Games and Competitions

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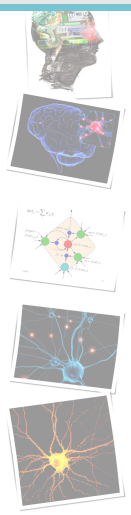
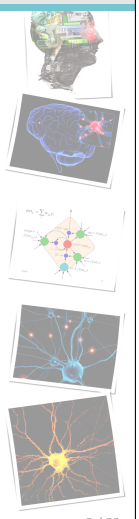


Games as a research tool

Competitions

Current state of the (game) AI art

The future of competitions



Games as a research tool

- Almost every Game AI paper begins with something along these lines:
- "Games have/can be used for Artificial Intelligence Research"
  - Because games are:
    - Fun (?!)
    - Provide nice abstractions of real world problems
    - Are universally accepted
    - Easy to compare with other researchers' AIs/agents
- Let's have an overview of the modern history of game research

Zermelo

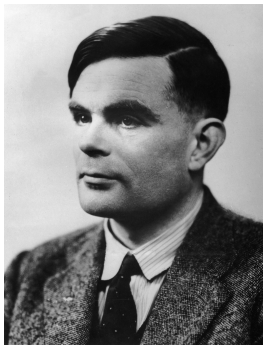
- First important result by *Ernst Zermelo, 1913*
- Use the game of Chess as an abstraction
- Kickstarts game theory - of course no real computers
- "Given that a player (say White) is in 'a winning position', how long does it take for White to force a win?"
- Wikipedia cites the correct papers, has the definitions mixed-up with ...

Von Neumann

- Modern tools actually invented in *John von Neumann, 1944* or possibly *1928*
- Backwards Induction
- You must have heard it as "MinMax" - again, no real computers at the time
- Poker and bluffing are discussed as well

Turing

- Most modern additions to min-max pioneered by *Alan Turing, 1953*
- Learning, look-aheads, evaluation functions
- Almost every modern method was at least imagined
- But machines still not capable of beating men



From theory to practice

- From this point onwards, there was a race
- Fundamentally asking the question
- "Can we use computers to actually do what was conceptualised in theory"
  - i.e., can we create (at least) human competitive machines
    - Chess - *IBM Deep Blue, 1996*
    - Head's Up Holdem (Poker) *University of Alberta, 2015*
    - Go *Deep Mind, soon* - apparently Japanese competitor?
- 50-60 years

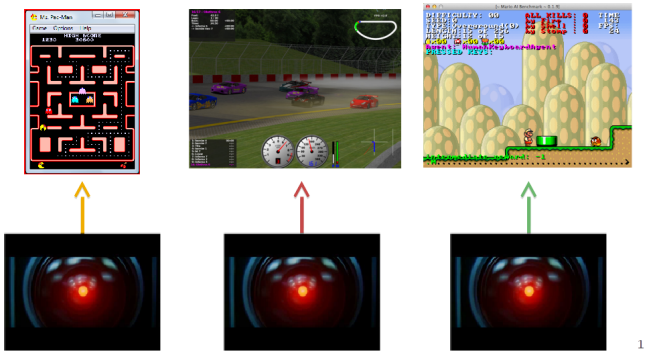
Where did all this research get us?

- Most classic games will be/are solved
- But what does it mean for Artificial Intelligence?
  - Narrow approaches for building narrow Systems
    - Chess
  - General approaches for building narrow systems
    - Backgammon, Poker, *Maybe* GO
  - *narrow approaches for building general systems*
    - Nothing # Current state of the art

Enter competitions

- Implicitly one can think of these "races to the top" as competitions
- In the case of go you even had
- Competitions are the most anti-intellectual thing you can do
  - Adoloscent/childish idea of "I can run faster than you"
  - When it comes to algorithms, it's mostly "My dad is stronger than your dad"
- But there must be some value, somewhere
- In fact, the most common sci-fi game design must be "war of resources"
- But you need some way to measure progress!!!

Some modern AI competitions



Some videos

Too narrow

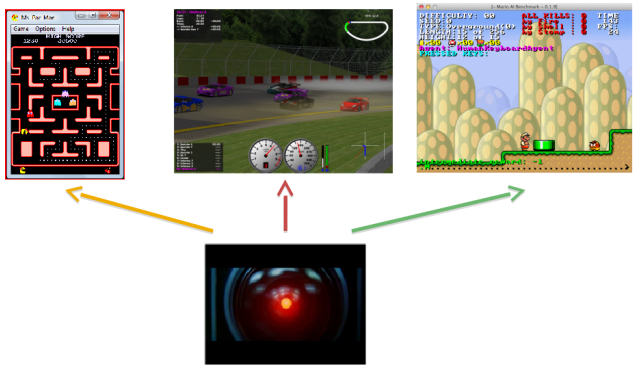
- Some people have plenty of time

State of the Art in Game AI

- Some form of lookahead (MCTS)
- Coupled with premature stopping (A value function)
- Some ability to do fast lookaheads (A policy)
- System seeded from Games

General Game Playing

General Video Game Playing Competition (I)



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General Video Game Playing Competition (II)

The problem with the Model

Characteristics of a good competition

- Competitions can be thought of as a formalisation of "Games as Benchmarks"
- A good looking website
- Instant gratification
  - A "competition slave"
    - Only real requirement!

What about generation?

- Some people actually care about the games themselves
- Procedural content generation
- Turing competitions

What about believable characters

- Some people care about this too!
- Insane!

Text

- My interest in in Role Playing Games
- . . . or text adventures
- Some new benchmarks but not competitions

Where to from here?

- Need better benchmarks
- Benchmarks that a machine can solve
- Without getting into the trap of "General Approaches for Narrow Systems"
- Models must go away

Thank you!