Meta Learning

Meta-learning is **learning** to learn; the process of *improving* a learning algorithm over multiple learning episodes/tasks.

Improve How?

- Generalization performance
  - Avoid overfitting
- Learning speed
- Adaptability
  - Adapt to new tasks with minimal data or tuning

Learn What?

- Hyper Parameters / Neural Architecture
- Initial Condition
- Optimizer
  - SGD/Adam? Step size?
- Loss Function
- Minibatch Selection

Formalizing Meta-Learning

$$\min_{\omega} \mathbb{E}_{\mathcal{T} \sim p(\mathcal{T})} \mathscr{L}\text{meta}(D_{\mathcal{T}}, \omega)$$