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Corrigendum: Optimizing trajectories for highway driving with offline reinforcement learning

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KEYWORDS

reinforcement learning, trajectory optimization, autonomous driving, offline reinforcement learning, continuous control

A Corrigendum on
Optimizing trajectories for highway driving with offline reinforcement learning

by Mirchevska B, Werling M and Boedecker J (2023). Front. Future Transp. 4:1076439. doi: 10.3389/ffutr.2023.1076439

In the published article, there was an error. **Algorithm 2: $\boldsymbol{a_{lo}}$ should be** a_{lat_p}.

A correction has been made to **3 Approach**, *3.2 Decision making*. This sentence previously stated:

“$\pi_\theta(s) = (a_{tv}, a_{lat_d}, a_{lon_d}, a_{lo})$.”

The corrected sentence appears below:

“$\pi_\theta(s) = (a_{tv}, a_{lat_d}, a_{lon_d}, a_{lat_p})$.”

In the published article, there was an error. **Algorithm 2: $\boldsymbol{a_{lo}}$ should be** a_{lat_p}.

A correction has been made to **3 Approach**, *3.2 Decision making*. This sentence previously stated:

“$t = generate\_traj(s, a_{tv}, a_{lat_d}, a_{lon_d}, a_{lo})$.”

The corrected sentence appears below:

“$t = generate\_traj(s, a_{tv}, a_{lat_d}, a_{lon_d}, a_{lat_p})$.”

A correction has been made to **4 MDP Formalization**, *4.3 Reward*. This sentence previously stated:

“For the first objective, not causing collisions and remaining within the road boundaries, we define an indicator ind_f signaling when the agent has failed in the following way:”

The corrected sentence appears below:

“For the first objective, not causing collisions and remaining within the road boundaries, we define an indicator f signaling when the agent has failed in the following way:”

A correction has been made to **4 MDP Formalization**, *4.3 Reward*. This equation previously stated:

$$ind_f = \begin{cases} 1, & \text{if the agent has failed} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

The corrected equation appears below:

$$f = \begin{cases} 1, & \text{if the agent has failed} \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

A correction has been made to **4 MDP Formalization**, *4.3 Reward*. This equation previously stated:

$$ind_v = \begin{cases} 1, & v_{lon} < v_{des} \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

The corrected equation appears below:

$$v_s = \begin{cases} 1, & v_{lon} < v_{des} \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

A correction has been made to **4 MDP formalization**, *4.3 Reward*. This equation previously stated:

$$\begin{aligned} r(s,a) = {} & ind_f(-0.5) + \left(1 - ind_f\right)\left[ind_v\left(1 - \delta_v/v_{des}\right) + \left(1 - ind_v\right)\right. \\ & + ind_{jlon}\left(pj_{lon}\left(sqj_{lon}(a)/j_{lon}^{max}\right)\right) + \left(1 - ind_{jlon}\right)\left(pj_{lon}\right) \\ & \left. + ind_{jlat}\left(pj_{lat}\left(sqj_{lat}(a)/j_{lat}^{max}\right)\right) + \left(1 - ind_{jlat}\right)\left(pj_{lat}\right)\right] \end{aligned} \tag{7}$$

The corrected equation appears below:

$$\begin{aligned} r(s,a) = {} & f(-0.5) + (1 - f)\left[v_s\left(1 - \delta_v/v_{des}\right) + \left(1 - v_s\right)\right. \\ & + ind_{jlon}\left(pj_{lon}\left(sqj_{lon}(a)/j_{lon}^{max}\right)\right) + \left(1 - ind_{jlon}\right)\left(pj_{lon}\right) \\ & \left. + ind_{jlat}\left(pj_{lat}\left(sqj_{lat}(a)/j_{lat}^{max}\right)\right) + \left(1 - ind_{jlat}\right)\left(pj_{lat}\right)\right] \end{aligned} \tag{7}$$

A correction has been made to **6 Experiments and results**, *6.3 Smoothness analysis*. This equation previously stated:

$$\begin{aligned} r(s,a) = {} & f(-0.5) + (1 - f)\left[v_s\left(1 - \delta_{\text{vel}}/v_{des}\right) + \left(1 - v_s\right)\right. \\ & \left. + j_s\left(j_{rw}\left(-j_{cost}(a)/j_{cost}^{ub}\right)\right) + \left(1 - j_s\right)\left(-j_{rw}\right)\right] \end{aligned} \tag{8}$$

The corrected equation appears below:

$$\begin{aligned} r(s,a) = {} & f(-0.5) + (1 - f)\left[v_s\left(1 - \delta_v/v_{des}\right) + \left(1 - v_s\right)\right. \\ & \left. + j_s\left(j_{rw}\left(-j_{cost}(a)/j_{cost}^{ub}\right)\right) + \left(1 - j_s\right)\left(-j_{rw}\right)\right] \end{aligned} \tag{8}$$

A correction has been made to **6 Experiments and results**, *6.3 Smoothness analysis*. This sentence previously stated:

"The results indicate that the best performance in terms of jerk is yielded when the reward function from Eq. 8 is used and when j_w is assigned a value around 2. However, is important to note that the performance is not very sensitive to the value chosen for j_w and performs similarly well in a range of values. It is interesting to note that when the value for j_w is too low, e.g., 0.5, the agent deems the jerk-related reward component less significant which results in higher jerk values."

The corrected sentence appears below:

"The results indicate that the best performance in terms of jerk is yielded when the reward function from Eq. 8 is used and when j_{rw} is assigned a value around 2. However, is important to note that the performance is not very sensitive to the value chosen for j_{rw} and performs similarly well in a range of values. It is interesting to note that when the value for j_{rw} is too low, e.g., 0.5, the agent deems the jerk-related reward component less significant which results in higher jerk values."

A correction has been made to **Appendix**, *Trajectory generation details*. This equation previously stated:

$$\begin{aligned} & traj_{lonp} = b_0 + b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4 \\ & \text{where} \quad t = \left\{0.0, dt, 2dt, \ldots, a_{lon_p} dt\right\} \end{aligned} \tag{A1}$$

The corrected equation appears below:

$$\begin{aligned} & traj_{lonp} = b_0 + b_1 t + b_2 t^2 + b_3 t^3 + b_4 t^4 \\ & \text{where} \quad t = \left\{0.0, dt, 2dt, \ldots, a_{lon_d}\right\} \end{aligned} \tag{A1}$$

A correction has been made to **Appendix**, *Trajectory generation details*. This equation previously stated:

$$\begin{aligned} & traj_{latp} = c_0 + c_1 t + c_2 t^2 + c_3 t^3 + c_4 t^4 + c_5 t^5 \\ & \text{where} \quad t = \left\{0.0, dt, 2dt, \ldots, a_{lat_p} dt\right\} \end{aligned} \tag{A2}$$

The corrected equation appears below:

$$\begin{aligned} & traj_{latp} = c_0 + c_1 t + c_2 t^2 + c_3 t^3 + c_4 t^4 + c_5 t^5 \\ & \text{where} \quad t = \left\{0.0, dt, 2dt, \ldots, a_{lat_d}\right\} \end{aligned} \tag{A2}$$

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note