Video Games
and
Artificial Intelligence

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Artificial Intelligence

Machines as intelligent as human beings
will exist in less than 20 years

AI Pioneers, Dartmouth College, 1956

Artificial Intelligence

*Machines as intelligent as human beings
will exist in less than 20 years*

AI Pioneers, Dartmouth College, 1956

But, they got funding! Millions of dollars!

The Golden Years: ELIZA, STUDENT, STRIPS, SHRDLU, …
AI Winter → Expert System Boom → Second AI Winter →
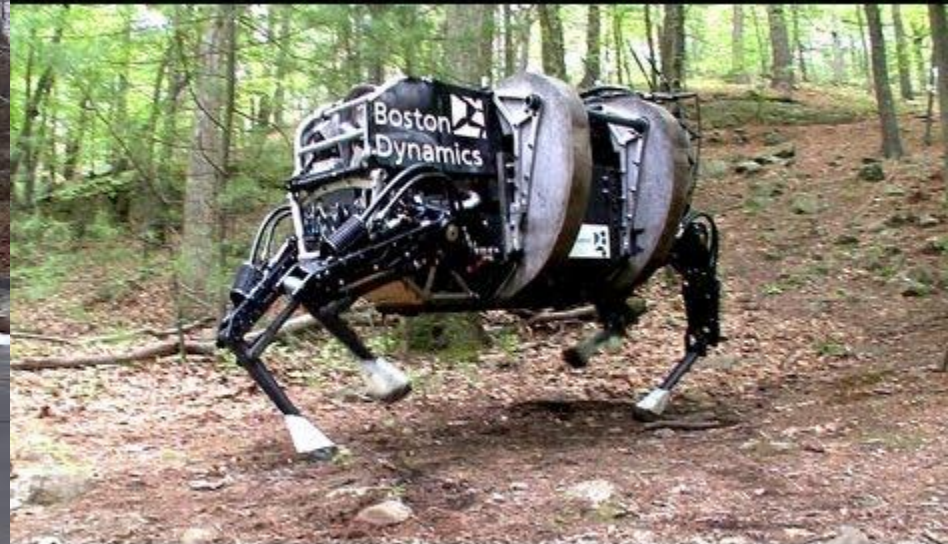1995-present: AI behind the scenes

Moravec's paradox
Easy for you, hard for the computer

https://youtu.be/g0TaYhjpOfo

http://gamesstudio.org/

Boston Dynamics (Bought by Google 2013)

https://youtu.be/M8YjvHYbZ9w

https://youtu.be/R7ezXBEBE6U

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Early AI for Games

Traditional AI vs Game AI

Optimal solutions

Human-like solutions

Blackbox solutions are OK

Storytelling is part of games, AI needs to be understood
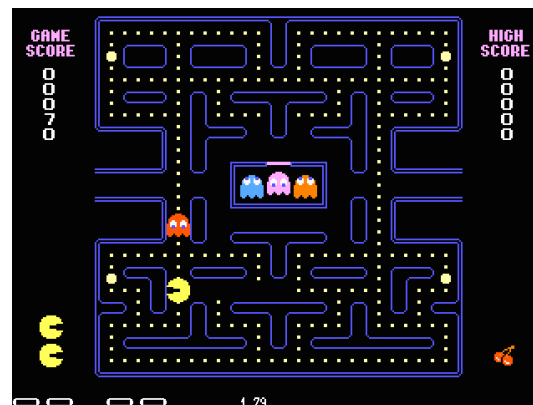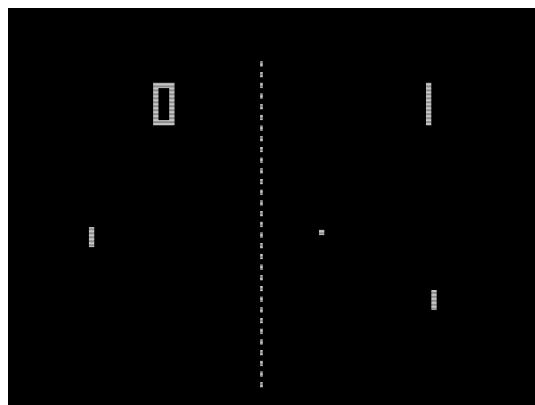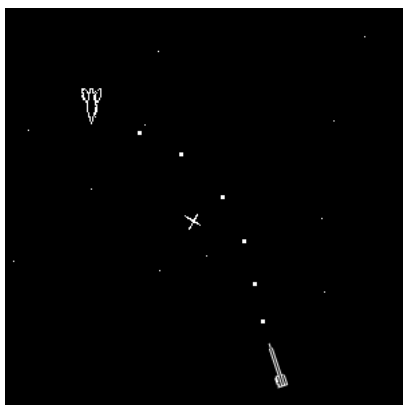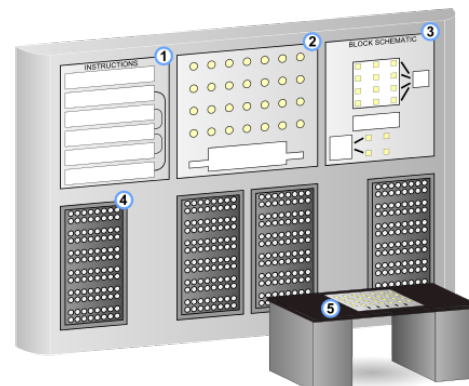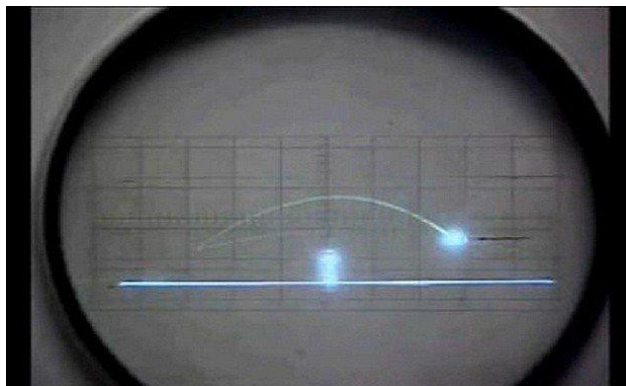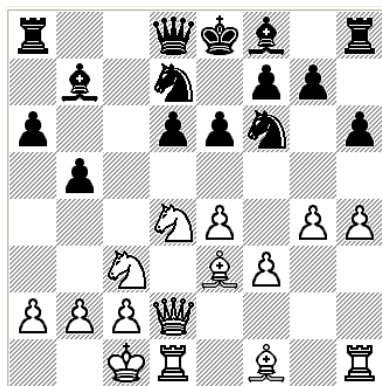
Traditional AI vs Game AI

Optimal solutions

Blackbox solutions are OK

Neural networks
Learning systems
Qualitative and Analogical
  Reasoning
Natural language
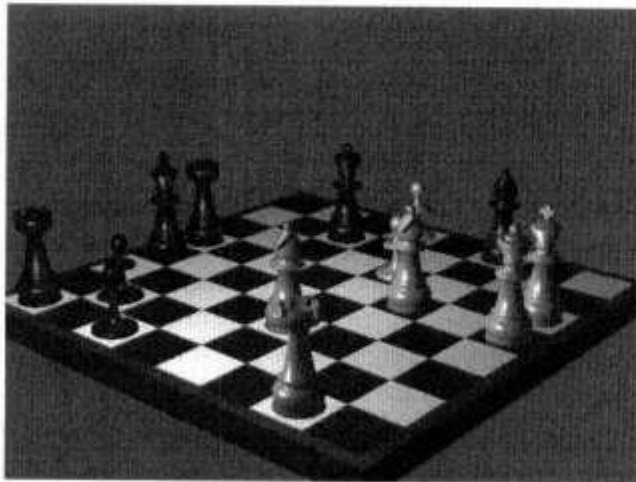
Human-like solutions

Storytelling is part of games, AI needs to be understood

A* for pathfinding
Finite State Machines

More Recent AI in Games

Thief: Sensory systems

Half-Life: Opponent tactics

More Recent AI in Games

Black & White:

Belief-desire-intention model

Halo:

Dynamic difficulty adjustment

More Recent AI in Games

Left 4 Dead:

AI Director - game dramatics, pacing, difficulty

Skyrim: Radiant AI

dynamic reaction to player actions, game plays differently each time, NPCs talk about play
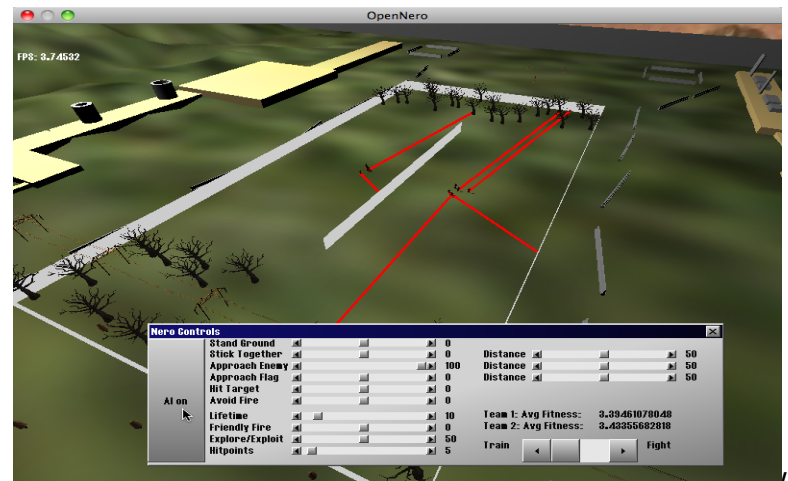
AI Research in Games

Facade:

Emotionally interactive

characters in natural language

NERO:

NeuroEvolving Robotic

Operatives. adaptive intelligent

agents

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Game AI - The Future

1. Player Experience Modelling

2. Procedural Content Generation

3. Data Mining

4. New NPC AI

5. Persuasive Games / Games for Learning

Player Experience Modelling

User modelling, affective computing,

experimental psychology,

human computer interaction

Personalisation of experience
- Player self-reports
- Biometrics
- Gameplay data

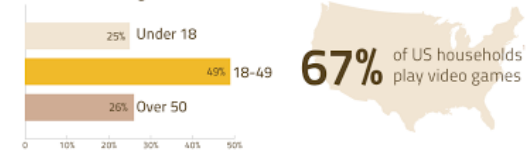**The Gamer**

34YRS
The average age of a gamer

39YRS
The average age of most frequent game purchaser

12YRS
Average number of years adult gamers have been playing computer/video games

2010 Gamer Ages
- 25% Under 18
- 49% 18-49
- 26% Over 50

67% of US households play video games

The 2010 average gamer spends 8 hours a week playing video games

168 Hours/Week

2010 Primary Console **Female** Players
- 11% XBOX360
- 80% Wii
- 9% PS3
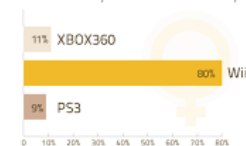
2008 Primary Console **Male** Players
- 38% XBOX360
- 41% Wii
- 21% PS3
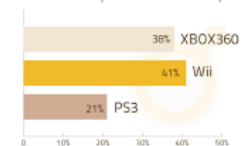
40% of all gamers are female

Procedural Content Generation

Algorithms generate content: Terrains, maps, levels, stories, rules, quests, music, maps, user aesthetics applied to game objects

Love

first-person collaborative online adventure game

Minecraft

http://gamesstudio.org/

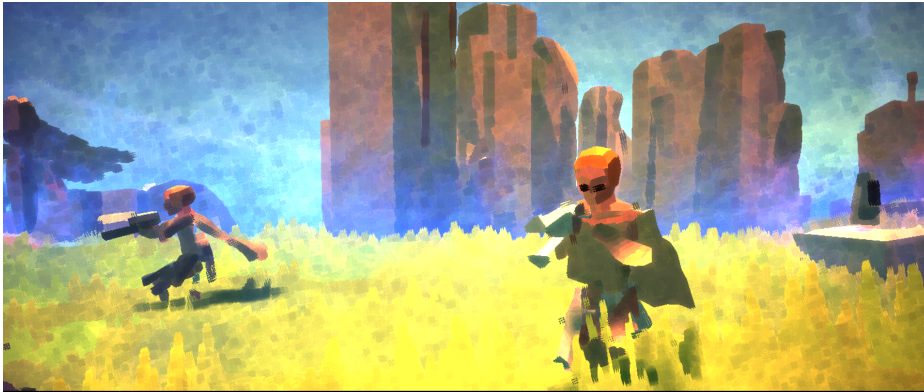# Data Mining

How do people play, why do they stop, predict what they will do, what is the player personality

Zynga

    FarmVille (2010) - 28M daily players, 75M monthly

    60B rows of data and 10TB of semi-structured data daily

    13 terabyte of raw log data from the server and app logs

GameAnalytics.com

    250M monthly users, 100B monthly game events

New NPC AI

Prom Week:

Complex social behaviour

Intelligence in the agent or in the environment - a balance
AIs for open worlds

AIs in central roles: trainee, co-creator, editable, guided, ...

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Persuasive Games / Games for Learning

Also known as *Serious Games*

Darfur is Dying

Games with a purpose other than entertainment

Marketing, advertising, exercise, medical diagnosis,

edutainment, training simulations, art, propaganda,

Killer Flu

TRY IT OUT

Participation Nation

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Tracy Fullerton @ USC -- Walden, a game, simulates the experiment in living made by Henry David Thoreau at Walden Pond in 1845-47, allowing players to walk in his virtual footsteps, attend to the tasks of living a self-reliant existence, discover in the beauty of a virtual landscape the ideas and writings of this unique philosopher.

You now have a fishing rod, which you can use to fish at specific places around the pond.