Reinforcement Learning Project

Rubber Duck Racing

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The CarRacing-v0 Environment

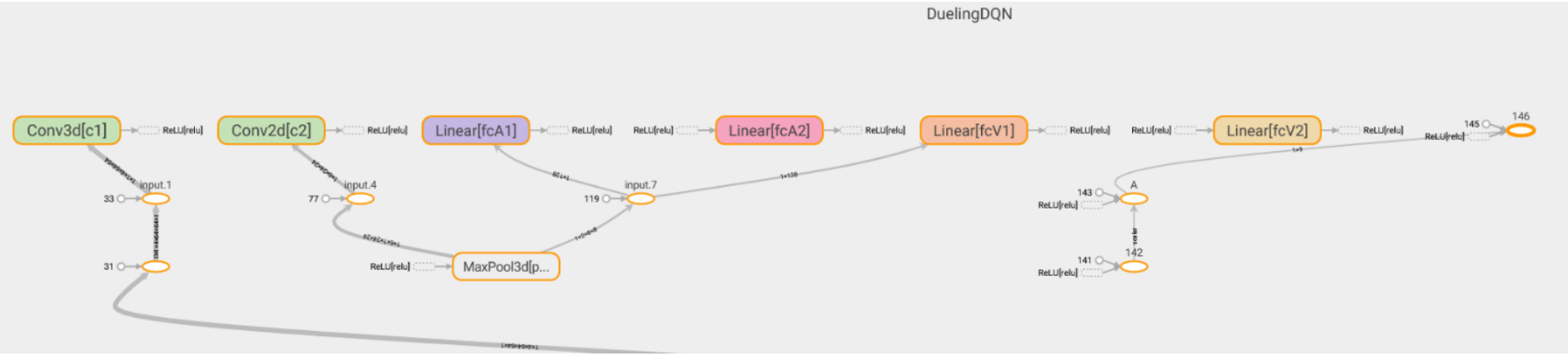
- Learning from 96x96 pixels
- Action space:
  - [steering, acc, brake]
  - $[(-1, 1), (0, 1), (0, 1)]$
- Reward function:
  - -0.1 every frame
  - $+1000$ / N for every track tile visited
  - Driving into the void: -100 penalty

Our Preprocessing

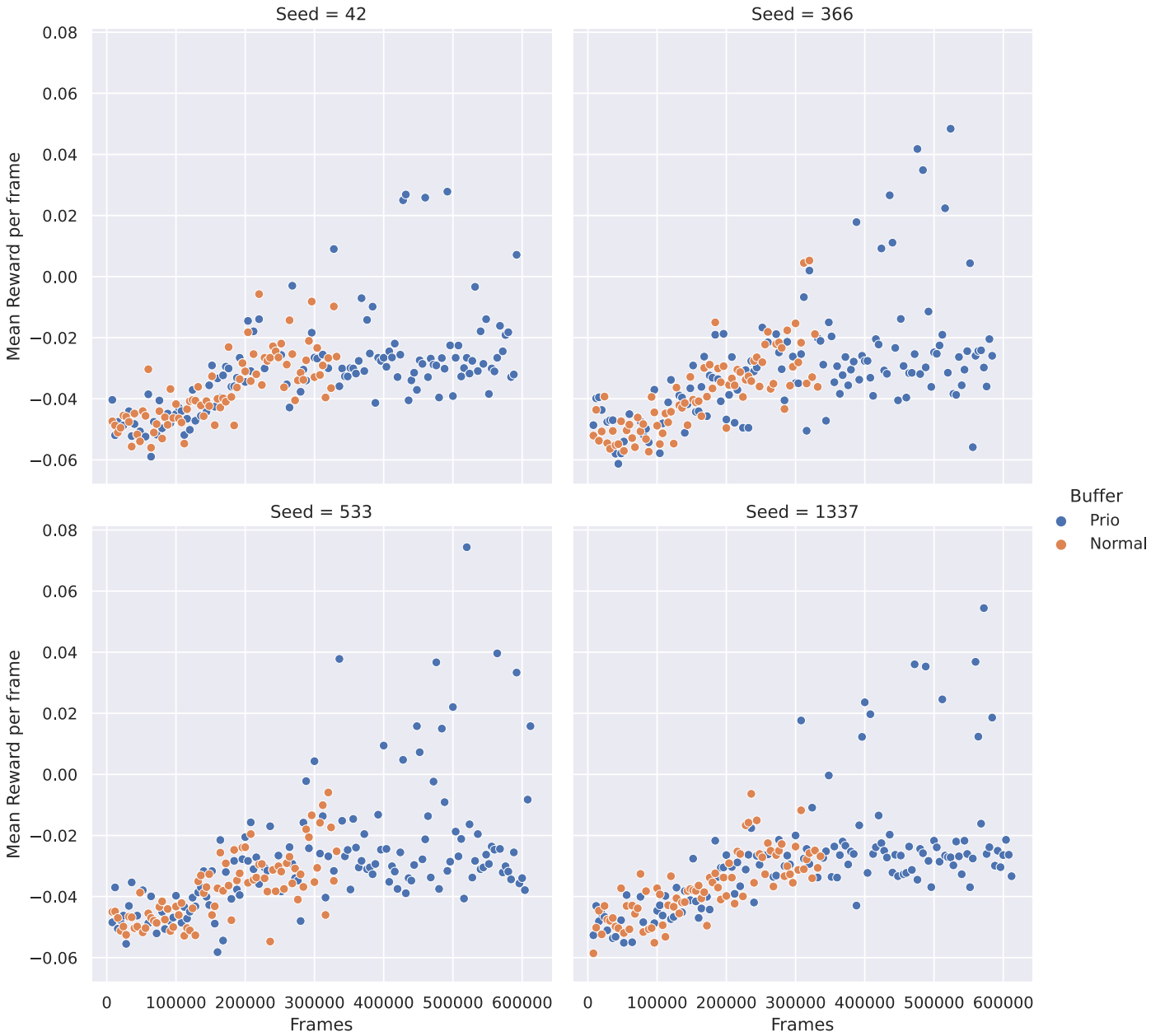
- Framestacking 4 frames to capture movement
- Greyscaling
- Resizing observations to 64x64
- Discretize action space to 1x9:
  - Gas (50%)
  - Gas + Direction
  - Brake
  - Brake + Direction
  - Pure Turn (both directions)
  - Nothing

Our Agent

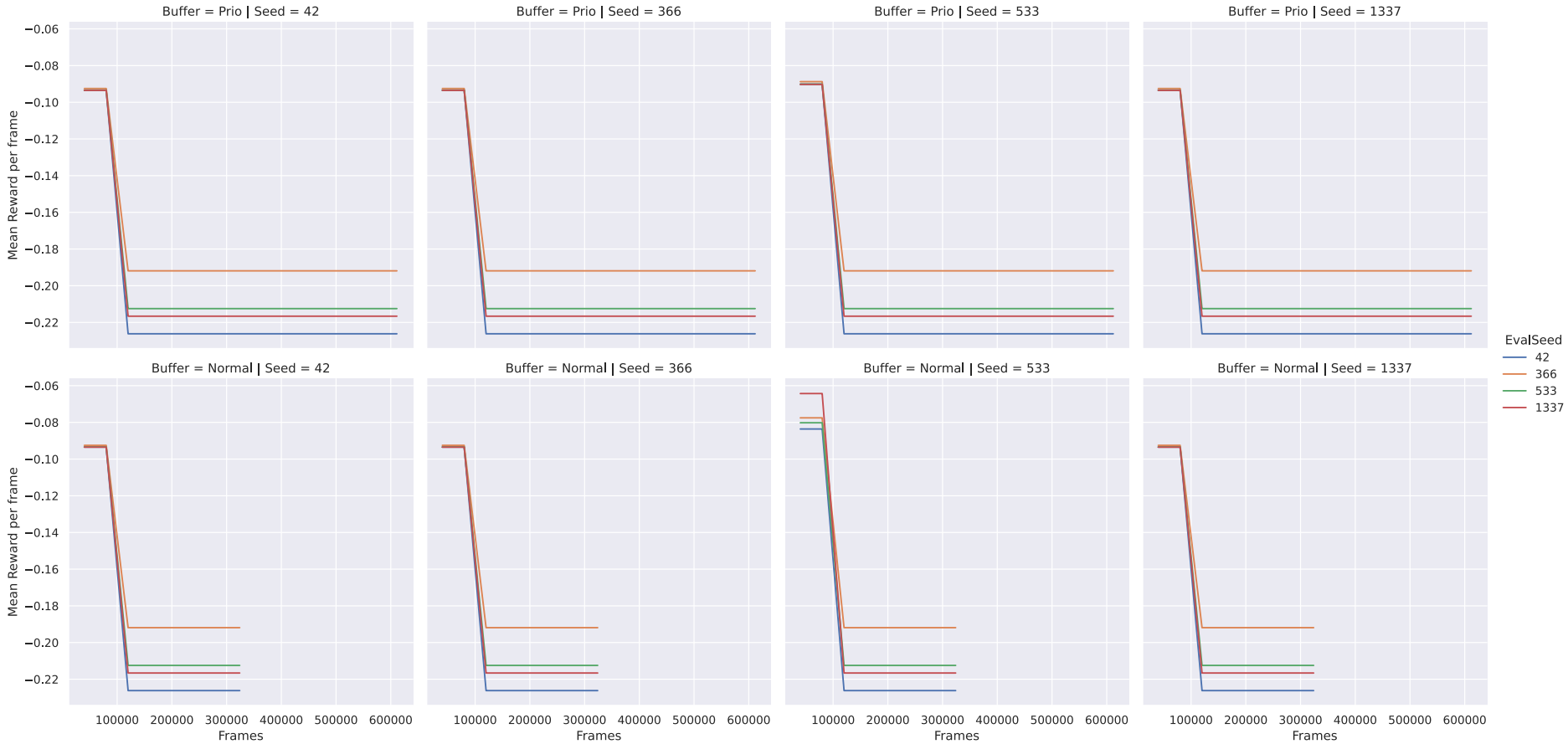
- DoubleDuelingDQN
- Polyak Averaging with $\tau = 0.01$
- Prioritized Replay Buffer / Replay Buffer
- ε-greedy exploration - linear decay from 1 to 0.1 over 1M frames
- Learning rate $\alpha = 0.01$
- Discount Factor $\gamma = 0.9$



Training Visualization



Evaluation of Training Checkpoints



Live Demo

Thanks for listening!