

# AI beats professional players at Super Smash Bros. video game



Jason Less  
Lab 4, Assignment 10





# Introduction

- Application of artificial intelligence to multiplayer video games
- Team from MIT created an AI to play Super Smash Bros. as Captain Falcon
- Within two weeks of practice the AI beat 10 top 100 human players in the world
- Programmed a branch of machine learning, called “reinforcement learning”

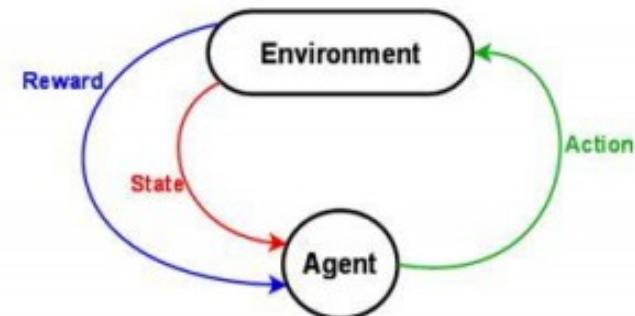


# New Challenges

- ◆ Traditional use of AI in games involves strategy games (i.e. Chess and Go)
  - ◆ Able to plan many moves ahead
  - ◆ Analyze a large data set of permutations to apply strategy
- ◆ Multiplayer video games are more dynamic
  - ◆ Real-time game against one or many opponents
  - ◆ Less strategy, more dependent on reaction time
  - ◆ Moves can have negative effects (i.e. reload time)

# Method of Learning

- ◆ Deep and Reinforcement Learning
  - ◆ Goal: Perform an action on the environment with the goal of getting the reward (defeat opponent)
  - ◆ Exposed to large amounts of data via coordinates of in-game items, map elements
  - ◆ AI performs an action on its opponent (input)
  - ◆ Learns from previous actions if successful or not (output)
  - ◆ Adapts to develop best fighting strategy



# Elements of Success

- ◆ Reaction time
  - ◆ Computers excel at fast reaction times
    - ◆ Computer: ~33ms, Human: +200ms
- ◆ Developed strong fight strategies and techniques
  - ◆ From repetition and trial-and-error (of reinforcement learning)
- ◆ Precise movements, reduced button errors

# Flaws

- ◆ Not programmed to deal with projectiles
  - ◆ Can only play as Captain Falcon (as he doesn't use projectiles)
- ◆ Fatal crouching error
  - ◆ If opponent crouches in corner, AI panics, and kills itself



# Applications

- ◆ Unreal speed to learn and adapt
  - ◆ Able to master a game in 2 weeks, which took the top players years to hone their skills
- ◆ Implementing the deep machine and reinforcement learning for the AI capable of a wide variety of applications:
  - ◆ Autonomous cars
  - ◆ Robots in the work force (e.g. truck drivers) etc.

