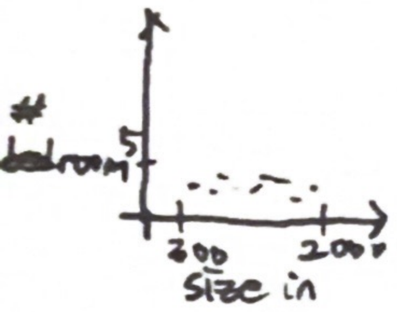
< Method of feature scaling >

① Divide feature by maximum of it's range



$300 \le x_1 \le 2000$ (max)

$x_1 \text{ scaled} = \frac{x_1}{2000}$

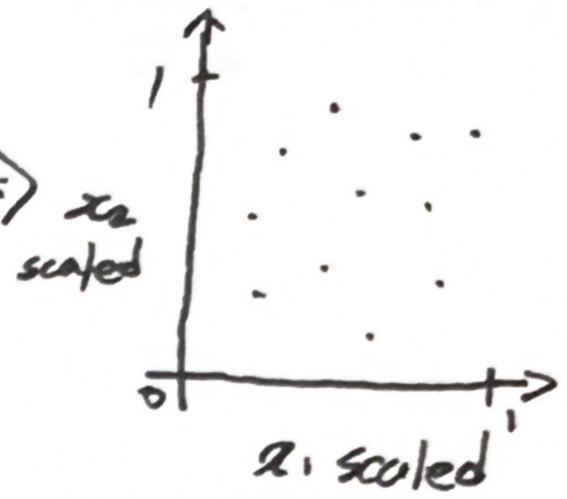
$\therefore 0.15 \le x_1 \text{ scaled} \le 1$

$0 \le x_2 \le 5$

$x_2 \text{ scaled} = \frac{x_2}{5}$

$\therefore 0 \le x_2 \text{ scaled} \le 1$

$\Rightarrow$



② Mean normalization

- μ_1 (mu) = average value of x_1 ex) $\mu_1 = 600$
- μ_2 = average value of x_2 ex) $\mu_2 = 2.3$

i) $300 \le x_1 \le 2000$

$$x_1 = \frac{x_1 - \mu_1}{\max - \min} = \frac{x_1 - \mu_1}{2000 - 300}$$

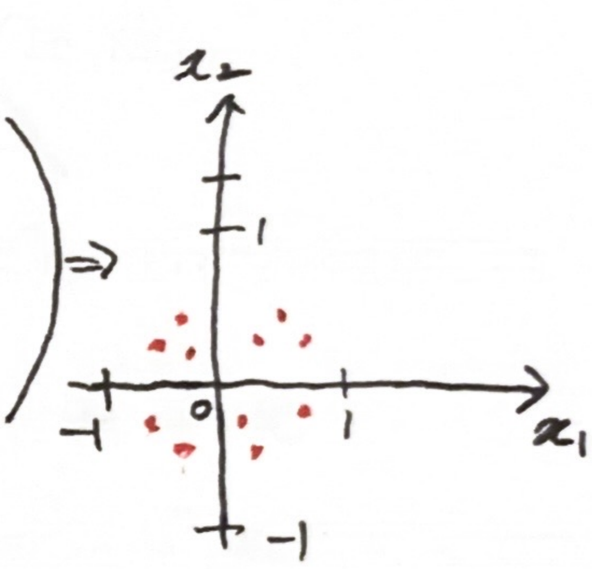
$\therefore -0.18 \le x_1 \le 0.82$

ii) $0 \le x_2 \le 5$

$$x_2 = \frac{x_2 - \mu_2}{\max - \min} = \frac{x_2 - \mu_2}{5 - 0}$$

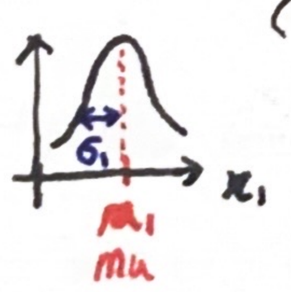
$\therefore -0.46 \le x_2 \le 0.54$

$\Rightarrow$



③ Z-score normalization

- standard deviation σ (표준편차)



ex) $\sigma_1 = 450$, $\mu_1 = 600$

$\sigma_2 = 1.4$, $\mu_2 = 2.3$

i) $300 \le x_1 \le 2000$

$$x_1 = \frac{x_1 - \mu_1}{\sigma_1} = \frac{x_1 - 600}{450}$$

$\therefore -0.67 \le x_1 \le 3.1$

ii) $0 \le x_2 \le 5$

$$x_2 = \frac{x_2 - \mu_2}{\sigma_2} = \frac{x_2 - 2.3}{1.4}$$

$\therefore -1.6 \le x_2 \le 1.9$

$\Rightarrow$