Two Rope Ball Balancer

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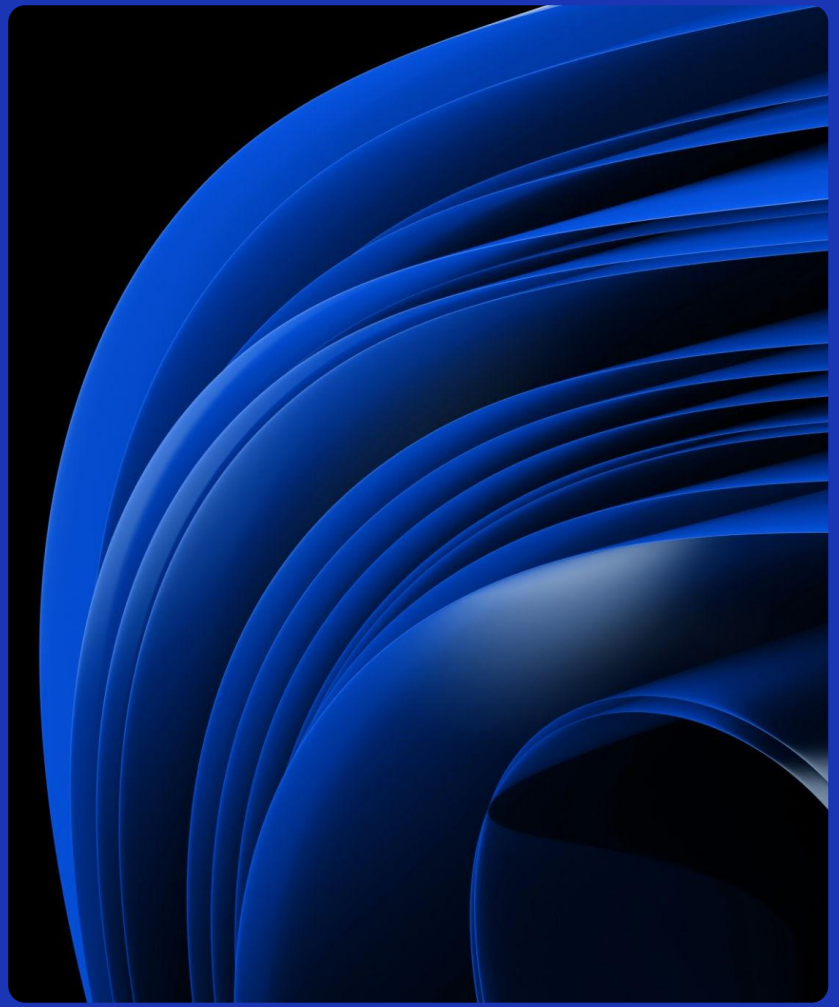
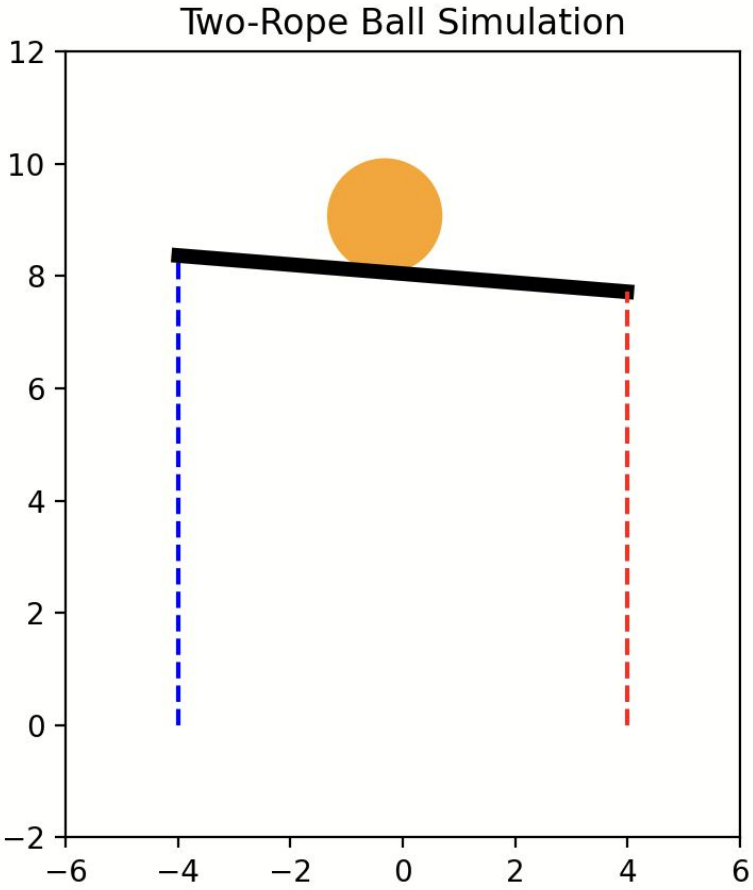


Modeling

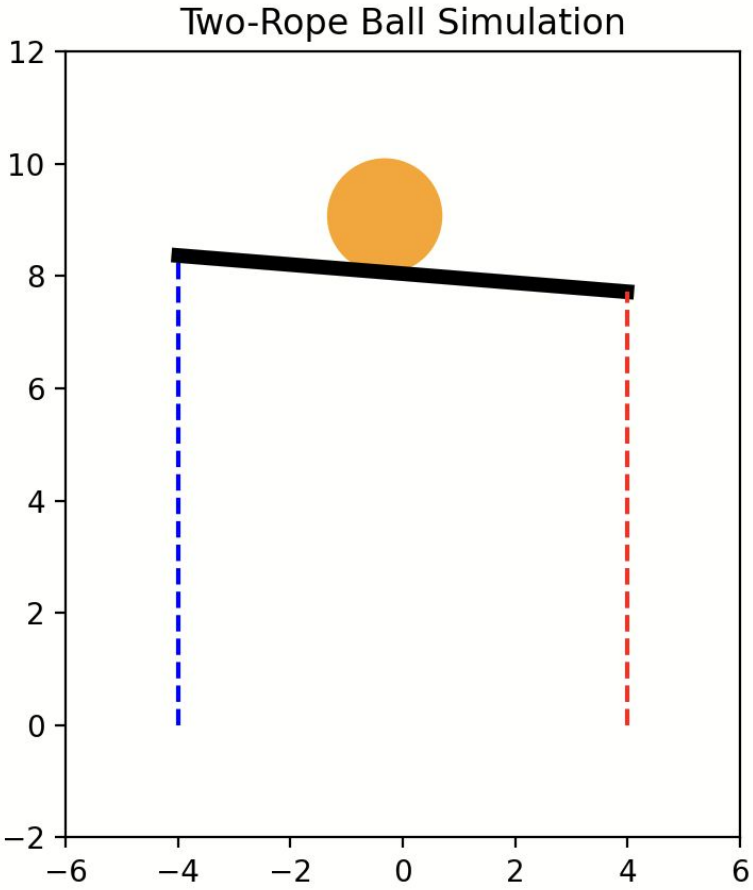
RL setup

- State Space
  - Height
  - Height′
  - Angle
  - Angle′
- Action Space
  - Force on left rope (0, +50)
  - Force on right rope (0, +50)



Two rope model

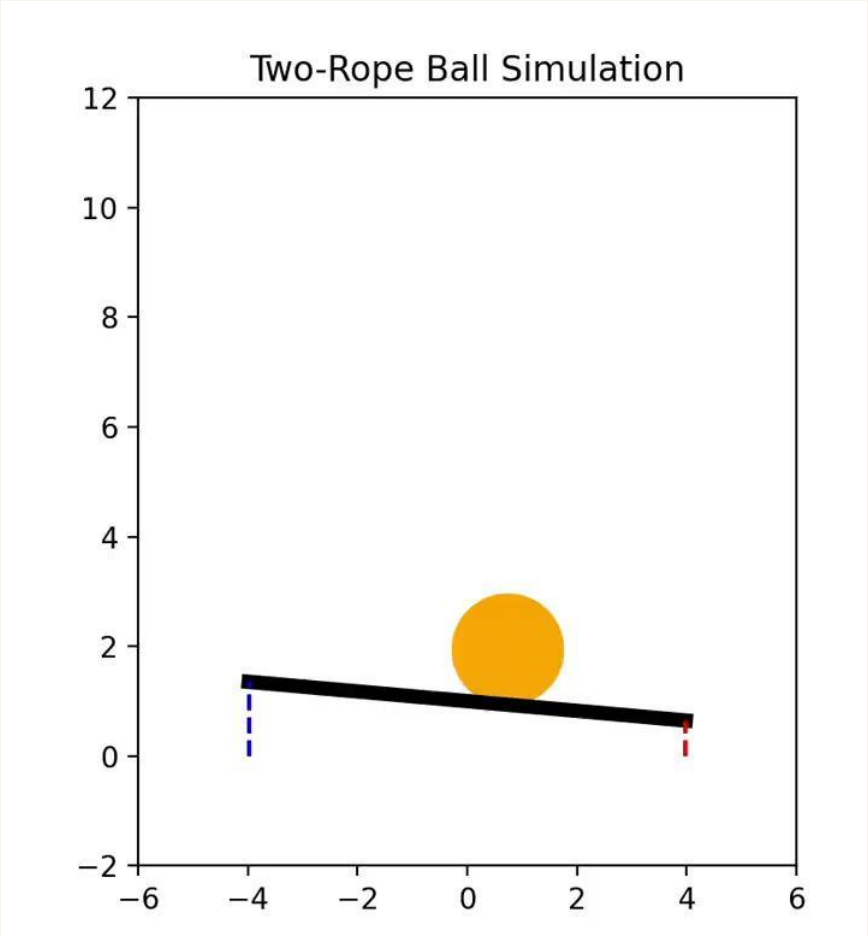
- matplotlib
- Physics work
- No time penalty (for now)



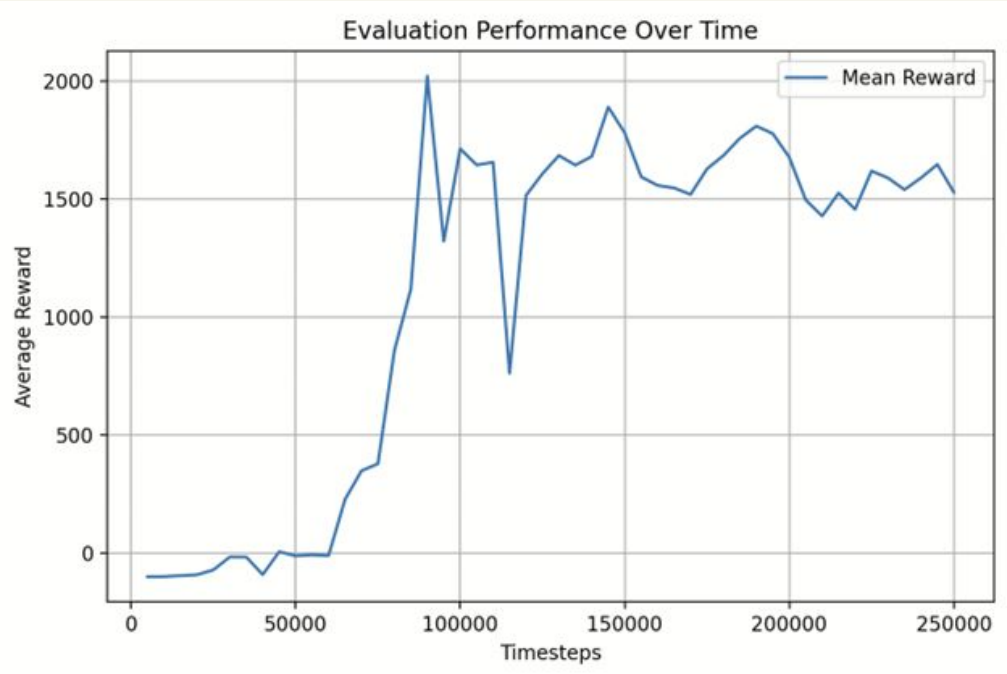
Training (pt 1)

PPO

- Chosen for robustness
- slow
- Worked!
    - High success rate



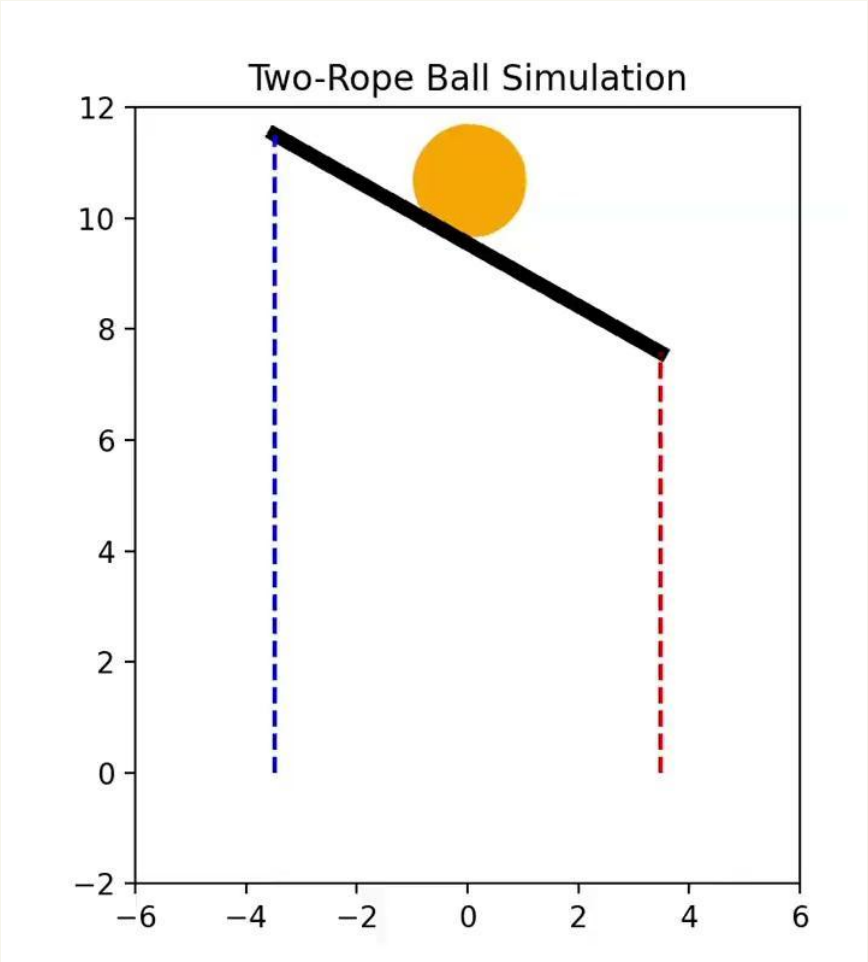
PPO-V1 learning curve



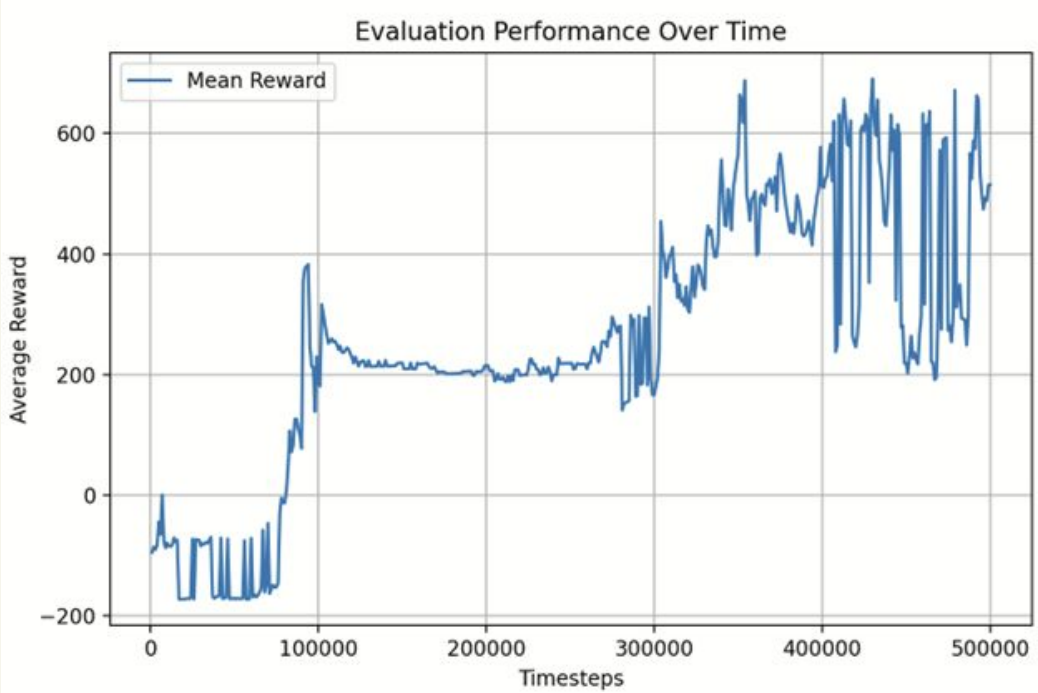
Training (pt 2)

PPO - w linear time penalty

- Lower success rate
- fast!
- worked!



PPO-V2 learning curve



- Initially rewarded jerky movements
-

Success evaluation

Results!

```
[Running] python -u "c:\Users\ianwi\OneDrive\Docum
Gym RopeBall environment imported successfully!
Model reloaded successfully!
Success rate: 86.90%, sample size: 10000
Evaluation completed successfully!
```

- 86.9% Success Rate!
- There is definitely room for improvement
- worked!

Next Steps

Tuning:

- Hyperparameter study
- Implement A2C
- Replace heavy training with thoughtful training (hyperparameter tuning)