Robust Learning from Observation with Model Misspecification

Anonymous Author(s)
Affiliation
Address
email

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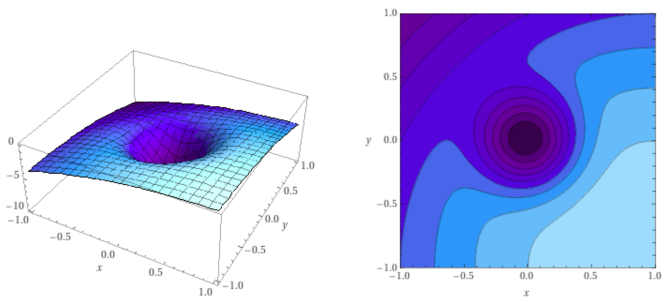
Dear reviewer,

here we present the results on our additional experiments evaluating the effectiveness of robust GAILFO for perturbations different than the ones induced by a friction or mass change in MuJoCo.

1 The environment



(a) Expert $\epsilon = 0.0$ (b) Expert $\epsilon = 0.05$

Figure 1: Schematics of the continuous gridworld environment

We consider a continuous gridworld, we denote the horizontal coordinate as x and vertical one as y. We enforce spatial constraints, i.e. $x \in [0, 1], y \in [0, 1]$.

The agent starts in coordinates $[0, 1]$ (the upper left corner) and the episode ends when the agent reaches the lower right region defined by the indicator function $\mathbf{1}\{x \in [0.95, 1], y \in [-1, -0.95]\}$.

The reward function is given by:

$$R(x, y) = -(x-1)^2 - (y+1)^2 - 80e^{-8(x^2+y^2)} + 10 \cdot \mathbf{1}\{x \in [0.95, 1], y \in [-1, -0.95]\} \quad (1)$$

In addition, the actions space for the agent is given by $\mathcal{A} = [-0.5, 0.5]^2$ and the transition dynamics are given by:

$$s_{t+1} = \begin{cases} s_t + \frac{a_t}{10} & \text{w.p.} \quad 1-\epsilon \\ s_t - \frac{s_t}{10||s_t||_2} & \text{w.p.} \quad \epsilon \end{cases} \quad (2)$$

The parameter ϵ can be varied to create a dynamic mismatch.

1.1 Experiments

We use three experts trained with $\epsilon = 0.0, \epsilon = 0.05$ and $\epsilon = 0.1$.

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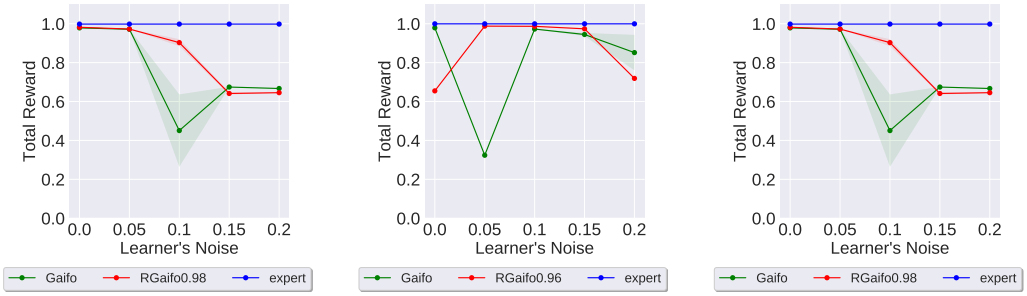
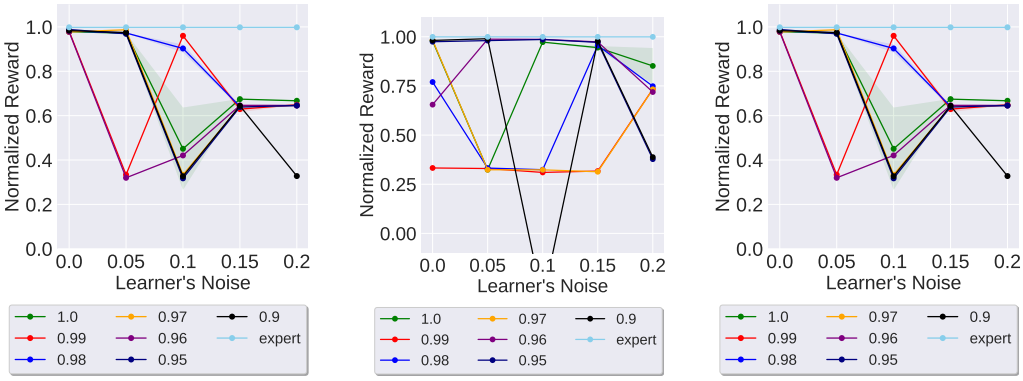


(a) Expert $\epsilon = 0.0$ (b) Expert $\epsilon = 0.05$ (c) Expert $\epsilon = 0.1$

Figure 2: Comparison between Gailfo and Robust GailFO for the best selected α



(a) Expert $\epsilon = 0.0$ (b) Expert $\epsilon = 0.05$ (c) Expert $\epsilon = 0.1$

Figure 3: Ablation study for α

The learners act in a different environment with the following values for ϵ: $0.0, 0.05, 0.1, 0.150.2$. In the following we report first the results of the comparison between GailFO and Robust GailFO with the best selected α and secondly the ablation study to assess the sensitivity to the parameter α.