2019/10/19

– Finding "weights" from the linear Prediction Model

$$
\begin{aligned}
x_{11}w_1 + x_{12}w_2 + \cdots + x_{1N}w_N &= y_1 \\
x_{21}w_1 + x_{22}w_2 + \cdots + x_{2N}w_N &= y_2 \\
\vdots \qquad \vdots \qquad\quad \vdots \qquad \vdots \quad &\quad \vdots \\
x_{N1}w_1 + x_{N2}w_2 + \cdots + x_{NN}w_N &= y_N
\end{aligned}
$$

$$Xw = y$$

$$
\underbrace{\begin{bmatrix}
x_{11} & x_{12} & x_{13} & \cdots & x_{1N} \\
x_{21} & x_{22} & x_{23} & \cdots & x_{2N} \\
x_{31} & x_{32} & x_{33} & \cdots & x_{3N} \\
\vdots & \vdots & \vdots & & \vdots \\
x_{N1} & \cdots & & \cdots & x_{NN}
\end{bmatrix}}_{X}
\underbrace{\begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ \vdots \\ w_N \end{bmatrix}}_{w}
=
\underbrace{\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ \vdots \\ y_N \end{bmatrix}}_{y}
$$

If X has an "inverse matrix", then

$$
\begin{aligned}
Xw &= y \\
X^{-1}Xw &= X^{-1}y \\
Iw &= X^{-1}y \\
\boxed{w} &\boxed{= X^{-1}y}
\end{aligned}
$$

↳ we could find the "weight" easily!

↳ Let's practice with real data (python)

↳ check on the Jupyter notebook.