

Penguins – ML-Agents

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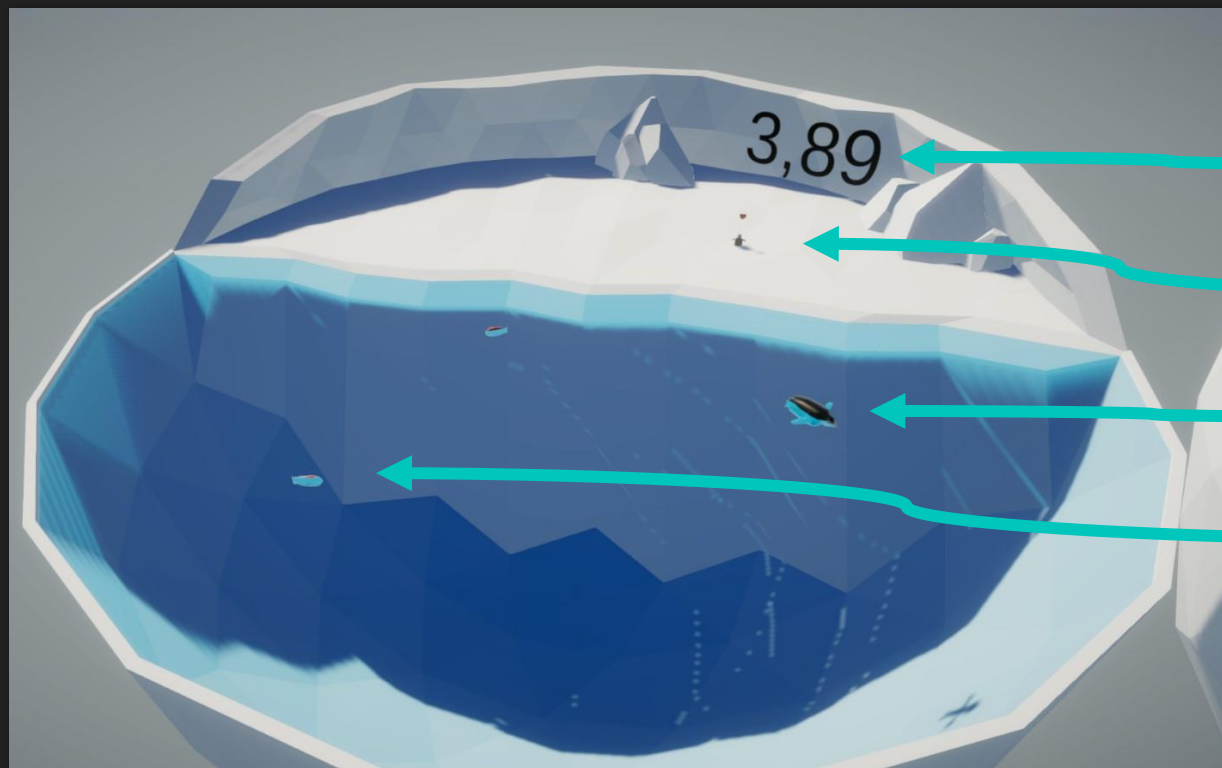
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Introduction

1. Train penguins to feed their babies by picking up fish
2. Add killer whales into their hábitat
3. Train them to avoid those killer whales
4. Compare performance

The penguin's habitat



Current Reward

Baby

Penguin

Fish

The penguin agent

○ Actions

- Move forward / stand still
- Turn left / Straight forward / Turn right

○ Observations

- Has fish in its belly?
- Distance to it's baby
- Direction to it's baby
- Direction in which the penguin's facing

○ Perception

- Using Sphere casts
- Detects objects with tag:
 - Baby
 - Fish
 - *Untagged*

○ Rewards

- +1 -> Eating a fish
- +1 -> Regurgitating fish

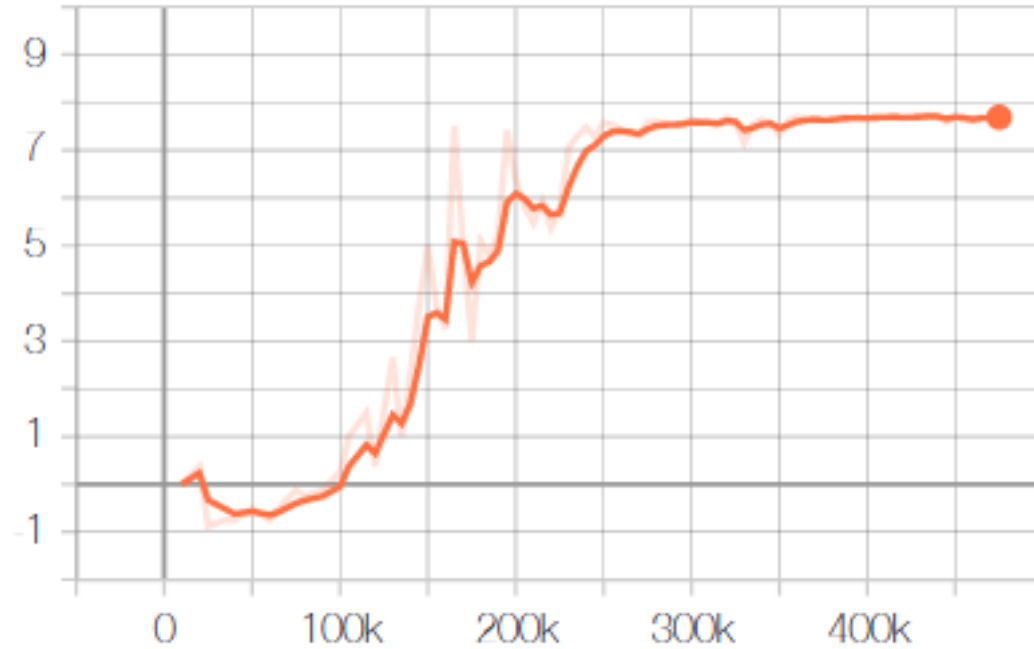
The penguin agent

- Curriculum
 - Measure: by reward
 - Thresholds to switch lessons:
 - `-0.1, 0.7, 1.7, 1.7, 1.7, 2.7, 2.7`
 - Minimum length of lesson: 80
 - Signal smothing is enabled
 - Parameters:
 - Fish Speed: `0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.5, 0.5`
 - Feed Radius: `6.0, 5.0, 4.0, 3.0, 2.0, 1.0, 0.5, 0.2`

Performance

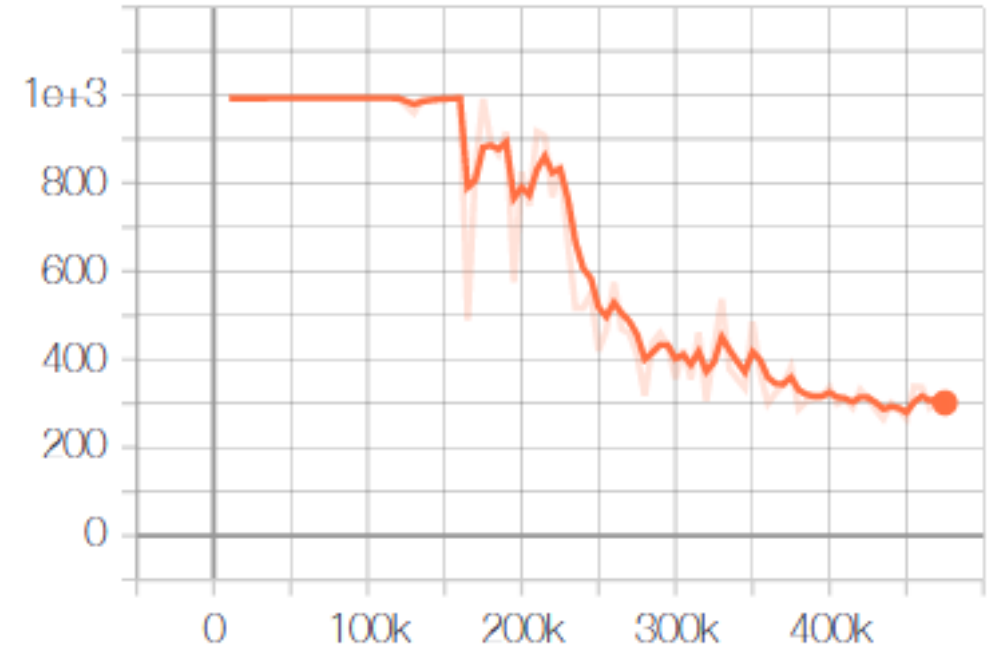
Cumulative Reward

tag: Environment/Cumulative Reward



Episode Length

tag: Environment/Episode Length



Danger approaches!



Killer whale
(a.k.a. *Orca*)

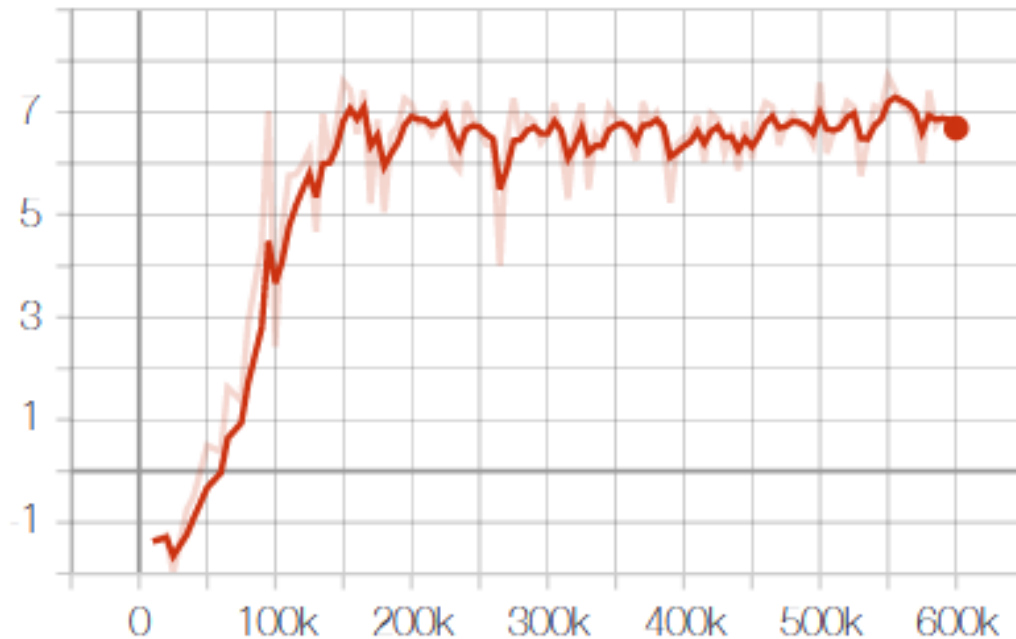
Updated Agent

- Perception
 - Now additionally detects objects tagged “Orca”
- Rewards
 - -3 -> Touching a killer whale
- Curriculum
 - New parameter:
 - Orca Speed: 0.0, 0.0, 0.0, 0.2, 0.3, 0.6, 1.2, 2.4

Updated performance

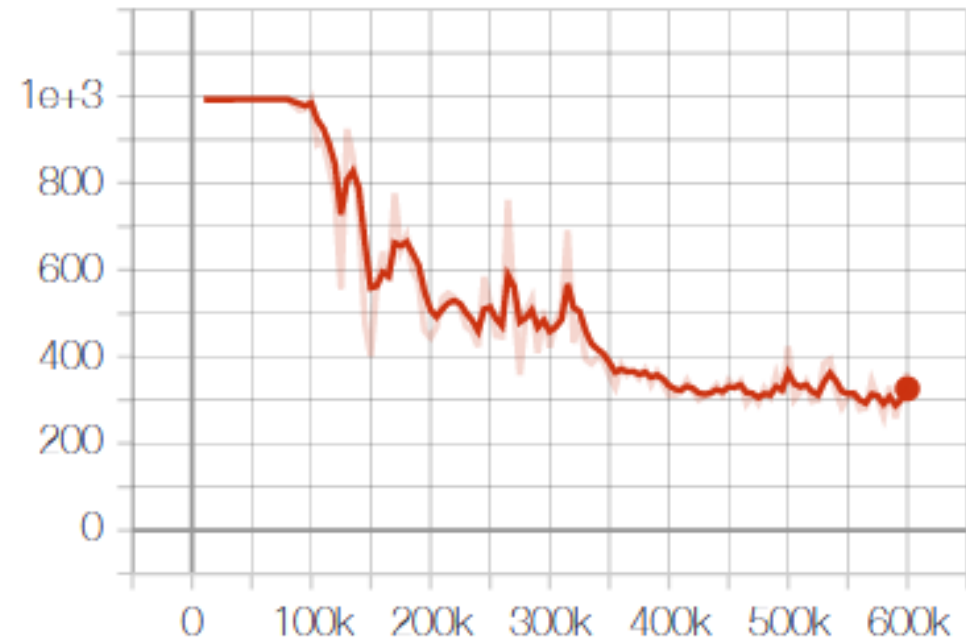
Cumulative Reward

tag: Environment/Cumulative Reward



Episode Length

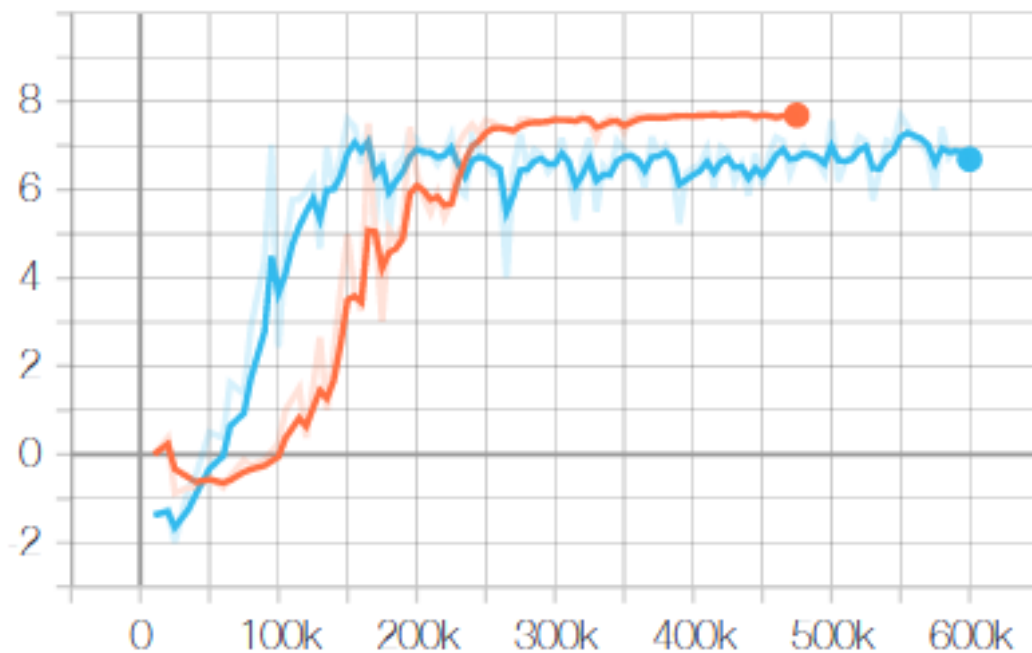
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Comparison

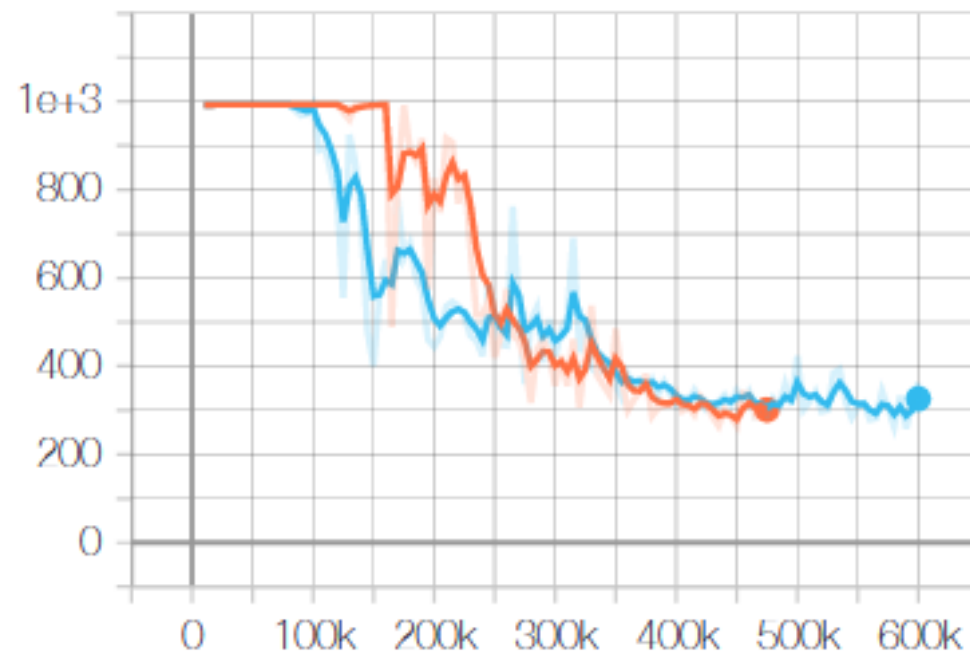
Cumulative Reward

tag: Environment/Cumulative Reward



Episode Length

tag: Environment/Episode Length



Video



Thank you very
much!



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