Simple Classification; Iris Flower
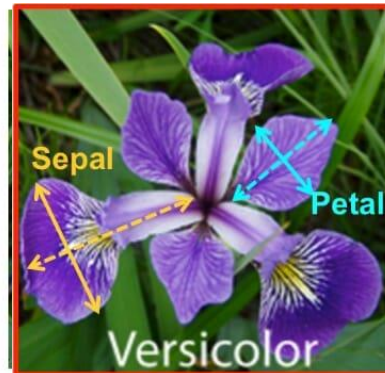
- Can you specify $\mathbf{x}_i$ and y_i?

Recall that We Learned ..

- Supervised vs. Unsupervised
- Classification vs. Regression

$$x \longrightarrow \boxed{\textbf{Decision Model}} \longrightarrow y$$
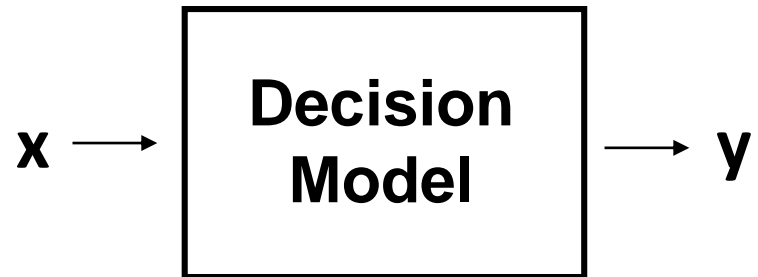
In Supervised Learning,

- The operations are performed in two phases

Training

x ⟶ **Decision Model** ⟶ y

Update This!

With what? **Training Set (x, y)**

Prediction

x ⟶ **Decision Model** ⟶ y

Already Trained (Rather fixed)

Obtain our goal through Trained Model
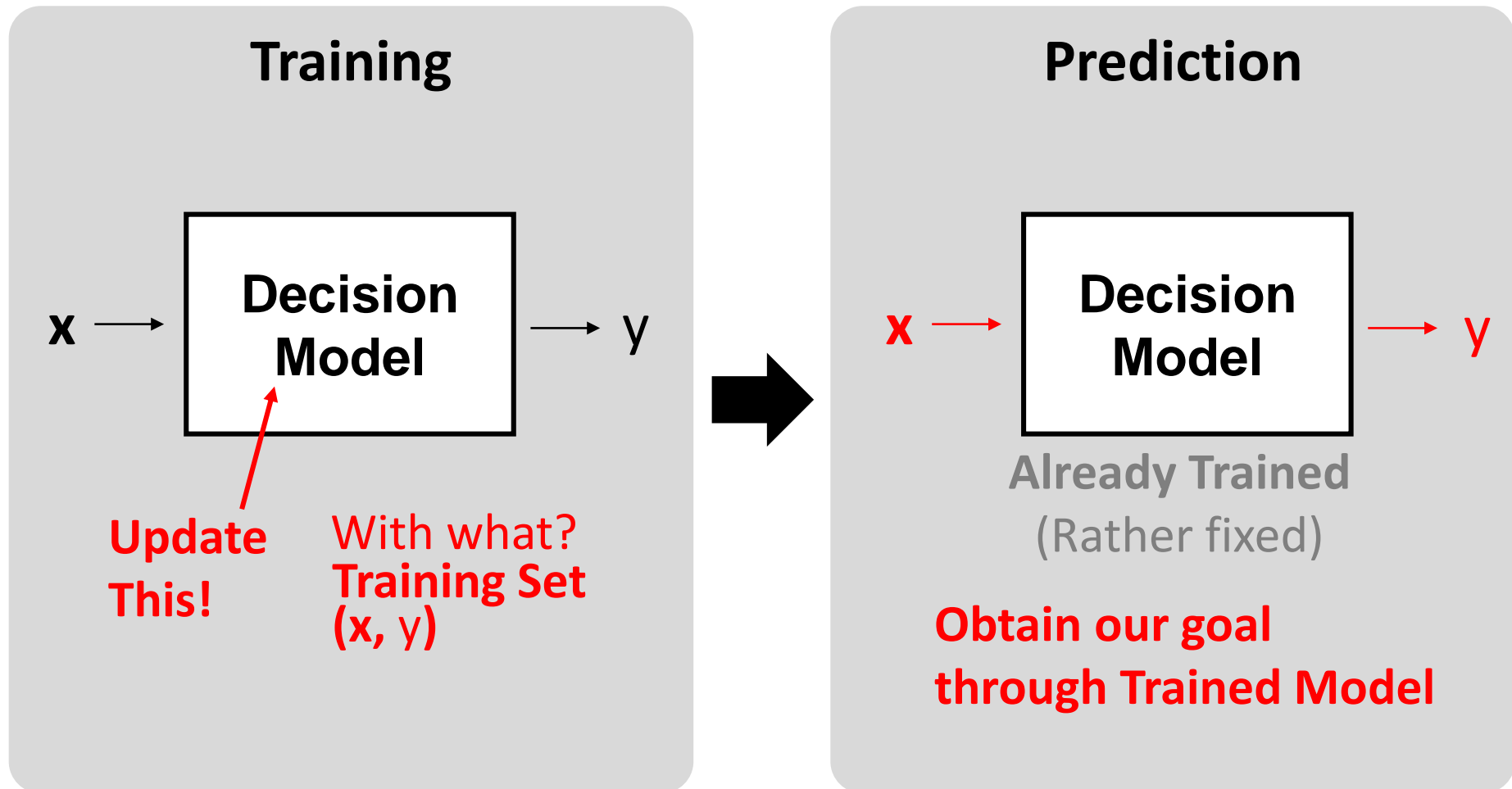
When We Use MAP for Classification

$$x \longrightarrow \boxed{\textbf{Decision Model} \quad \boxed{\begin{array}{l}\text{Comparing} \\ P(y=c_i/x) \text{ for} \\ i = 1,2,3 \ldots\end{array}}} \longrightarrow y = c^*$$
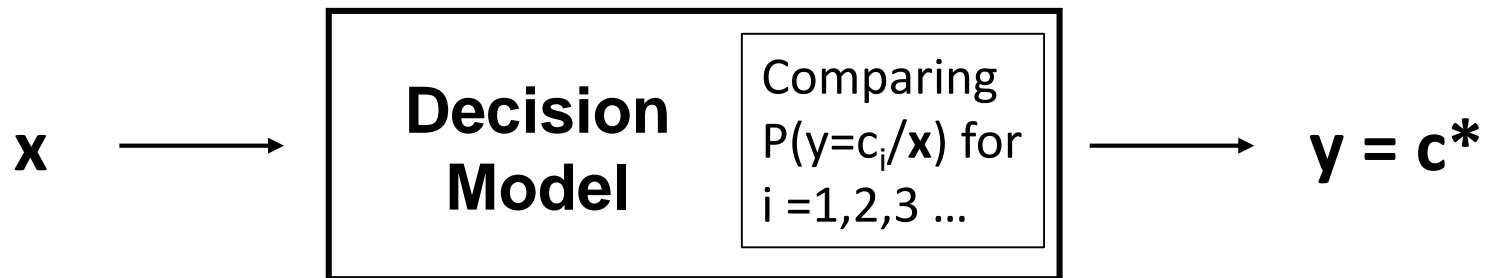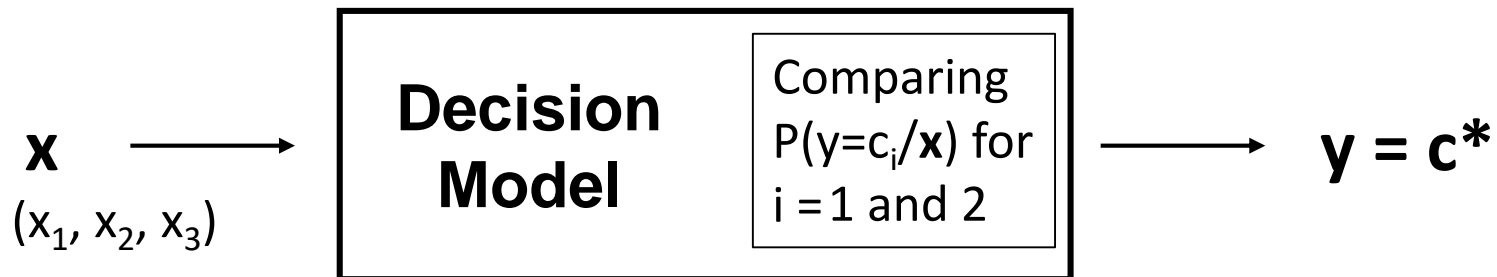
- It will apply similarly to regression (PMF vs. PDF)
- **You remember what you will learn in this course?**
  - How can you establish model?
  - ➔Like the mathematical expression of $P(c_i/x)$
  - ➔More specifically or easily, parameter in the given mathematical expression format.

Example

- Simplified case

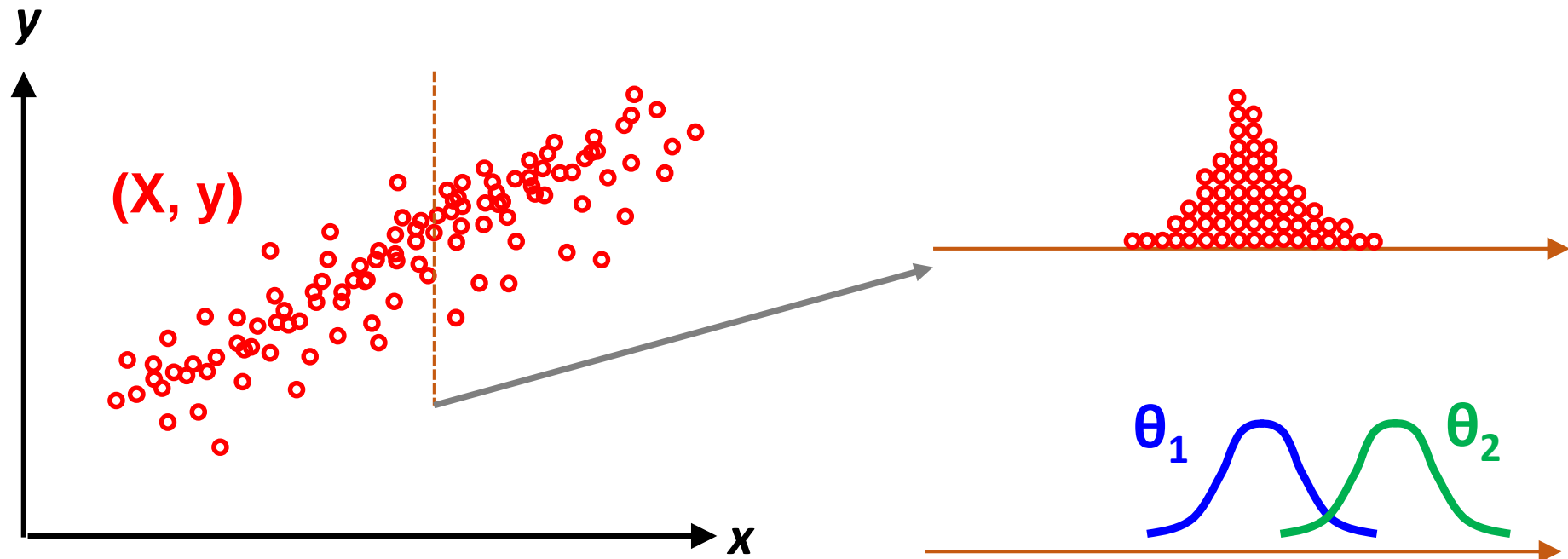$$P(y=c_1/(x_1, x_2, x_3)) = 0.3(x_1^2 + 3x_2 + \log_5 x_3)$$

$$P(y=c_2/(x_1, x_2, x_3)) = 1 - 0.3x_1^2 - 0.9x_2 - 0.3\log_5 x_3$$

You see θ in the determined model?

To determine them is your job

Meaning of p(D/θ)?

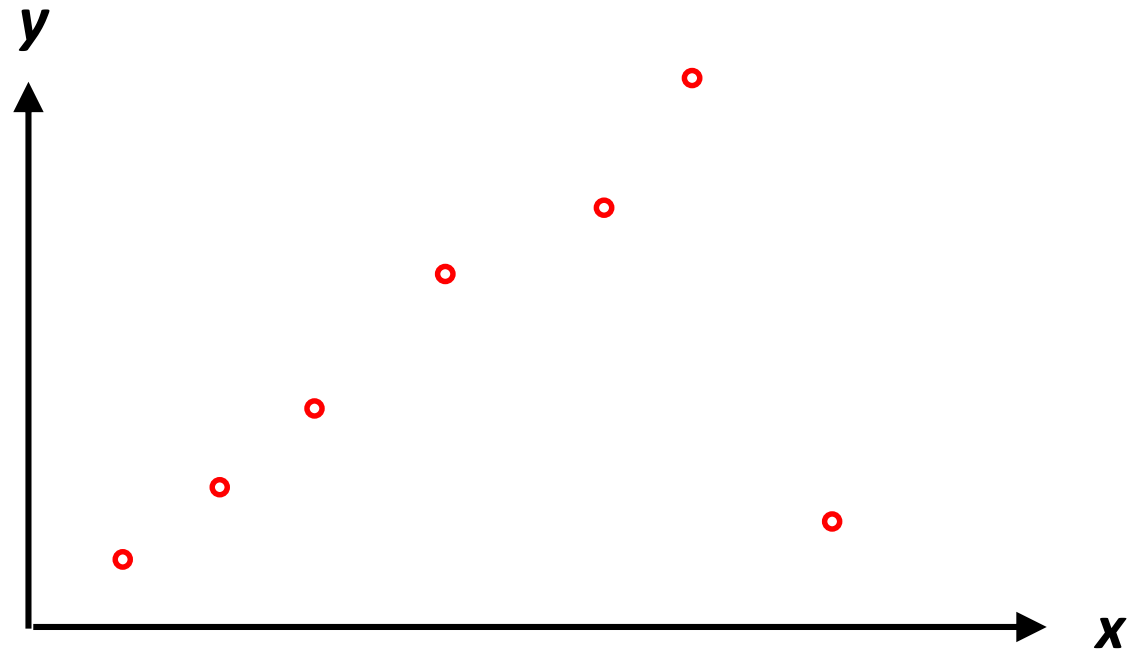$$p(y|\mathbf{x}, \boldsymbol{\theta}) = \mathcal{N}(y|\mathbf{w}^T\mathbf{x}, \sigma^2)$$

➔ **Can you compare p(D/θ$_1$) and p(D/θ$_2$)?**
Note that probability is probability $\propto$ PDF

➔ **Can you relate this with Number Game case? Occam's razor?**

Overfitting Issue

Solution for Overfitting
MAP vs. MLE w/ Abundant Data