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, …

Al 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/g0TaYhpOfo
Boston Dynamics (Bought by Google 2013)

https://youtu.be/M8YjvHYbZ9w

https://youtu.be/R7ezXBEBE6U
Early AI for Games
Traditional AI vs Game AI

Optimal solutions
Blackbox solutions are OK

Human-like solutions
Storytelling is part of games, AI needs to be understood
# Traditional AI vs Game AI

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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
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
- 35% 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
- Xbox 360: 15%
- Wii: 15%
- PS3: 15%

2010 Primary Console Male Players
- Xbox 360: 20%
- Wii: 25%
- PS3: 25%

40% of all gamers are female

Yusuf Pisan
http://gamesstudio.org/
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, ...
Persuasive Games / Games for Learning

Also known as Serious Games

Games with a purpose other than entertainment
Marketing, advertising, exercise, medical diagnosis, edutainment, training simulations, art, propaganda,
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.

http://newsfeed.time.com/2012/04/30/thoreaus-walden-the-video-game/