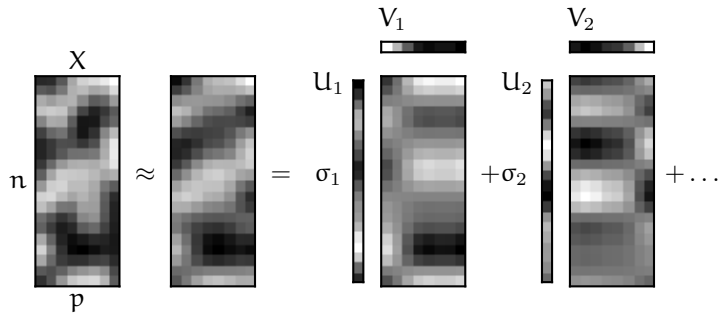


# PCA

The diagram illustrates the first step of PCA. It shows a data matrix  $X$  of size  $n \times p$  (vertical rectangle) being approximated ( $\approx$ ) by a matrix of size  $n \times 1$  (vertical rectangle). This approximation is shown as an equality ( $=$ ) to the product of the first singular value  $\sigma_1$  (scalar) and the first right singular vector  $V_1$  (vertical rectangle). The first left singular vector  $u_1$  (vertical rectangle) is also shown, along with the first singular value  $\sigma_1$  (vertical rectangle). The approximation is followed by a plus sign and an ellipsis ( $+\dots$ ), indicating that more components are needed for a better approximation.

$$\begin{matrix} n \\ \end{matrix} \begin{matrix} X \\ \end{matrix} \begin{matrix} p \\ \end{matrix} \approx \begin{matrix} \end{matrix} = \begin{matrix} u_1 \\ \end{matrix} \begin{matrix} \sigma_1 \\ \end{matrix} \begin{matrix} V_1 \\ \end{matrix} + \dots$$

# PCA



# PCA

