

# Curriculum Reinforcement Learning

## Goal Generation<sup>a</sup>

Marius Lindauer



Winter Term 2021

---

<sup>a</sup>Based on a blog by Lilian Weng

# Automatic Goal Generation

- ▶ Let's assume that the task itself is fixed but the goal condition is flexible
  - ▶ For example, the goal position can change
  - ▶ That is, we define a set of states  $S^g$  that represent the goal

# Automatic Goal Generation

- ▶ Let's assume that the task itself is fixed but the goal condition is flexible
  - ▶ For example, the goal position can change
  - ▶ That is, we define a set of states  $S^g$  that represent the goal
- ▶ **Idea:** Generate the set of goals adaptively based on the learning needs of the agent

## Example: GoalGAN [Florensa et al. 2017]

- ▶ Select which goals are of a currently appropriate difficulty
- ▶ Train a GAN to generate instances with that difficulty
- ▶ Train agent on those instances to improve
- ▶ You can see the results & generated images **here**

## Example: GoalGAN [Florensa et al. 2017]

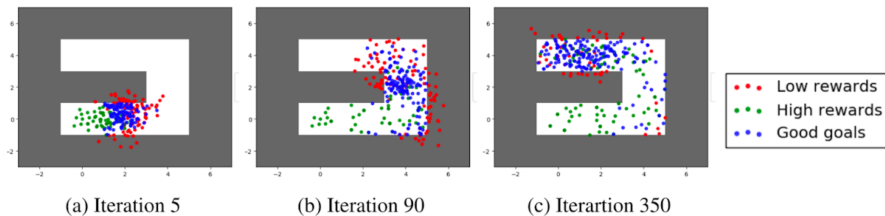


Figure: Example training progress

## Related Approaches

- ▶ The generator can be refined by including more criteria for goal generation like goal validity, feasibility and coverage [Racanière et al., 2020]
- ▶ The brute force variation: POET [Wang et al., 2019] & enhanced POET [Wang et al., 2019]
- ▶ Hindsight Experience Replay [Andrychowicz et al., 2017] variations generate intermediate goals to reach to final state