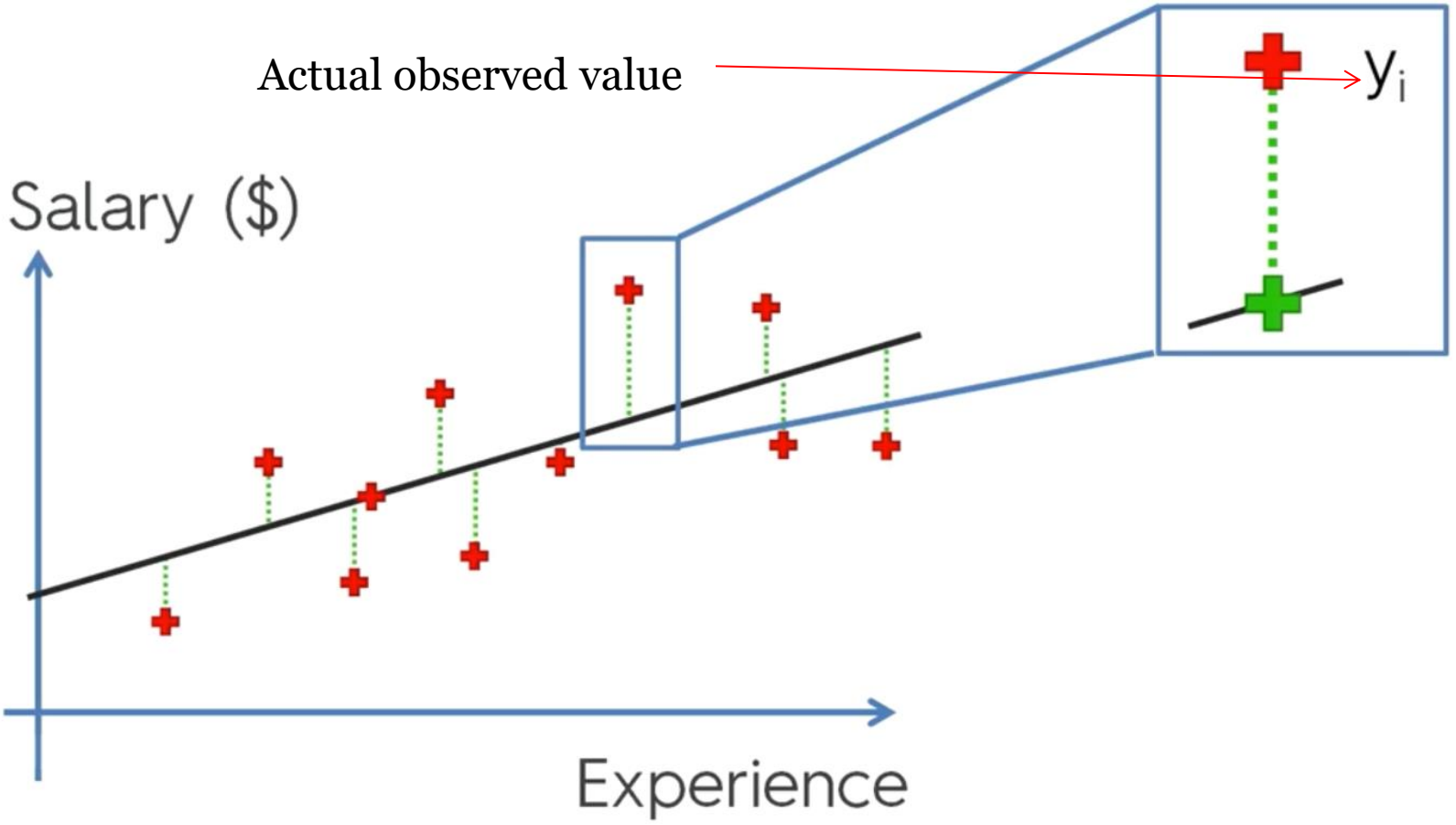
SLR



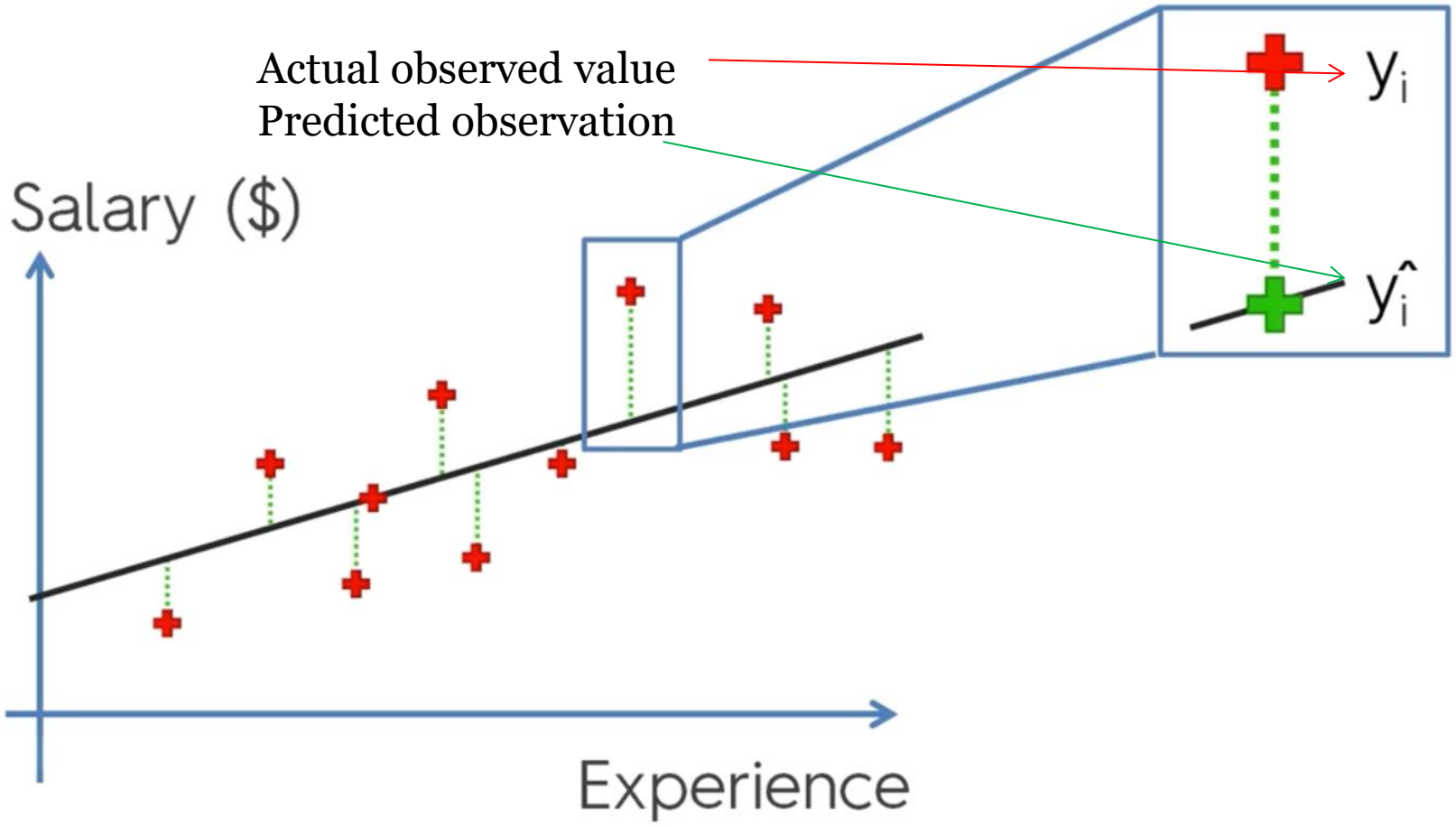
SLR



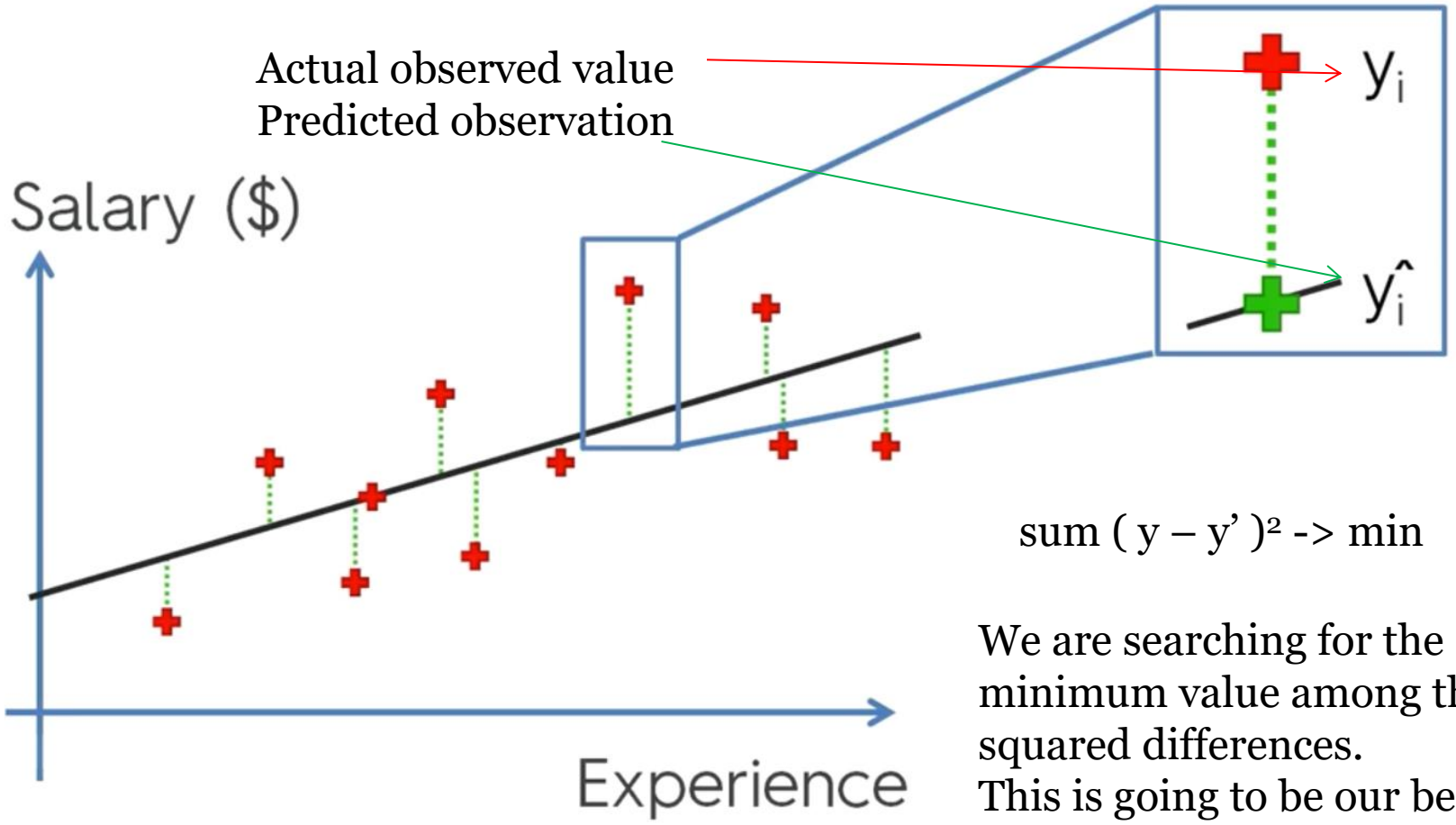
SLR



SLR


Actual observed value
Predicted observation
y_i
$\hat{y}_i$
Salary ($)
Experience

SLR



sum (y – y')² -> min

We are searching for the minimum value among these squared differences.
This is going to be our best fitting line