Let (x_i, y_i) represent the bivariate data which is represented in the scatter diagram. We intend to fit a straight line to the given data with method of least square. In this method we assume the equation of the line as $Y = aX + b$, where a & b are to be determined. Then we measure the difference between the fitted value according to the equation and the tabular value according to the data We want to minimize the error (square of)

$$S^2 = (y_i - ax_i - b)^2$$

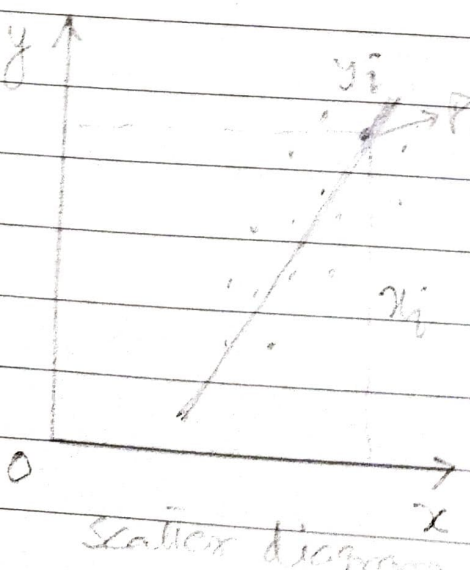
$$\frac{\partial S}{\partial a} = \sum 2x_i (y_i - ax_i - b) = 0$$

$$\frac{\partial S}{\partial b} = \sum -2 (y_i - ax_i - b) = 0$$

giving the two equations

$$\begin{cases} \frac{1}{n}\Sigma x_i y_i = a \cdot \frac{1}{n}\Sigma x_i^2 + b\bar{x} \\ \bar{y} = a\bar{x} + b \end{cases}$$

This determines a & b always.



5 Sunday