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Indian Institute of Technology Hyderabad

Biostatistics

BT2023

Lecture 12

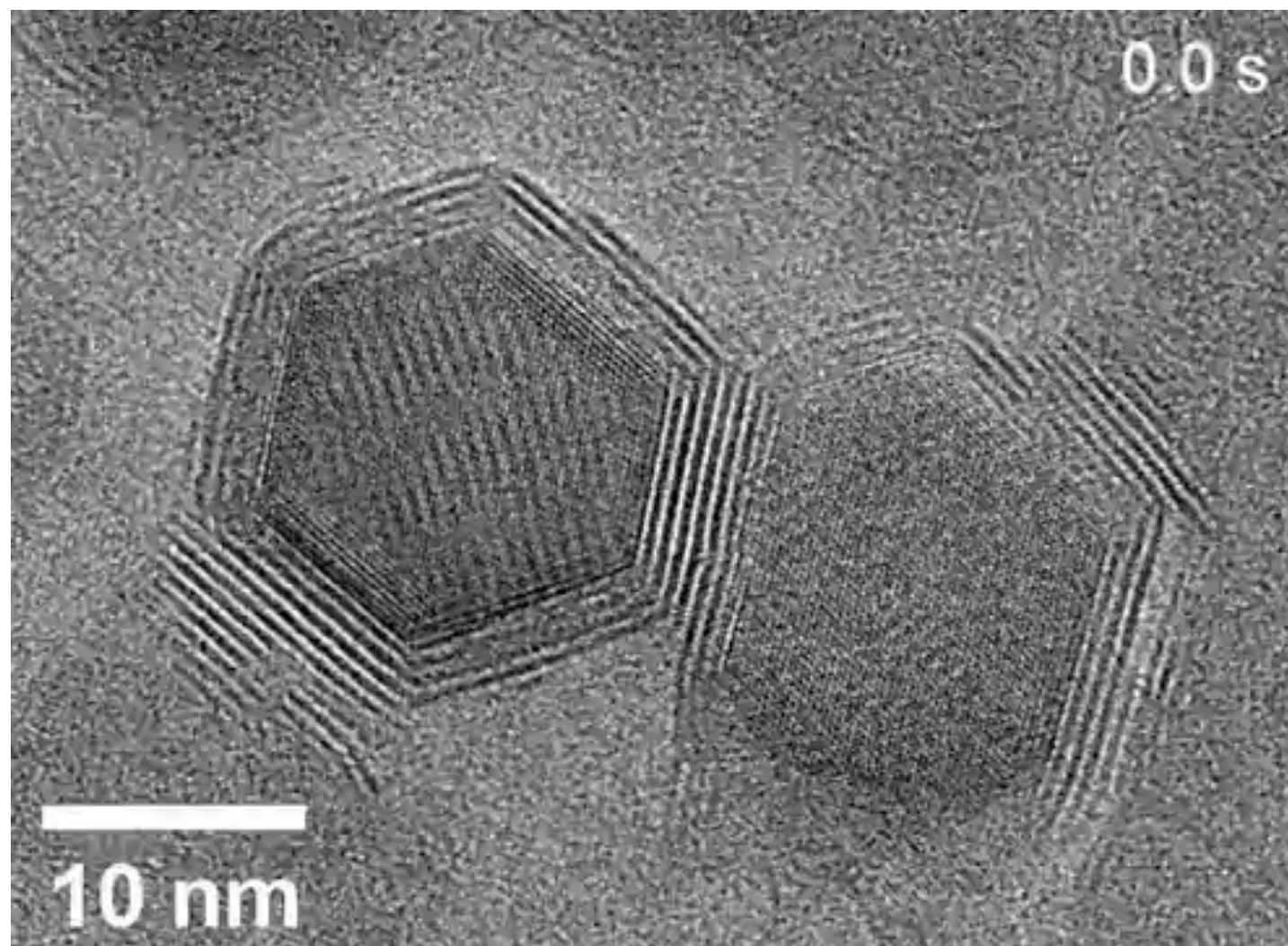
Correlation and regression

Himanshu Joshi
16 September 2022



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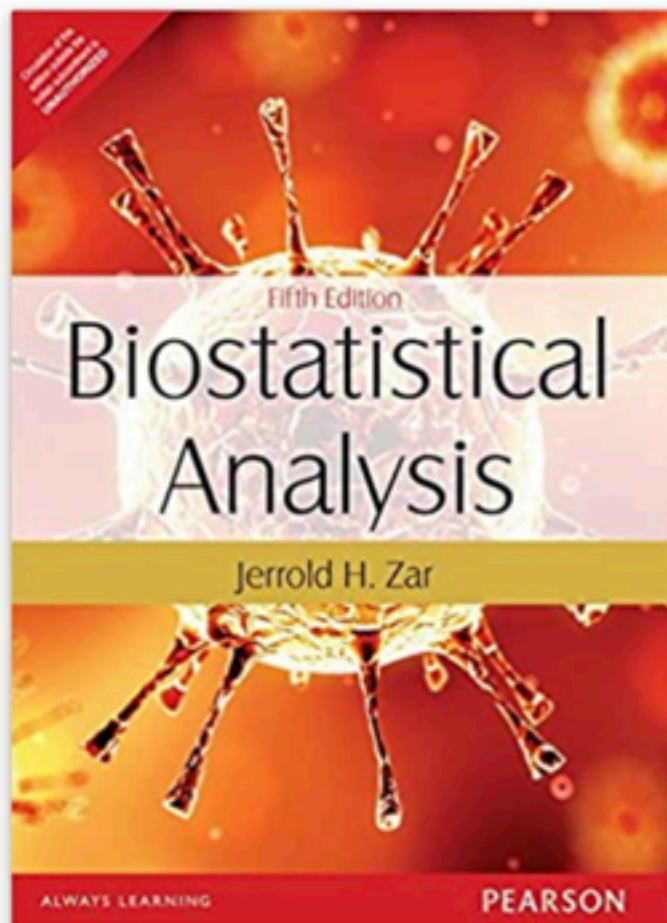
Defect-mediated ripening of two Cd-CdCl₂ core-shell nanoparticles



[*Reference Nature Communications*](#)
volume 13, Article number: 2211 (2022)

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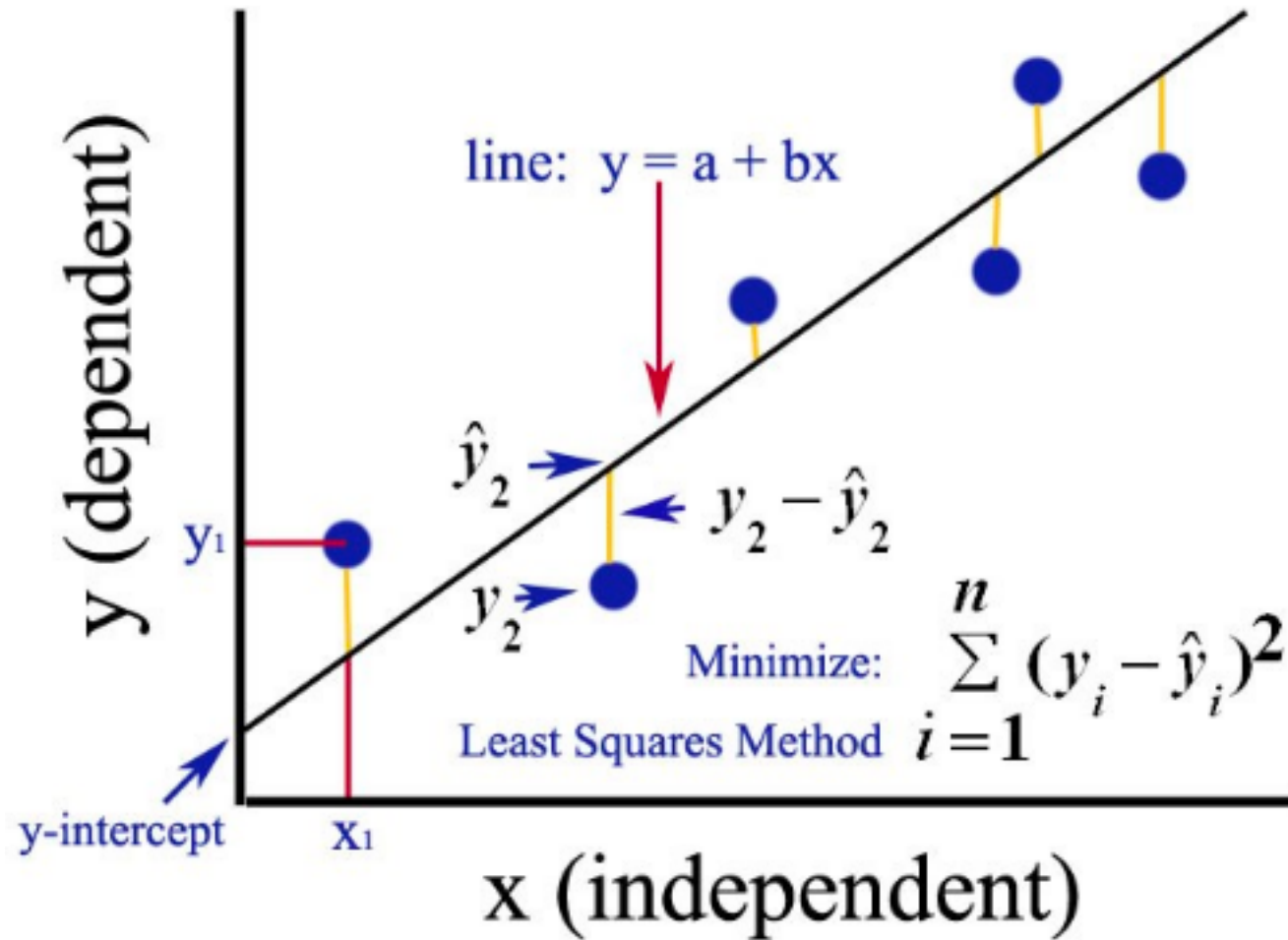
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Linear regression by least square method



$$\sum y = na + b \sum x$$
$$\sum xy = a \sum x + b \sum x^2$$

$$b_{yx} = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$



Correlation and Regression

$$\begin{aligned} b_{yx} &= \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2} \\ &= \frac{Cov(X, Y)}{\sigma_x} \\ &= r \frac{\sigma_y}{\sigma_x} \end{aligned}$$

The regressor and response

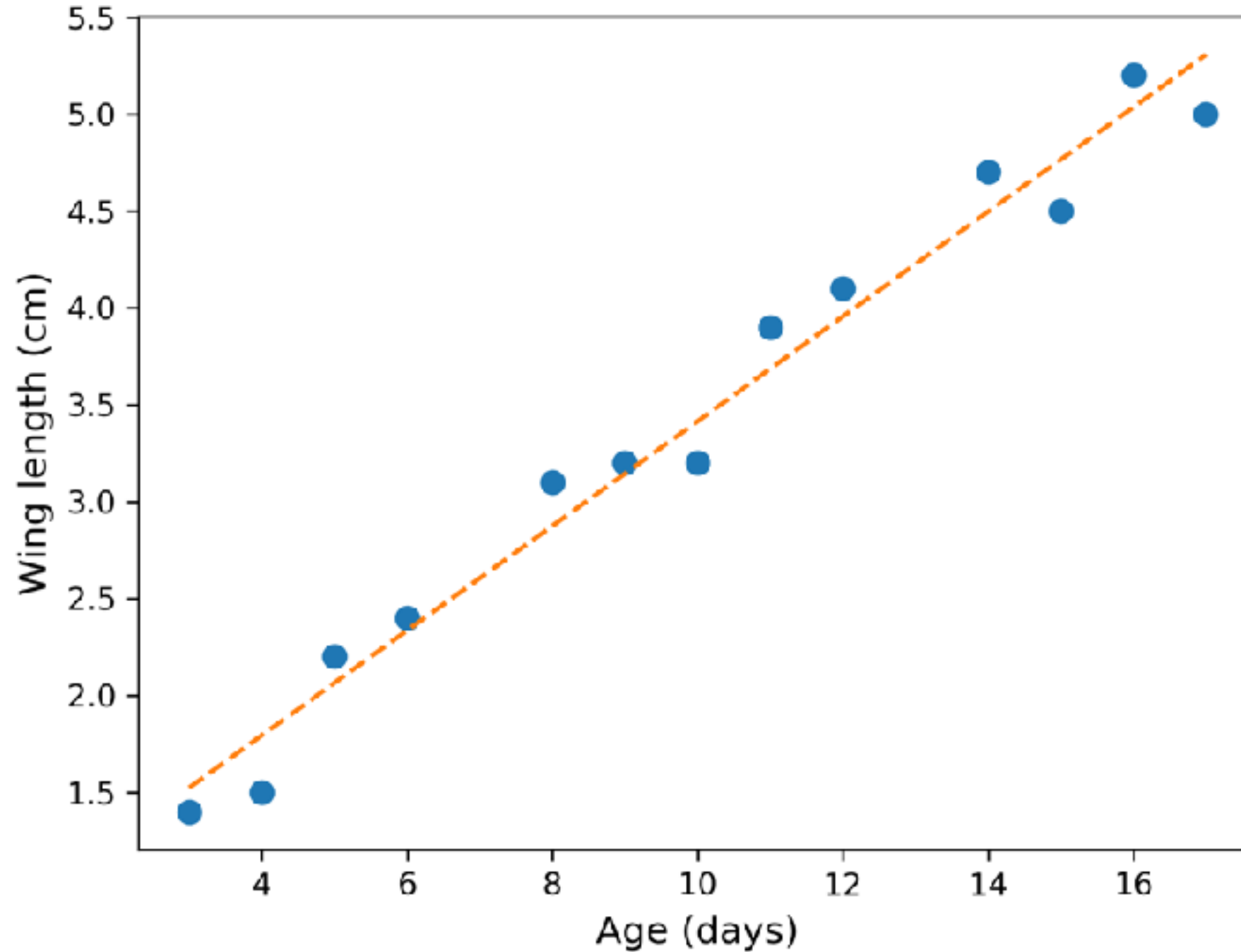
When there is a possibility of functional dependence of one variable to another, such relationship is called regression. The variables are called independent and dependent variables but it doesn't a cause and effect relationships between two variable.

Consider the following examples;

1. Blood pressure and the age of the patient
2. Length of arm vs length of legs

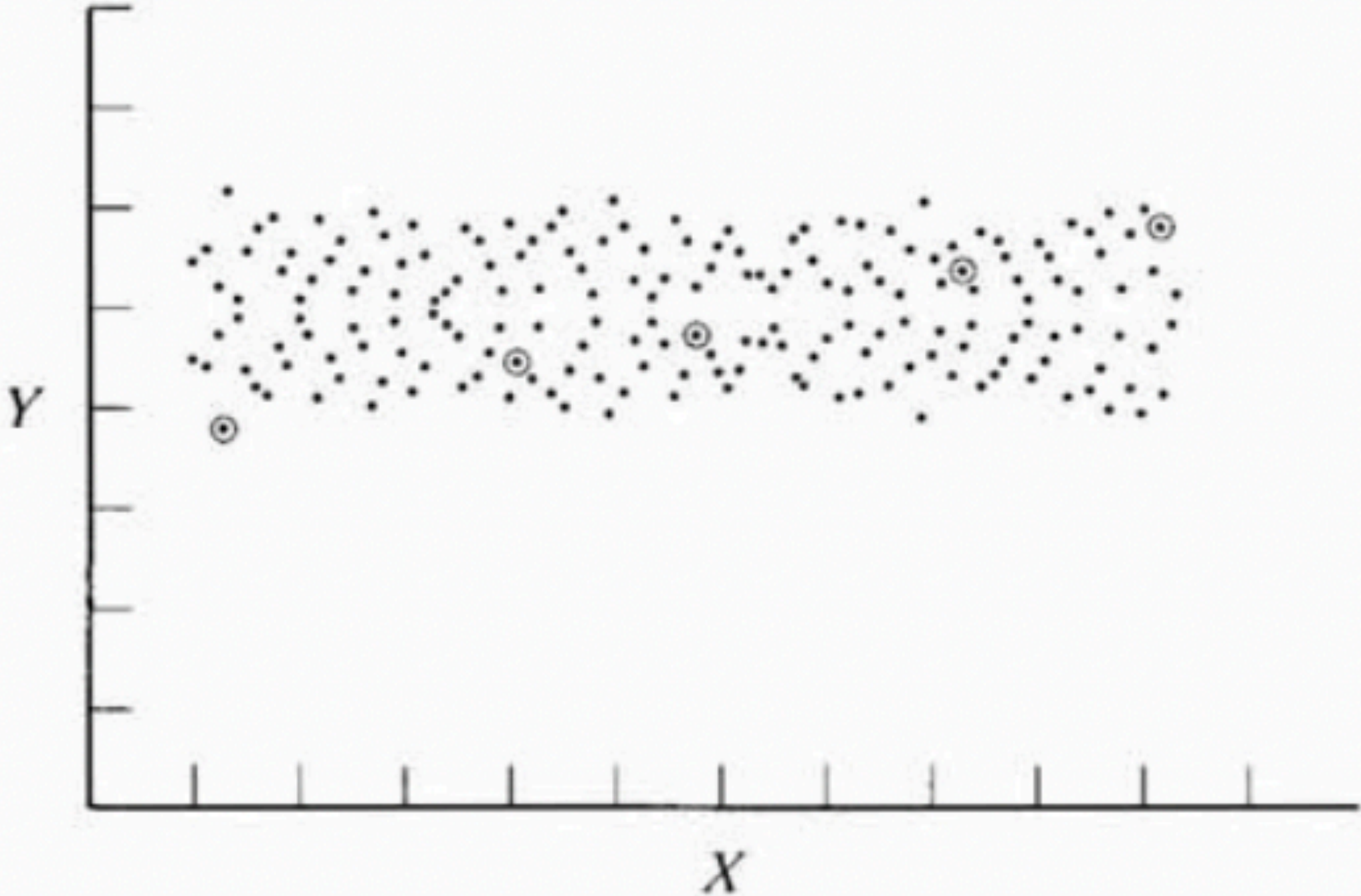


Caution with regression





Caution with regression





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2:30 PM Friday, 20 September 2022