

# Uno: Luck or Skill

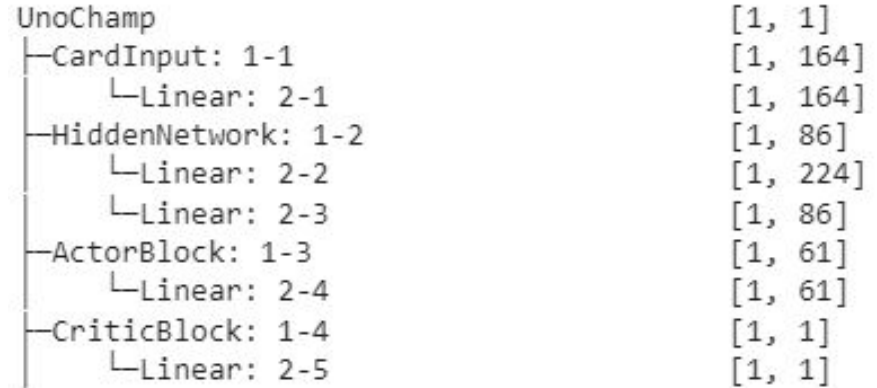
Grant Bruneel



In a Game of Luck, Can a RL Agent  
Learn Specifics of a Training Set to  
increase win probability?

# Actor-Critic Neural Network

- Input (120 x 1 Array)
  - Player Hand (60)
    - 4 x 15 Array
    - 4 Colors
    - 15 Cards
  - Target Card (60)
    - 4 x 15 Array
    - Same as Hand
- Output
  - Action to take (61)
    - 60 cards to play
    - 1 Draw Card Option
  - Critic Output(1)
    - Number representing how good a hand is



Shape of the Neural Network used by the Agent, Actor and Critic Block are both outputs

# Methods

100 Training Seeds, 100 Testing Seeds

Play 50 Games for each seed and keep track of win percentage as baseline

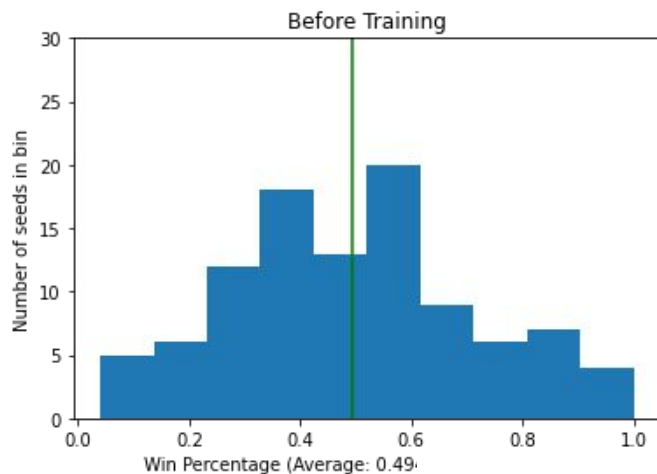
Calculate Average Win rate over 100 Seeds

Train Agent on Training Seeds

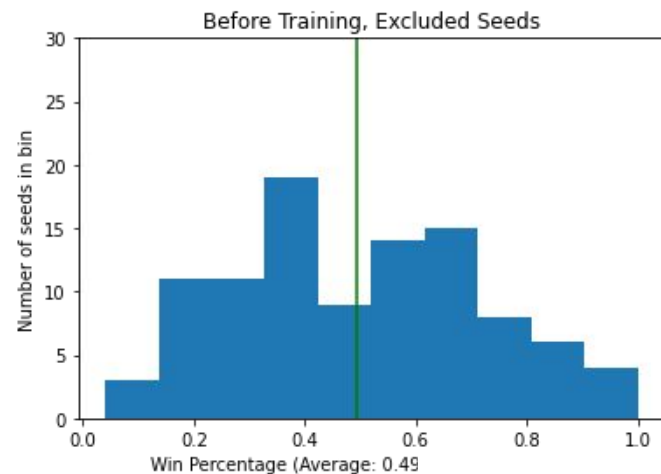
Repeat Baseline test and compare results

Before  
Training

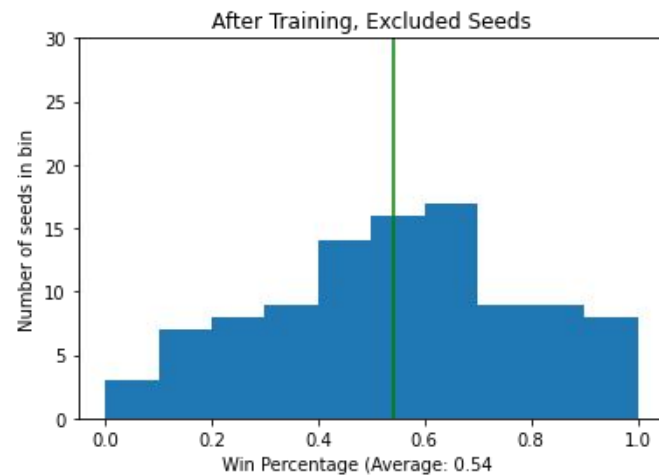
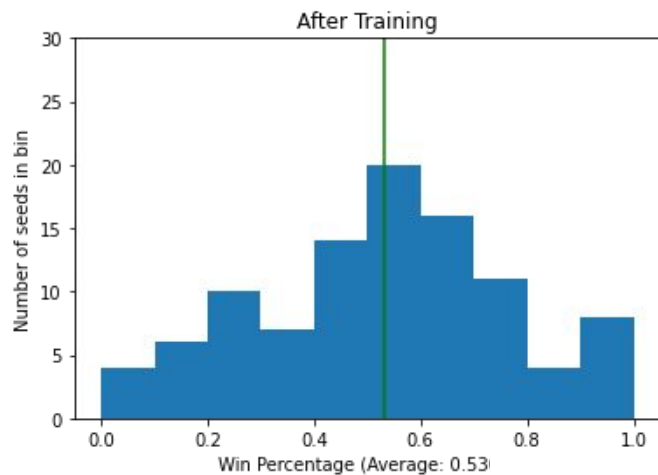
Training Seeds



Testing Seeds



After  
Training



# Conclusion

- Successfully taught Agent to play UNO
  - Increase Average Win rate, distribution moved as well.
- Determined UNO is a game of Luck
  - Due to Agent never winning more than 55% of Games
- Agent performs just as well on seeds never seen as seeds it trained on