REGRESSION ANALYSIS EXAMPLE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tidal Rise | 0.5 | 0.4 | 0.3 | 0.4 | 0.5 | 0.7 |
| Temperature | 28.2 | 27.8 | 27.7 | 27.9 | 29.1 | 28.6 |
| Wind speed | 4.5 | 3.9 | 2.7 | 2.7 | 6.1 | 3.2 |
| Relative Humidity | 84 | 82 | 74 | 81 | 76 | 74 |
| Precipitation | 74.8 | 34 | 32.88 | 64 | 48.9 | 43.1 |

$$\hat{P}=β\_{0}+β\_{1}×TR+β\_{2}×T+ β\_{3}×W+ β\_{4}×R$$

 $\left[\begin{matrix}\begin{matrix}1&0.5&28.2\\1&0.4&27.8\\1&0.3&27.7\end{matrix} \begin{matrix}4.5&84\\3.9&82\\2.7&74\end{matrix}\\\begin{matrix}1&0.4&27.9\\1&0.5&29.1\\1&0.7&28.6\end{matrix} \begin{matrix}2.7&81\\6.1&76\\3.2&74\end{matrix}\end{matrix} \begin{matrix}\begin{matrix}|\\|\\|\end{matrix}&\begin{matrix}74.8\\34\\32.88\end{matrix}\\\begin{matrix}|\\|\\|\end{matrix}&\begin{matrix}64\\48.9\\43.1\end{matrix}\end{matrix}\right]$

$$\begin{matrix} X& \begin{matrix}| &Y\end{matrix}\end{matrix} $$

$$Y=Xβ$$

$β=X^{'}Y$ or $β=\left(X'X\right)^{-1}\left(X'Y\right)$

$\left[\begin{matrix}\begin{matrix}β\_{0}\\β\_{1}\\β\_{2}\end{matrix}\\\begin{matrix}β\_{3}\\β\_{4}\end{matrix}\end{matrix}\right]=\left(\left[\begin{matrix}\begin{matrix}1&0.5&28.2\\1&0.4&27.8\\1&0.3&27.7\end{matrix} \begin{matrix}4.5&84\\3.9&82\\2.7&74\end{matrix}\\\begin{matrix}1&0.4&27.9\\1&0.5&29.1\\1&0.7&28.6\end{matrix} \begin{matrix}2.7&81\\6.1&76\\3.2&74\end{matrix}\end{matrix}\right]^{T}\left[\begin{matrix}\begin{matrix}1&0.5&28.2\\1&0.4&27.8\\1&0.3&27.7\end{matrix} \begin{matrix}4.5&84\\3.9&82\\2.7&74\end{matrix}\\\begin{matrix}1&0.4&27.9\\1&0.5&29.1\\1&0.7&28.6\end{matrix} \begin{matrix}2.7&81\\6.1&76\\3.2&74\end{matrix}\end{matrix}\right]\right)^{-1}\left(\left[\begin{matrix}\begin{matrix}1&0.5&28.2\\1&0.4&27.8\\1&0.3&27.7\end{matrix} \begin{matrix}4.5&84\\3.9&82\\2.7&74\end{matrix}\\\begin{matrix}1&0.4&27.9\\1&0.5&29.1\\1&0.7&28.6\end{matrix} \begin{matrix}2.7&81\\6.1&76\\3.2&74\end{matrix}\end{matrix}\right]^{T}\left[\begin{matrix}\begin{matrix}74.8\\34\\32.88\end{matrix}\\\begin{matrix}64\\48.9\\43.1\end{matrix}\end{matrix}\right]\right)$

$\left[\begin{matrix}\begin{matrix}β\_{0}\\β\_{1}\\β\_{2}\end{matrix}\\\begin{matrix}β\_{3}\\β\_{4}\end{matrix}\end{matrix}\right]=\left[\begin{matrix}\begin{matrix}16.40912\\44.7879\\-5.45401\end{matrix}\\\begin{matrix}1.799378\\2.016175\end{matrix}\end{matrix}\right]$

$\hat{P}=16.40912+44.787\_{1}TR-5.45401T+ 1.799378W+ 2.016175R$