



IDALAB

EFFICIENT DATA ANALYSIS SOLUTIONS



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FOR AIRPLANE

Function approximation (FA):

- Parametric – compact approximation of a function using a parametrised representation $f(x) \approx \hat{f}(x, \bar{\theta})$, where $\bar{\theta}$ are parameters to be adapted:

→ Fixed representational power

Constant computational complexity - fixed set of parameters

Example: Artificial neural networks (ANNs), linear approximations.

• Non-parametric-memory based:

$$\bullet \quad f(x) \approx \hat{f}(x, \mathcal{D}) = \sum_{x' \in \mathcal{D}} k(x, x') g(x')$$

• *Not fixed representation at power*

Parameters are not learned directly

★Computationally complexity grows with data

• Example: Gaussian processes, Kernel-based methods,...





POMDP



Value

Policy



MDP



state



Data



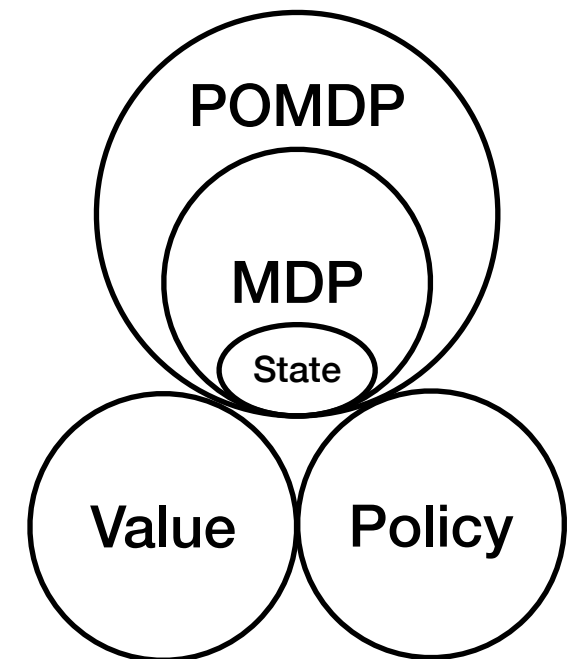
Kernel



Weight

Function approximation (FA):

- Parametric - compact approximation of a function using a parametrised representation $f(x) \approx \hat{f}(x, \bar{\theta})$, where $\bar{\theta}$ are parameters to be adapted:
 - ➔ Fixed representational power
 - ➔ Constant computationally complexity - fixed set of parameters
 - ➔ Example: Artificial neural networks (ANNs), linear approximations...
- Non-parametric - memory based:
 - $f(x) \approx \hat{f}(x, \mathcal{D}) = \sum_{x' \in \mathcal{D}} \underbrace{k(x, x')}_{\text{Kernel}} \underbrace{g(x')}_{\text{Weight}}$
 - ➔ No fixed representational power
 - ➔ Parameters are not learned directly
 - ➔ Computationally complexity grows with data
 - ➔ Example: Gaussian processes, Kernel-based methods,...



Key points

- GP-MPC - why?
 - ➔ Extremely sample efficient
 - ➔ Can handle constraints
 - ➔ GP is non-parametric → computational intense
 - ➔ Only model is stored
- Dyna - why?
 - ➔ Fast and more flexible
 - ➔ Can handle more complicated problems
 - ➔ MBPO has some guarantees
- Meta-RL - why?
 - ➔ Need an approximative model
 - ➔ Can be used in POMDPs
 - ➔ MFRL with some guarantees
 - ➔ Robustness in general
 - ➔ Exploration...