Lecture 17 notes

Thursday, November 9, 2023 9:32 AM

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$$

$$\hat{\beta}_1 = \frac{cov(x, y)}{var(x)}$$

$$y = \beta_0 + \beta_1 x_i + \beta_2 x_2 + u_i$$

$$\beta_1 = \frac{[var(x_2)cov(y, x_1) - cov(x_1, x_2)cov(y, x_2)]}{[var(x_1)var(x_2) - (cov(x_1, x_2))^2]}$$

__Scalar:__ uni-dimensional points

↳ $5, x, 5x-7$

__Vector:__ bi-dimensional concept

$$\vec{v} = \begin{bmatrix} 1 \\ 2 \\ 5 \\ -3 \end{bmatrix} \Rightarrow \vec{v} = \begin{bmatrix} 1 & 2 & 5 & -3 \end{bmatrix}$$

Matrix: 3-d concept; collections of vectors

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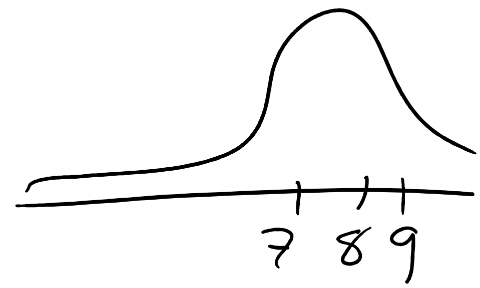
$$
\begin{array}{cc}
 & \vec{v} \\
\vec{v} & \\
M = & \begin{bmatrix} 1 & 2 & 5 & -3 \\ 4 & 5 & 7 & 27 \\ 7 & 9 & 1 & 10 \\ 21 & 17 & -2 & -2 \end{bmatrix}
\end{array}
$$



Mathematical Operations

① Transpose: $(\vec{v}^T)$

$$\vec{v} = \begin{bmatrix} 1 \\ 2 \\ 5 \\ -7 \end{bmatrix} \qquad \vec{v}\,' = \begin{bmatrix} 1 & 2 & 5 & -7 \end{bmatrix}$$

$$m = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \qquad m' = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$$

$$(m')' = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

Conformability

$$\vec{v}_1 = \underset{1\times 3}{\begin{bmatrix} 1 & 3 & 5 \end{bmatrix}}, \quad \vec{v}_2 = \underset{1\times 3}{\begin{bmatrix} 2 & 4 & 6 \end{bmatrix}}$$

$$\vec{v}_1 + \vec{v}_2 = \underset{1\times 3}{\begin{bmatrix} 3 & 7 & 11 \end{bmatrix}} \qquad \vec{v}_2' = \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$$

$$\underset{1\times 3}{\vec{v}_1} + \underset{3\times 1}{\vec{v}_2'} =$$