Meta Reinforcement Learning

The Big Picture

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Can We Generalize beyond a given MDP?

- What happens if the environment changes? (non-stationary environments)
  - Can we efficiently adapt our policy to changed transitions or reward functions?
- After a human player learned how to play Super Mario Bros in the first levels, they will also play fairly well the upcoming levels.
- However, an RL agent potentially will fail.

$\rightsquigarrow$ Strong limitations regarding the applications of a trained agent

Main Ideas

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2. Can we train a policy that is easily adaptable to new environments?
3. Can we find better training dynamics across a set of environments?
4. Can we train a policy that generalizes to new environments without any new training?

- Assumption: We sample our environments i.i.d. from a fixed distribution
  - Similar to the assumption in supervised learning, but on a meta-level
  - Training environments to train our agent on and test environments to check how well it performs.
  - We might have control how we sample from this distribution; we might don't.