

Lampiran 6

Mencari Persamaan Regresi

1. Regresi Y atas X_1

$$\begin{array}{ll} \text{Diketahui : } \sum X_1 = 1000 & \sum Y^2 = 51906,14 \\ \sum X_1^2 = 51908,89 & \sum X_1 Y = 51248,14 \\ \sum Y = 1000 & n = 20 \end{array}$$

$$\begin{aligned} a &= \frac{(\sum Y)(\sum X_1^2) - (\sum X_1)(\sum X_1 Y)}{n(\sum X_1^2) - (\sum X_1)^2} \\ &= \frac{(1000)(51908,89) - (1000)(51248,14)}{20(51908,89) - (1000)^2} \\ &= \frac{51908890 - 51248140}{1038178 - 1000000} \\ &= \frac{660750}{38177,8} \\ &= 17,30 \end{aligned}$$

$$\begin{aligned} b &= \frac{n(\sum X_1 Y) - (\sum X_1)(\sum Y)}{n(\sum X_1^2) - (\sum X_1)^2} \\ &= \frac{(20 \cdot 51248,14) - (1000 \cdot 1000)}{20(51908,89) - (1000)^2} \end{aligned}$$

$$= \frac{1024963 - 1000000}{1038178 - 1000000}$$

$$= \frac{24962,8}{38177,8}$$

$$= 0,65$$

Jadi persamaan regresi Y terhadap X_1 adalah $\hat{y} = 17,30 + 0,65X_1$

2. Regresi Y atas X_2

$$\text{Diketahui : } \sum X_2 = 1000$$

$$\sum Y^2 = 51906,14$$

$$\sum X_2^2 = 51904,97$$

$$\sum X_2 Y = 51403,98$$

$$\sum Y = 1000$$

$$n = 20$$

$$a = \frac{(\sum Y)(\sum X_2^2) - (\sum X_2)(\sum X_2 Y)}{n(\sum X_2^2) - (\sum X_2)^2}$$

$$= \frac{(1000)(51904,97) - (1000)(51403,98)}{20(51904,97) - (1000)^2}$$

$$= \frac{51904970 - 51403980}{1038099 - 1000000}$$

$$= \frac{500990}{38099,4}$$

$$= 13,14$$

$$\begin{aligned}
 b &= \frac{n(\sum X_2 Y) - (\sum X_2)(\sum Y)}{n(\sum X_2^2) - (\sum X_2)^2} \\
 &= \frac{(20 \cdot 51403,98) - (1000 \cdot 1000)}{20(51904,97) - (1000)^2} \\
 &= \frac{1028080 - 1000000}{1038099 - 1000000} \\
 &= \frac{28079,6}{38099,4} \\
 &= 0,73
 \end{aligned}$$

Jadi persamaan regresi Y terhadap X_2 adalah $\hat{y} = 13,14 + 0,73X_2$

3. Regresi ganda Y atas X_1 dengan X_2

Dicari dengan rumus sebagai berikut :

$$b_0 = \bar{Y} - b_1 \bar{X}_1 - b_2 \bar{X}_2$$

$$b_1 = \frac{(\sum X_2^2)(\sum X_1 Y) - (\sum X_1 X_2)(\sum X_2 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)^2}$$

$$b_2 = \frac{(\sum X_1^2)(\sum X_2 Y) - (\sum X_1 X_2)(\sum X_1 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)^2}$$

Dimana:

$$\sum Y^2 = \sum Y^2 - \frac{(\sum Y)^2}{n}$$

$$\sum X_1^2 = \sum X_1^2 - \frac{(\sum X_1)^2}{n}$$

$$\sum X_2^2 = \sum X_2^2 - \frac{(\sum X_2)^2}{n}$$

$$\sum X_1Y = \sum X_1Y - \frac{(\sum X_1)(\sum Y)}{n}$$

$$\sum X_2Y = \sum X_2Y - \frac{(\sum X_2)(\sum Y)}{n}$$

$$\sum X_1X_2 = \sum X_1X_2 - \frac{(\sum X_1)(\sum X_2)}{n}$$

Diketahui :

$$\bar{Y} = 50 \quad \sum X_1 = 1000 \quad \sum X_1^2 = 51908,89 \quad \sum X_1Y = 51248,14$$

$$\bar{X}_1 = 50 \quad \sum X_2 = 1000 \quad \sum X_2^2 = 51904,97 \quad \sum X_2Y = 51403,98$$

$$\bar{X}_2 = 50 \quad \sum Y = 1000 \quad \sum Y^2 = 51906,14 \quad \sum X_1X_2 = 51191,16$$

Jadi :

$$\begin{aligned}\Sigma Y^2 &= \Sigma Y^2 - \frac{(\Sigma Y)^2}{n} \\ &= 51906,14 - \frac{(1000)^2}{20} \\ &= 51906,14 - 50000 \\ &= 1906,14\end{aligned}$$

$$\begin{aligned}\Sigma X_1^2 &= \Sigma X_1^2 - \frac{(\Sigma X_1)^2}{n} \\ &= 51908,89 - \frac{(1000)^2}{20} \\ &= 51908,89 - 50000 \\ &= 1908,89\end{aligned}$$

$$\begin{aligned}\Sigma X_2^2 &= \Sigma X_2^2 - \frac{(\Sigma X_2)^2}{n} \\ &= 51904,97 - \frac{(1000)^2}{20} \\ &= 51904,97 - 50000 \\ &= 1904,97\end{aligned}$$

$$\begin{aligned}
\Sigma X_1 Y &= \Sigma X_1 Y - \frac{(\Sigma X_1)(\Sigma Y)}{n} \\
&= 51248,14 - \frac{(1000)(1000)}{20} \\
&= 51248,14 - 50000 \\
&= 1248,14
\end{aligned}$$

$$\begin{aligned}
\Sigma X_2 Y &= \Sigma X_2 Y - \frac{(\Sigma X_2)(\Sigma Y)}{n} \\
&= 51403,98 - \frac{(1000)(1000)}{20} \\
&= 51403,98 - 50000 \\
&= 1403,98
\end{aligned}$$

$$\begin{aligned}
\Sigma X_1 X_2 &= \Sigma X_1 X_2 - \frac{(\Sigma X_1)(\Sigma X_2)}{n} \\
&= 51191,16 - \frac{(1000)(1000)}{20} \\
&= 51191,16 - 50000 \\
&= 1191,16
\end{aligned}$$

$$\begin{aligned}
 b_1 &= \frac{(\sum X_2^2)(\sum X_1 Y) - (\sum X_1 X_2)(\sum X_2 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)^2} \\
 &= \frac{(1904,97)(1248,14) - (1191,16)(1403,98)}{(1908,89)(1904,97) - (1191,16)^2} \\
 &= \frac{2377669 - 1672365}{3636378 - 1418862} \\
 &= \frac{705304,4}{2217516} \\
 &= 0,31
 \end{aligned}$$

$$\begin{aligned}
 b_2 &= \frac{(\sum X_1^2)(\sum X_2 Y) - (\sum X_1 X_2)(\sum X_1 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)^2} \\
 &= \frac{(1908,89)(1403,98) - (1191,16)(1248,14)}{(1908,89)(1904,97) - (1191,16)^2} \\
 &= \frac{1680043 - 1486734}{3636378 - 1418862} \\
 &= \frac{1193309}{2217516} \\
 &= 0,53
 \end{aligned}$$

$$\begin{aligned}b_0 &= \bar{Y} - b_1 \bar{X}_1 - b_2 \bar{X}_2 \\&= 50 - (0,31)(50) - (0,53)(50) \\&= 50 - 15,50 - 26,50 \\&= 8\end{aligned}$$

Jadi persamaan regresi ganda Y atas X_1 dan X_2 adalah $\hat{y} = 8 + 0,31 X_1 + 0,53$

X_2