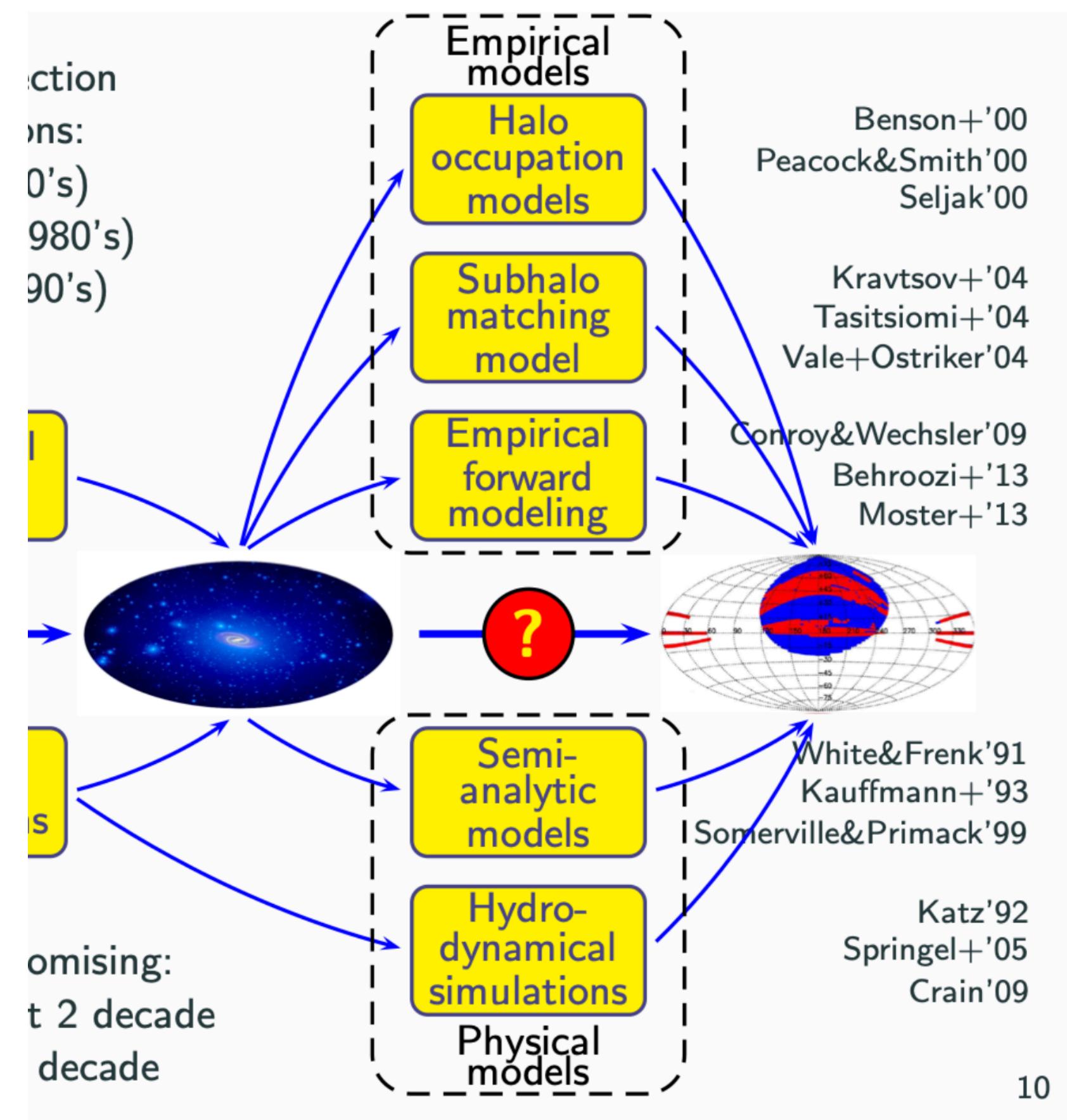


A glance at few-shot learning

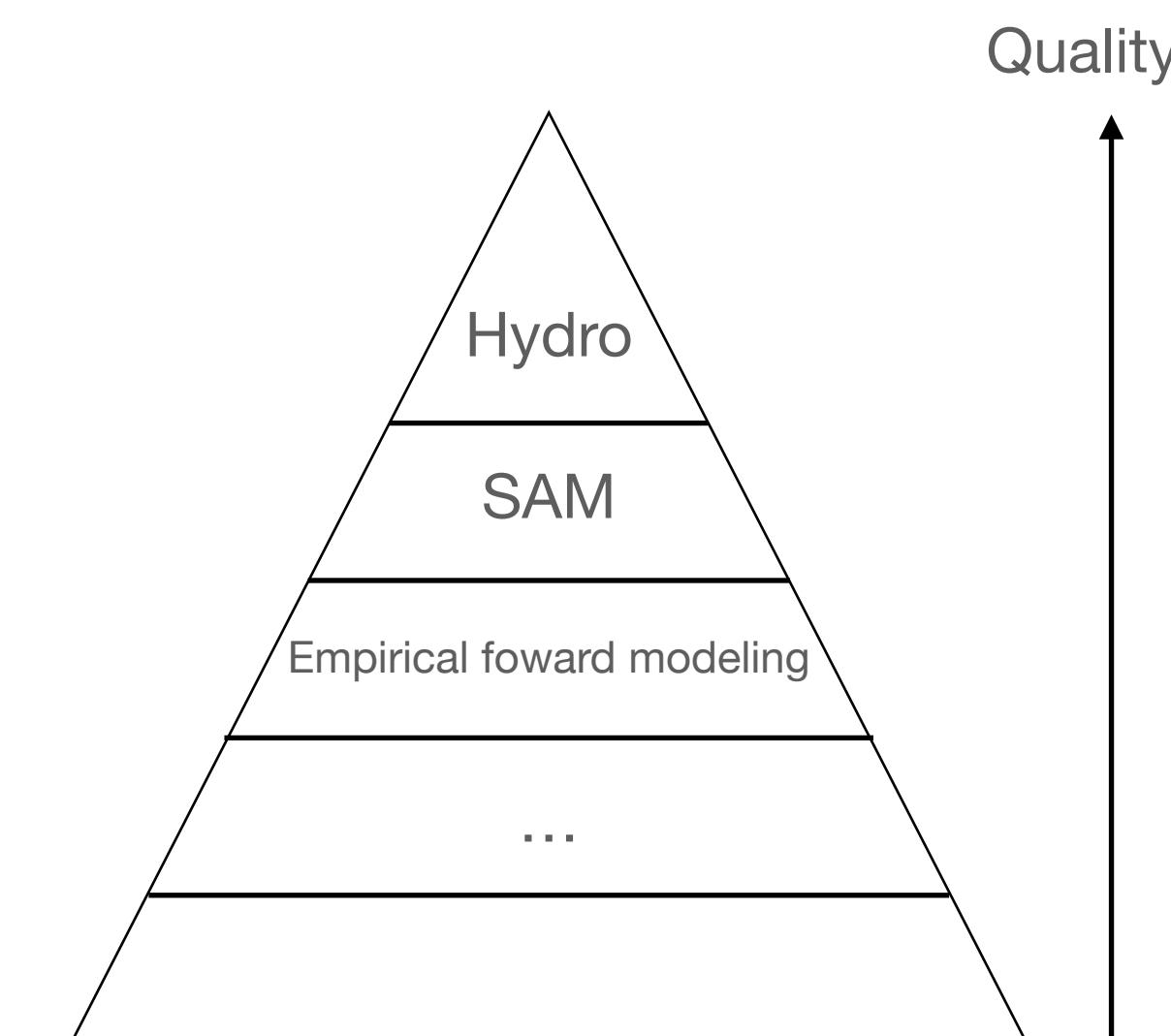
Diao Kangning April 4th 2023@ML session

Data pyramid

Different models from DM to gal



The amount of data

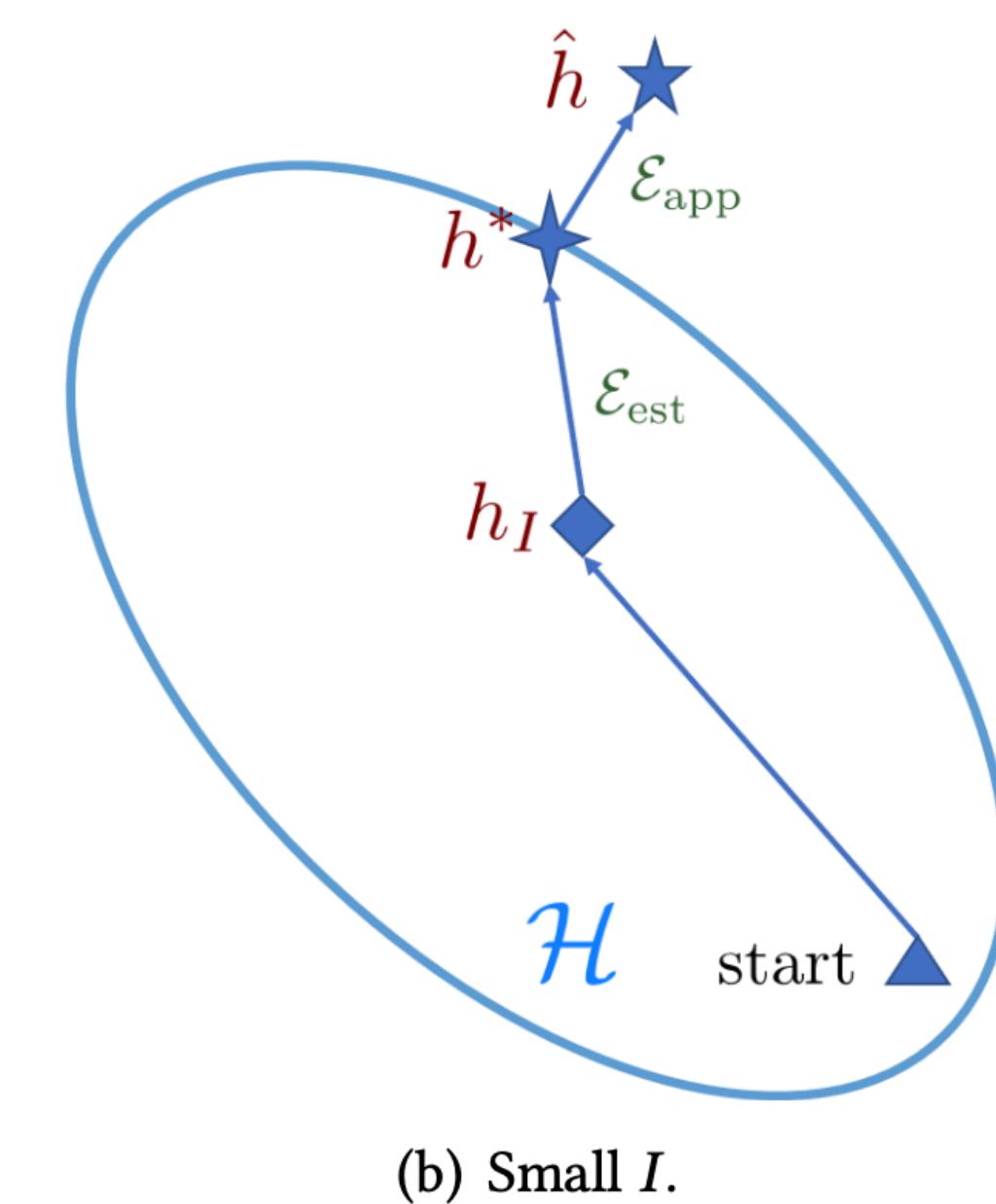
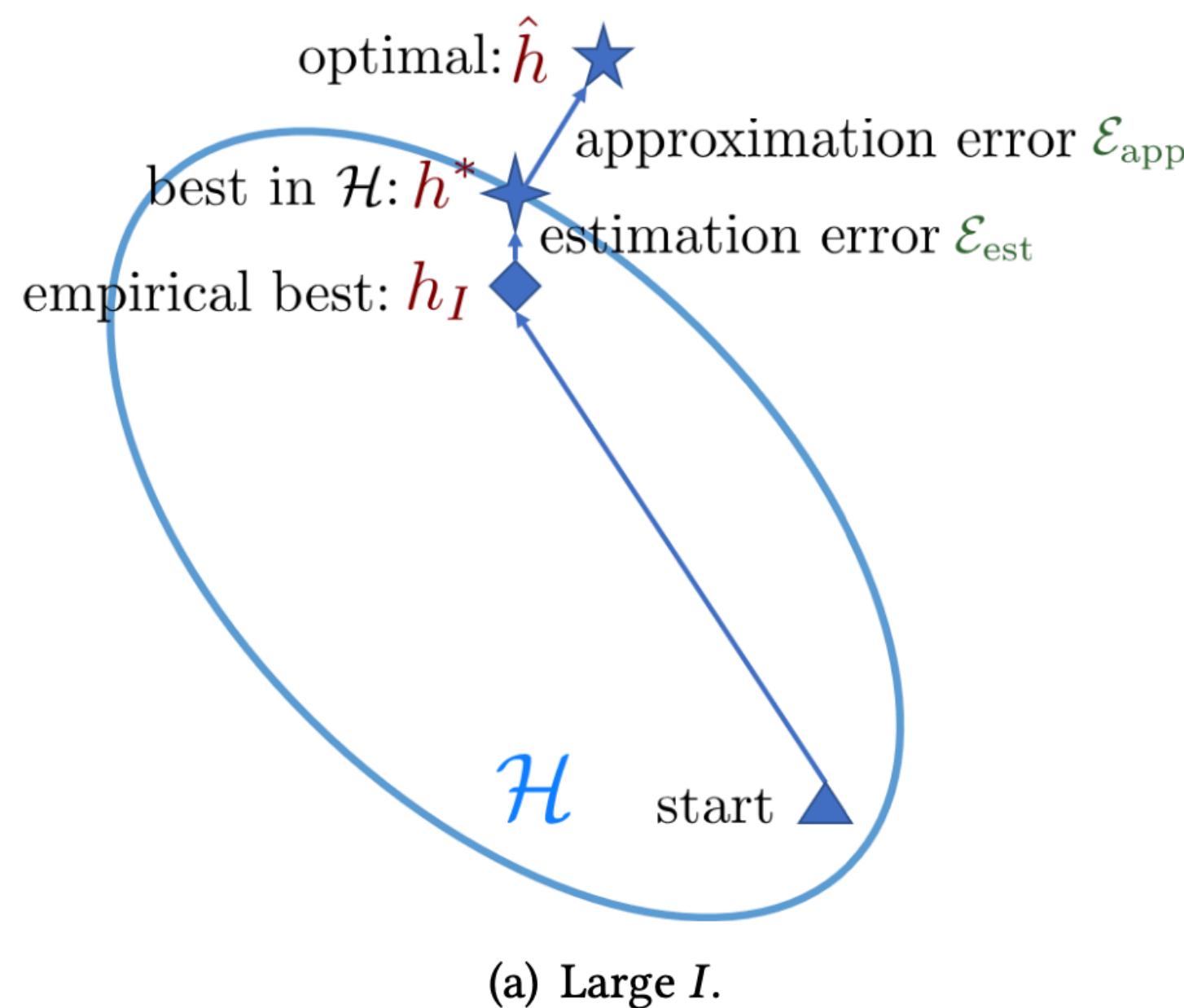


In ML, how to use insufficient data properly?

The problem

- Small dataset result in the problem of overfitting

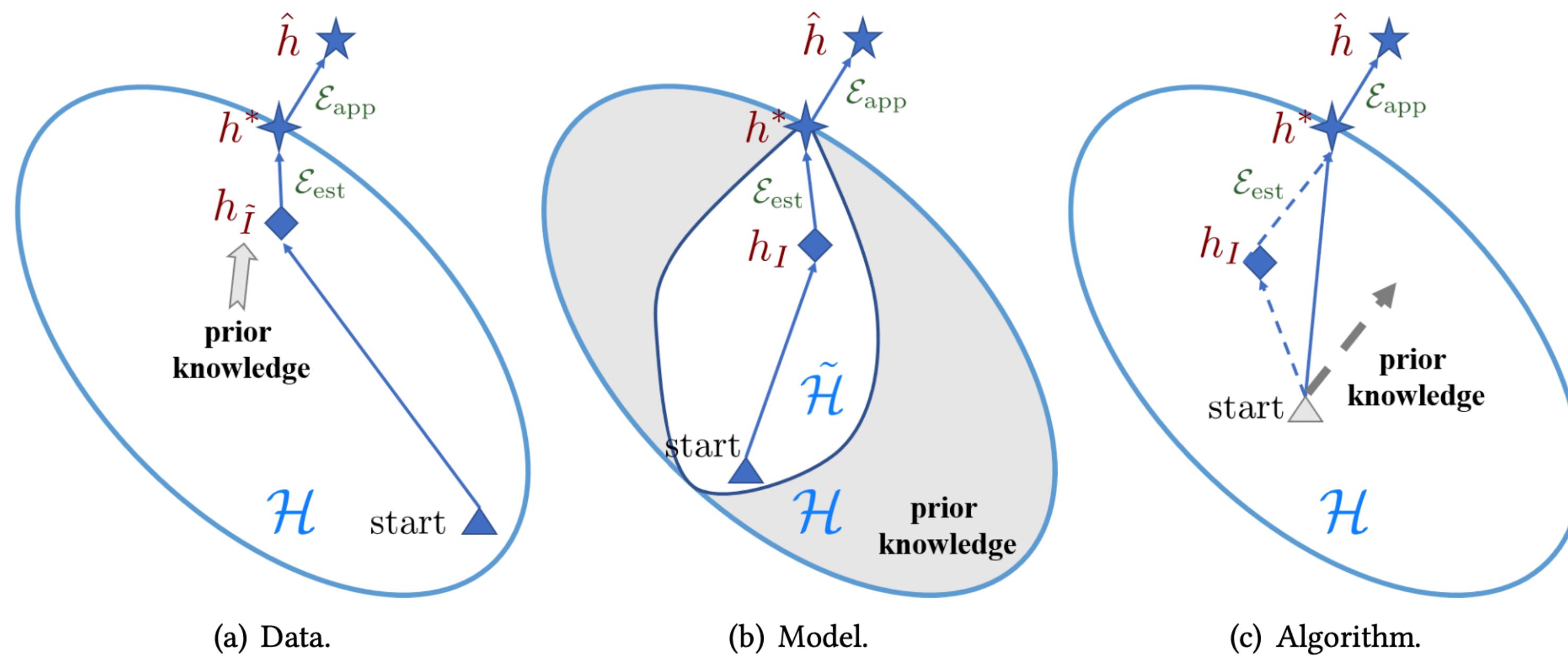
- \mathcal{H} : model space
- h : some model
- I : dataset



Wang et al. 2019

Possible solutions

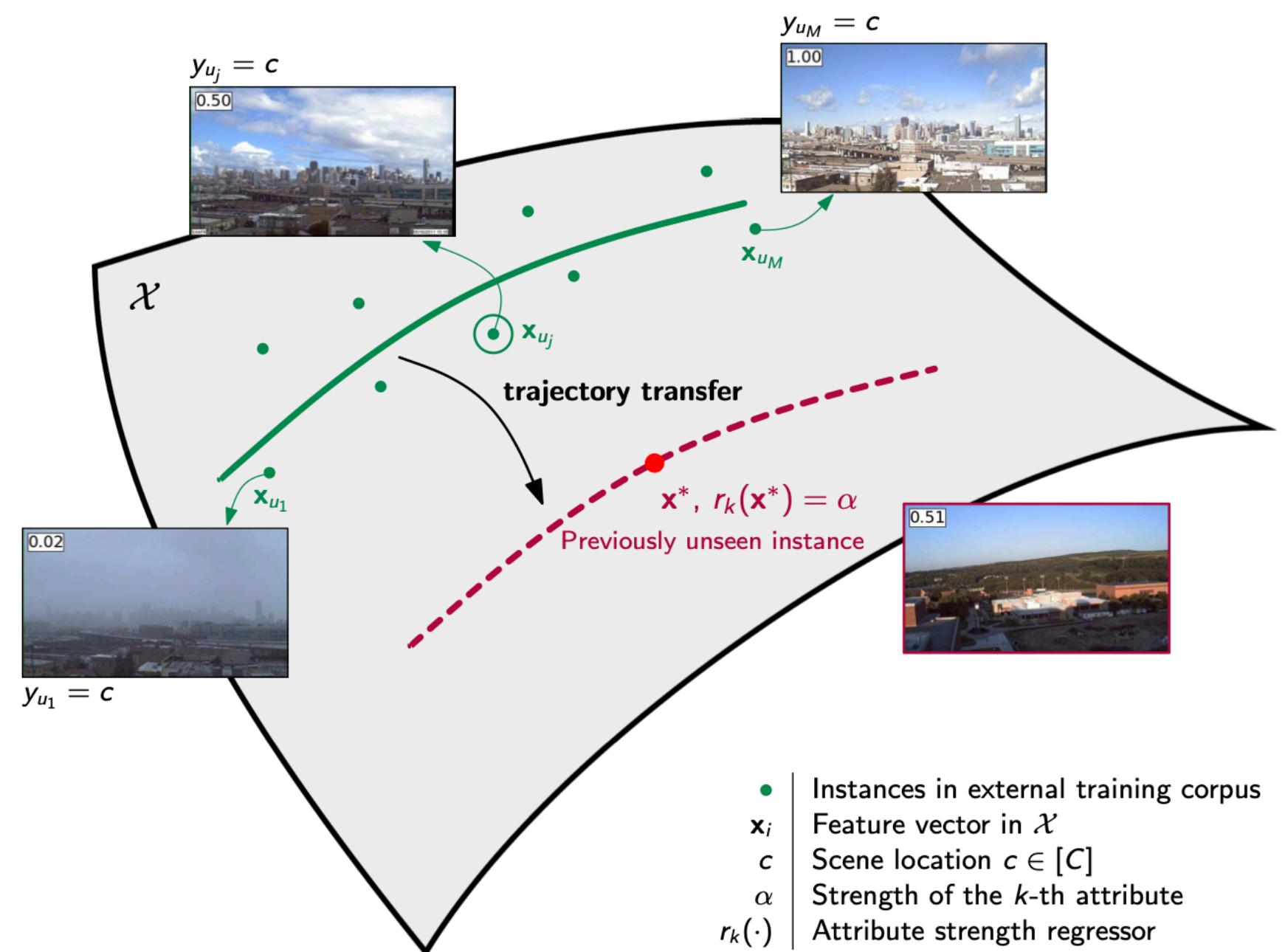
- Core idea: use **prior knowledge** properly.



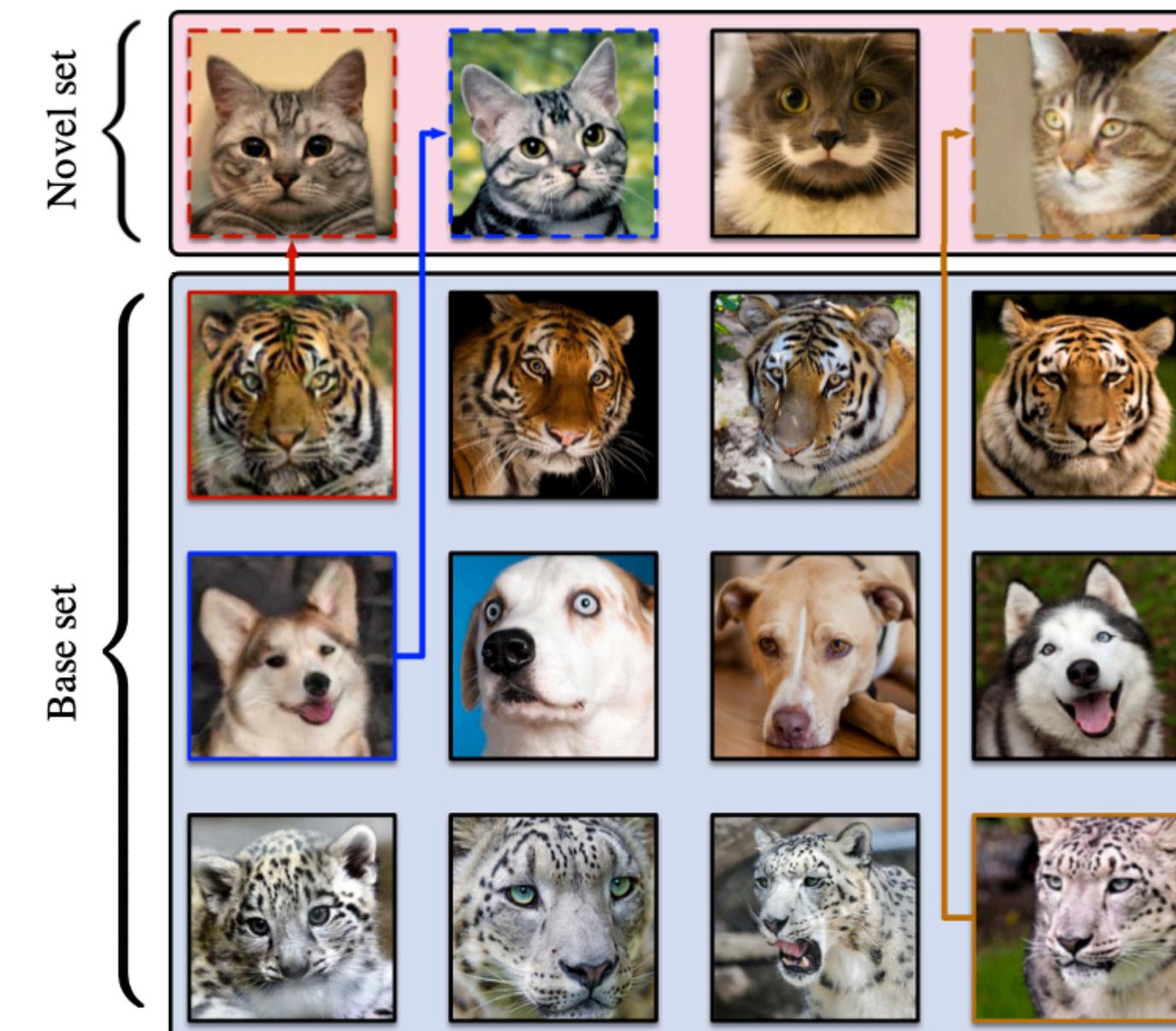
Data

- Augmentation beyond simple manipulation

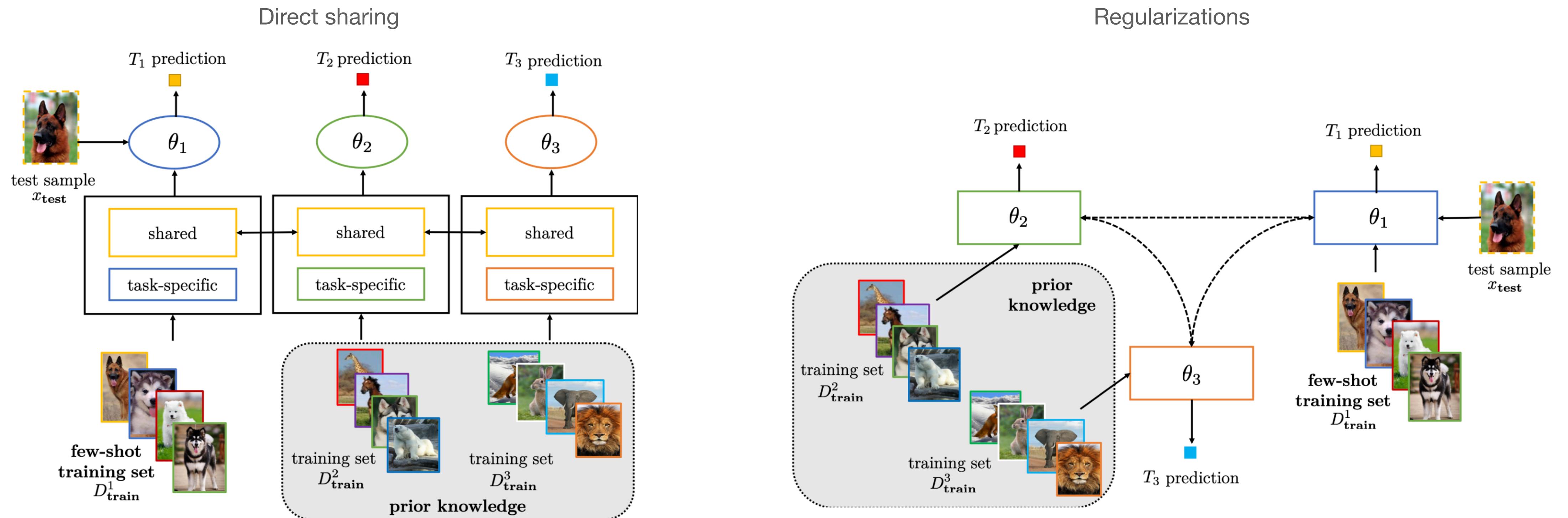
Feature regression and transferring



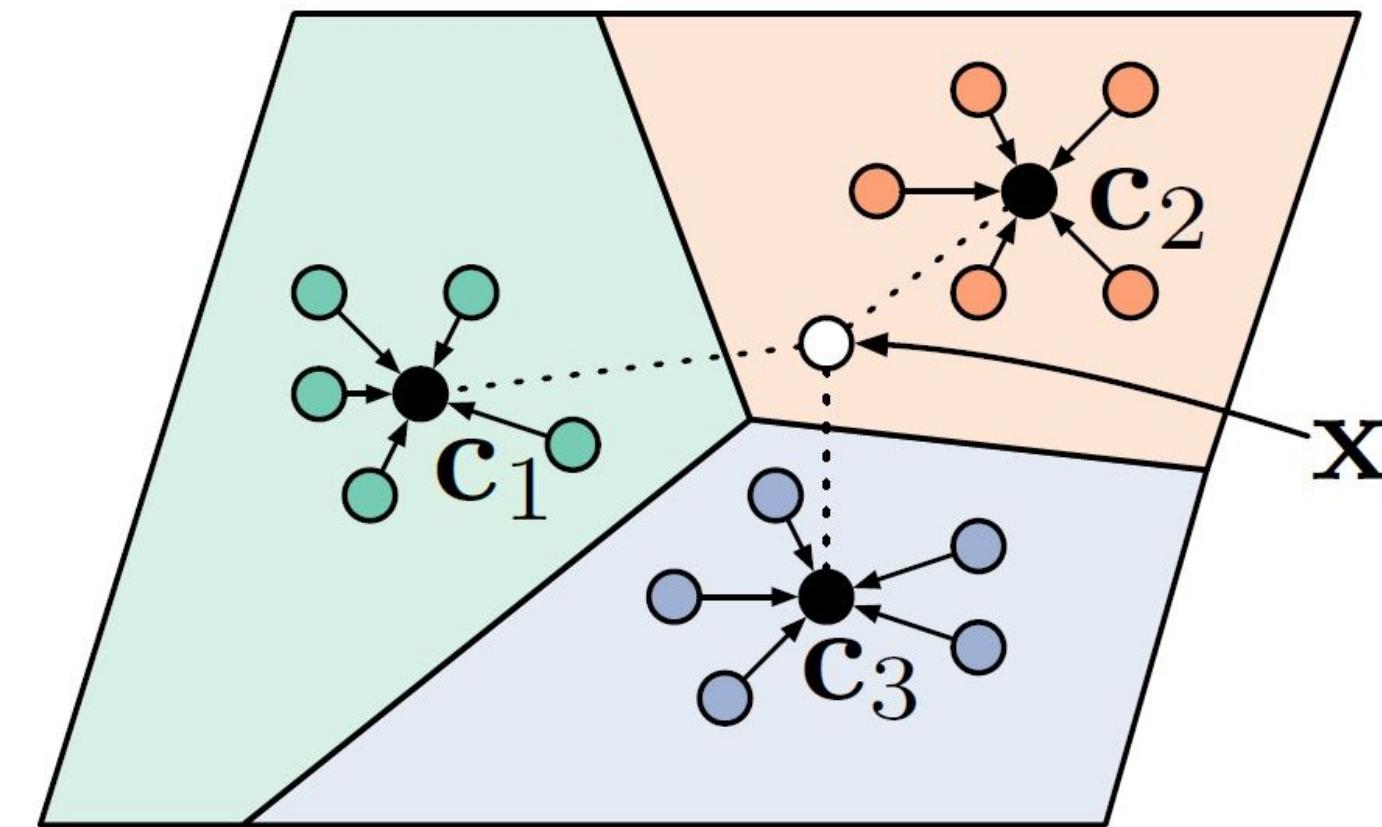
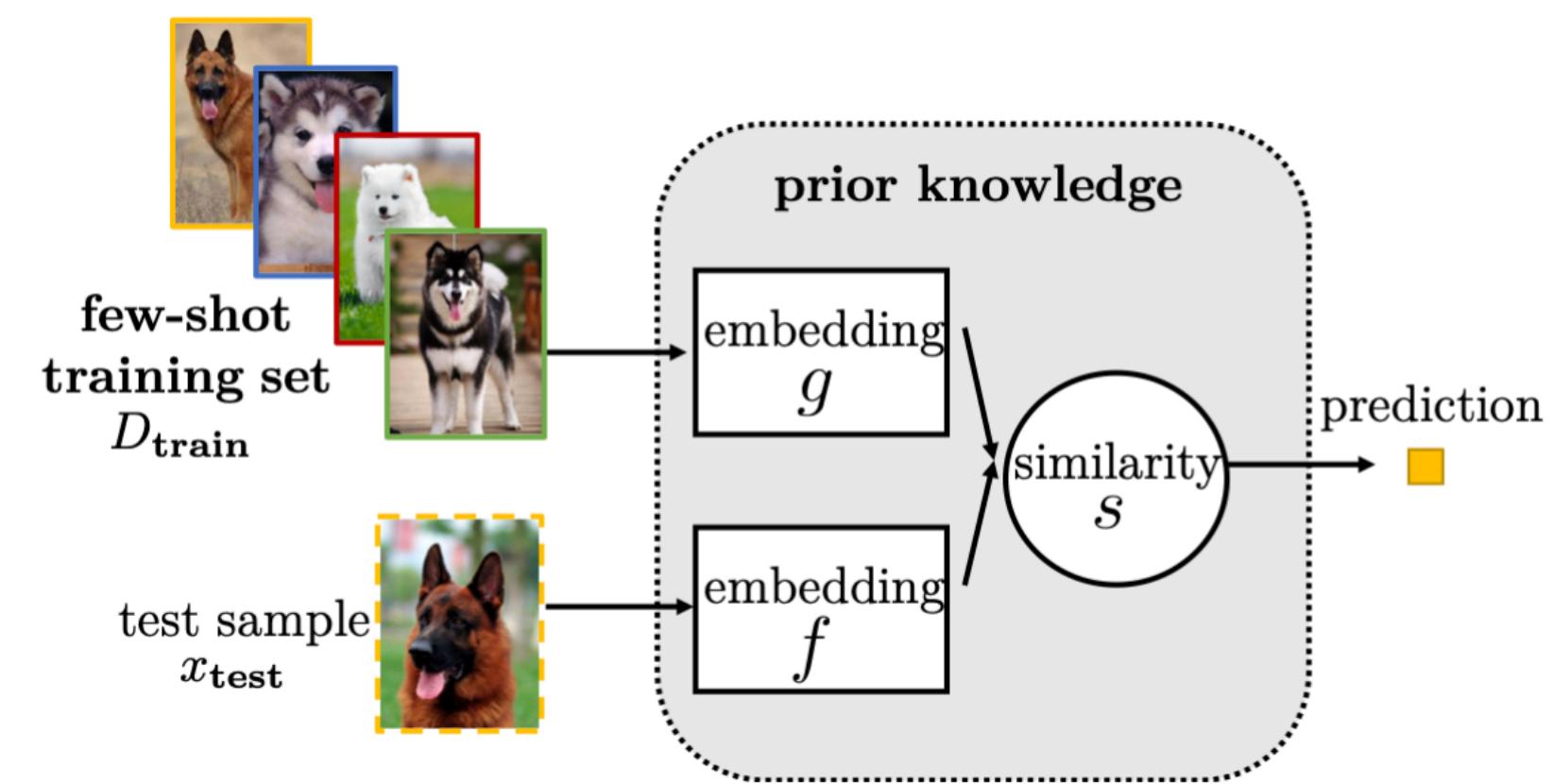
GAN transformation



Model: Parameters

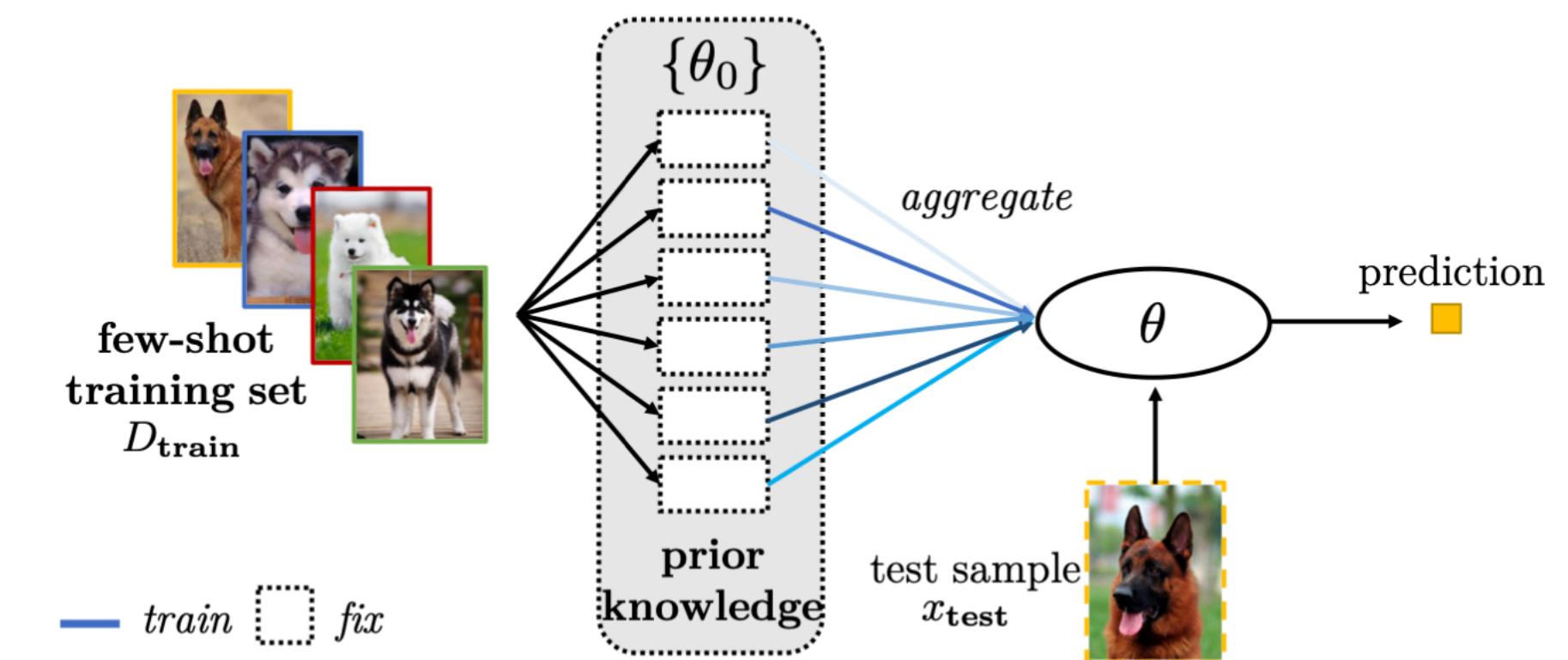
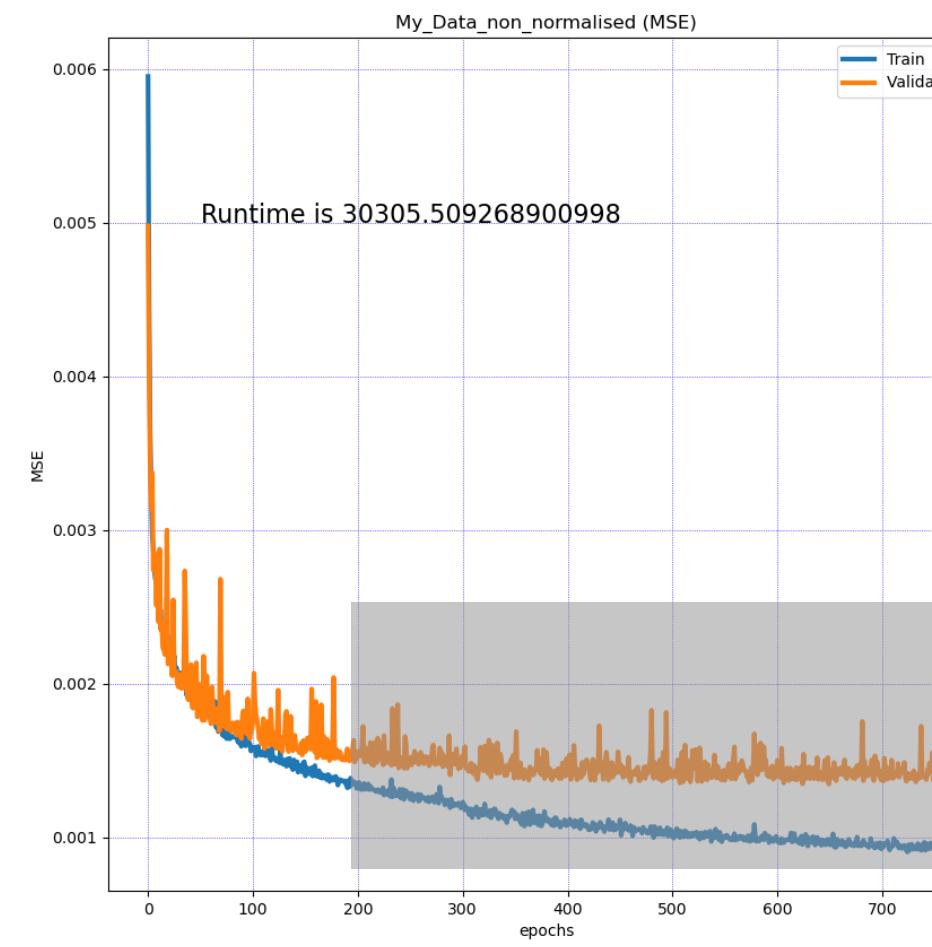


Model: Embedding



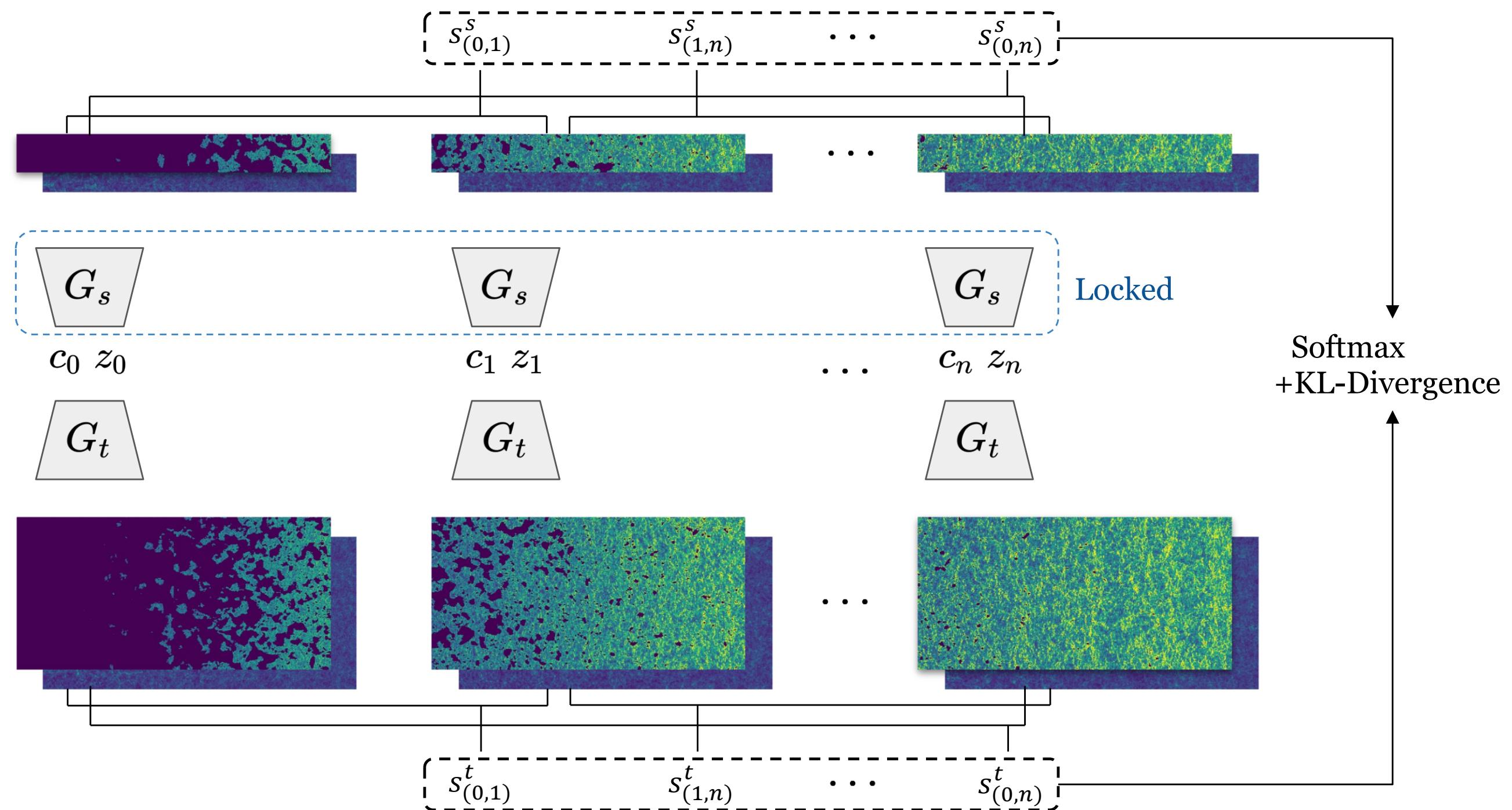
Algorithms: Fine-tuning

- Early stopping
- Direct sharing
- Aggregating other models



Algorithms: Fine-tuning

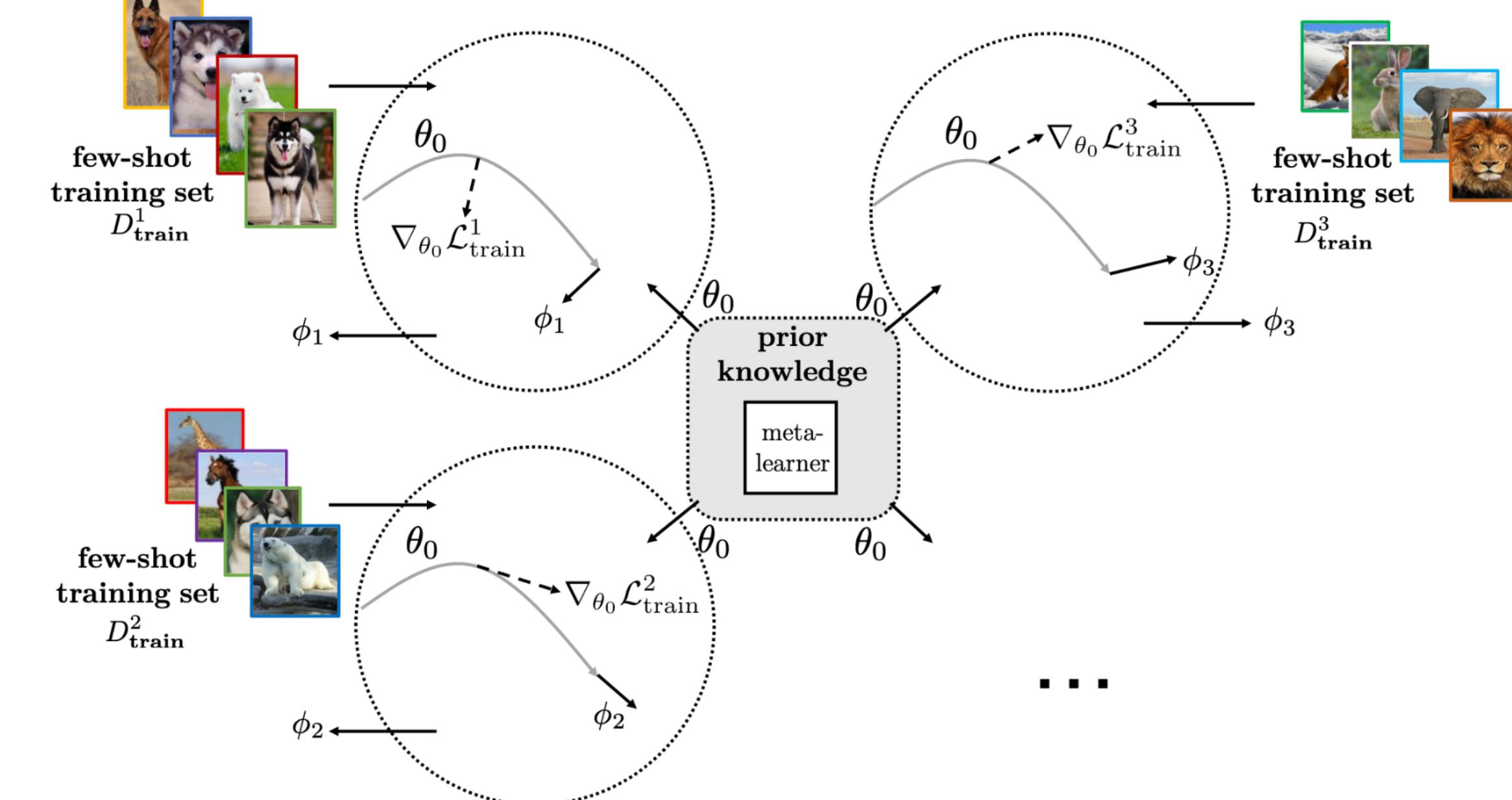
- Regularizations



Algorithms: Meta-learning

Example: MAML

- Core idea: learn a parameter θ_0 , which is a very good initialization
- Method: bootstrapping some tasks, learn several steps, then update the initial position



Summary

- The core of few-shot learning is getting help from prior knowledge
- With limited data, we can only learn less
- Knowing what we want might help (e.g. in regularizations)