NPC Population Control

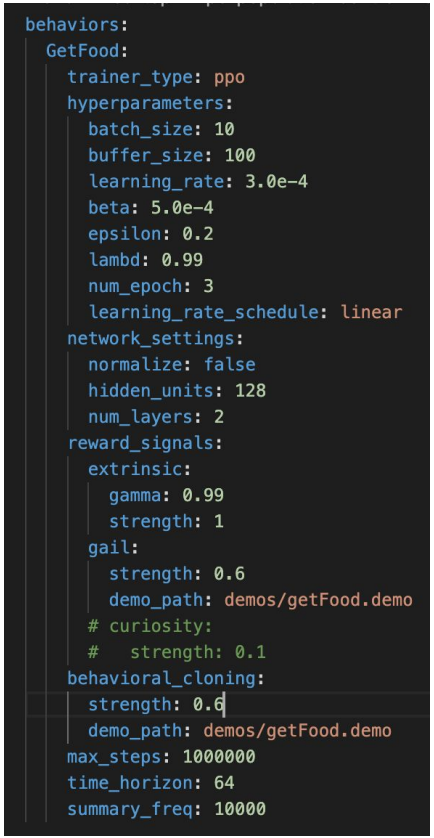
Project by Maria Barbulescu

Loosely based on Boiński, T. (2021). *ANFIS-Based NPC Population Control in Video Games*.

NPC Population Control

- NPC = Non-Playable/Non-Player Character
- Population control is important for game experience: the game field should not be overly populated or too empty
- Anthill game: NPCs are ants that collect food, player can gather food, explore, or kill NPCs

ML Environment



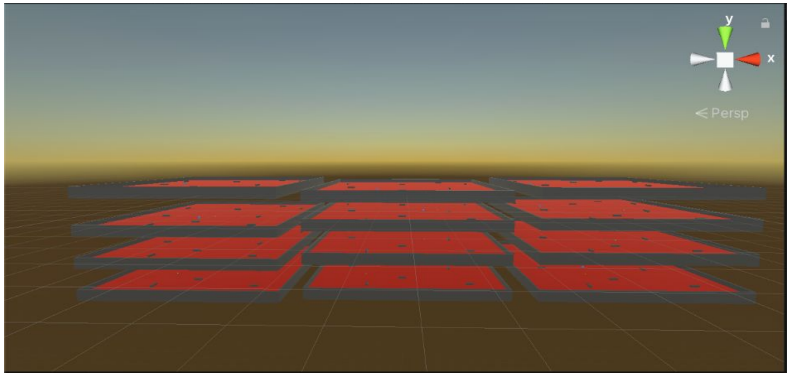
```yaml
behaviors:
  GetFood:
    trainer_type: ppo
    hyperparameters:
      batch_size: 10
      buffer_size: 100
      learning_rate: 3.0e-4
      beta: 5.0e-4
      epsilon: 0.2
      lambd: 0.99
      num_epoch: 3
      learning_rate_schedule: linear
    network_settings:
      normalize: false
      hidden_units: 128
      num_layers: 2
    reward_signals:
      extrinsic:
        gamma: 0.99
        strength: 1
      gail:
        strength: 0.6
        demo_path: demos/getFood.demo
      # curiosity:
      #   strength: 0.1
    behavioral_cloning:
      strength: 0.6
      demo_path: demos/getFood.demo
    max_steps: 1000000
    time_horizon: 64
    summary_freq: 10000
```

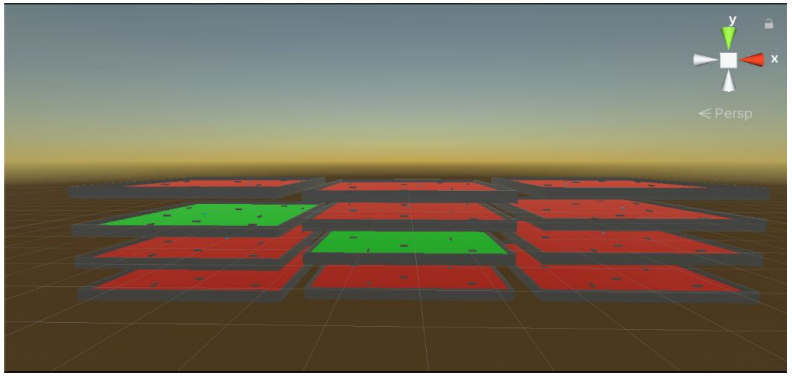
ML Environments

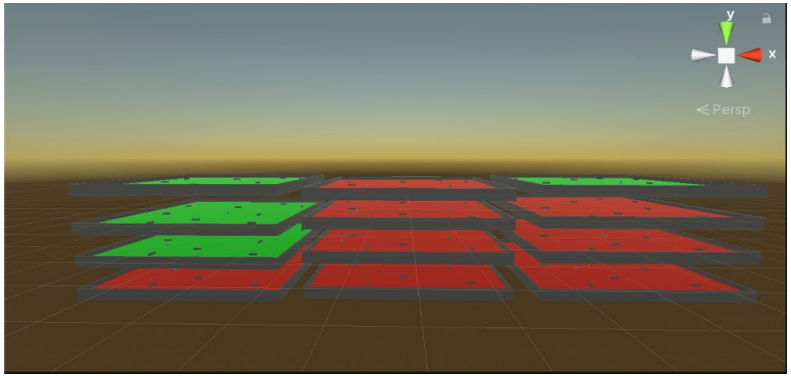
- Ant-food environment
  - Get food reward: +1
  - Touch wall reward: -1
  - Step reward: - 1/max_num_steps

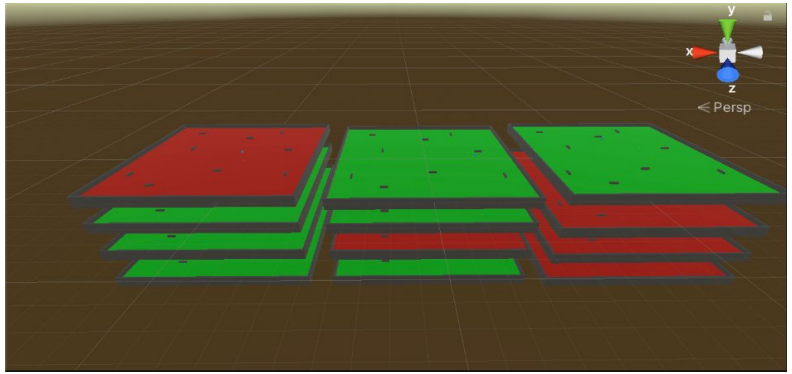
- Prey-Predator model:
  - Ant:
    - Get food reward: +1
    - Encounter predator: -1

ML Progress



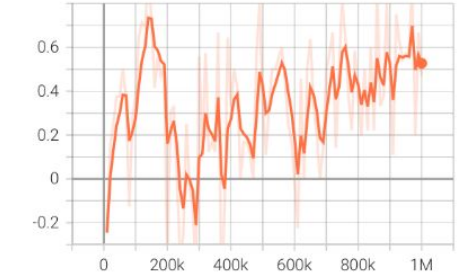




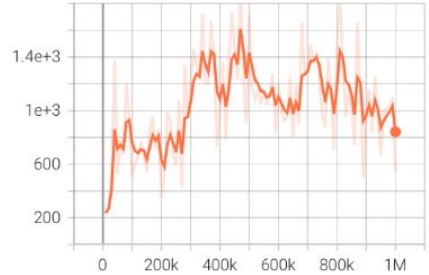


Environment

Environment/Cumulative Reward
tag: Environment/Cumulative Reward

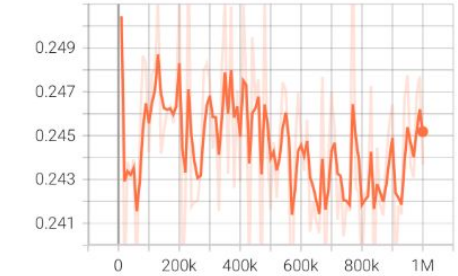


Environment/Episode Length
tag: Environment/Episode Length

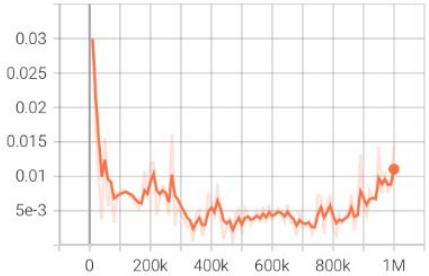


Losses

Losses/Policy Loss
tag: Losses/Policy Loss



Losses/Value Loss
tag: Losses/Value Loss



Features-to-be

- Prey-Predator component to the game: introduce anteater
- ML? Maybe