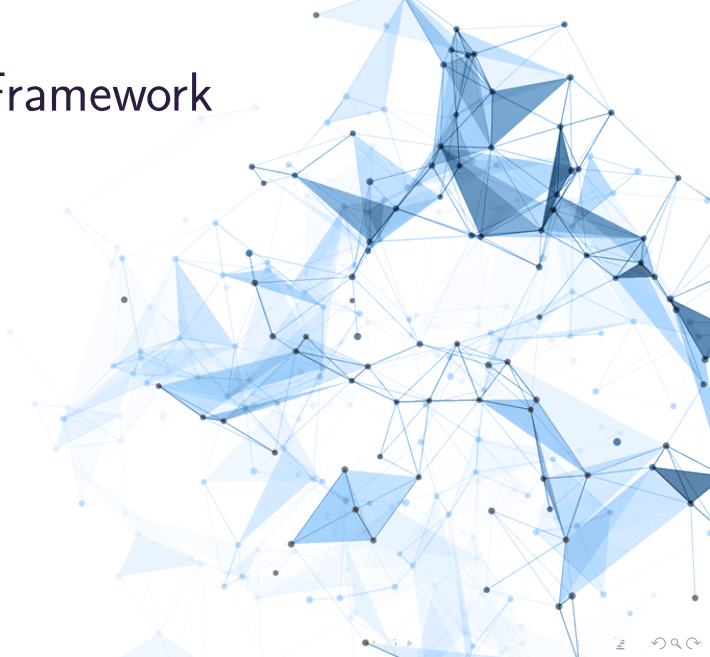


Supervised Learning Framework



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Supervised Learning Framework

| | Regression | Classification |
|------------------------|---|---|
| Dataset: | $\mathcal{D} = \{(x_i, y_i)\}_{i=1}^N, (x_i, y_i) \in \mathcal{X} \times \mathcal{Y}$ | |
| | $\mathcal{Y} = \mathbb{R}^d$ | \mathcal{Y} is a finite set. |
| Model: | $y = f_{\theta}(x) + \varepsilon$ | |
| | $f_{\theta}(x) (\approx \mathbb{E}[y x])$ | $f_{\theta}(x) (\approx \mathbb{P}[y x])$ |
| Empirical Loss: | $L(\theta \mathcal{D}) \rightarrow \text{Minimize}$ | |
| | (e.g. MSE) | (e.g. Cross entropy) |
| Optimization: | $\theta^* = \arg \min_{\theta} (L(\theta \mathcal{D}))$ | |
| Prediction: | $\hat{y}_* = f_{\theta^*}(x_*)$ | $\hat{y}_* = \arg \max_{i \in \mathcal{Y}} f_{\theta^*}^i(x_*)$ |
| Validation: | Compute the test metrics | |
| | e.g. MSE . | e.g. Accuracy . |

Table: Summary of the framework of regression and classification. The difference between them is highlighted in **blue**.



Thanks for your attention!