Artificial Intelligence and Games

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Mediamatics /
Knowledge based systems

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Artificial players for Quake and Quake II

Artificial players for Quake III Arena & Team Arena

Contents

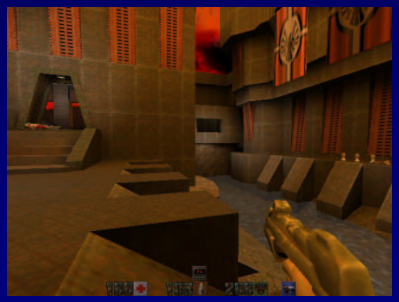
- id Software
- id & Artificial Intelligence
- Requirements
- AI subsystems
- Commonly used techniques
- Development
- Games & scientific research
- Conclusion

id Software

- Started in 1991
- 20 people
- First person shooter (FPS) games
- Licensing game technology

id Software

- Wolfenstein
- Doom
- Doom 2
- Quake 1
- Quake 2
- Quake III Arena
- Team Arena



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id & Artificial Intelligence

- Monsters
- Artificial players

- In earlier games the AI was not very advanced
- Limited CPU available
- AI in the newer games much more advanced
- More CPU available also due to 3D accelerator cards

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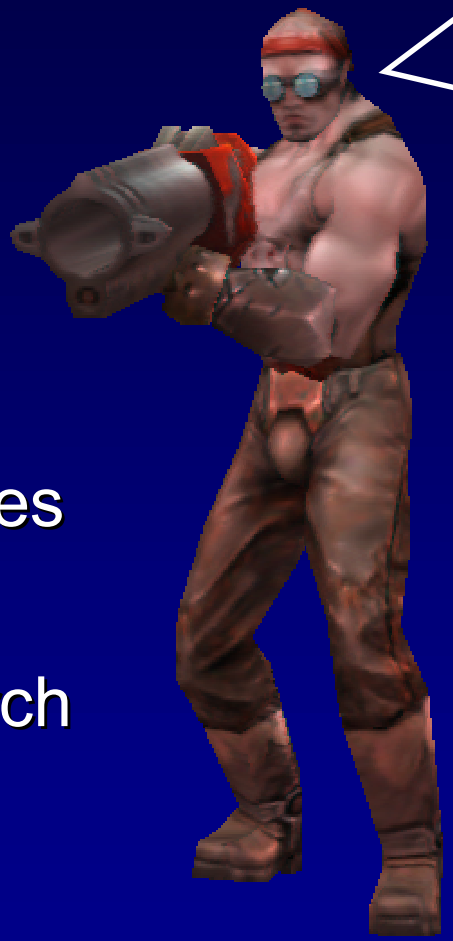

Requirements

- Believable Artificial Intelligence.
- Illusion of intelligence is more important than real intelligence.
- Human-like behaviour because people can associate with such behaviour.
- AI characters may not be too smart. Single player story line can be at risk if the AI characters are too smart. The player should also be able to win.
- It should be hard to distinguish artificial players from human players.
- Same game rules apply to both artificial and human players.
- Not allowed to cheat.
- Resource efficient (CPU & memory).
- Commercial quality code.
- Easy extendable/modifiable architecture and implementation.

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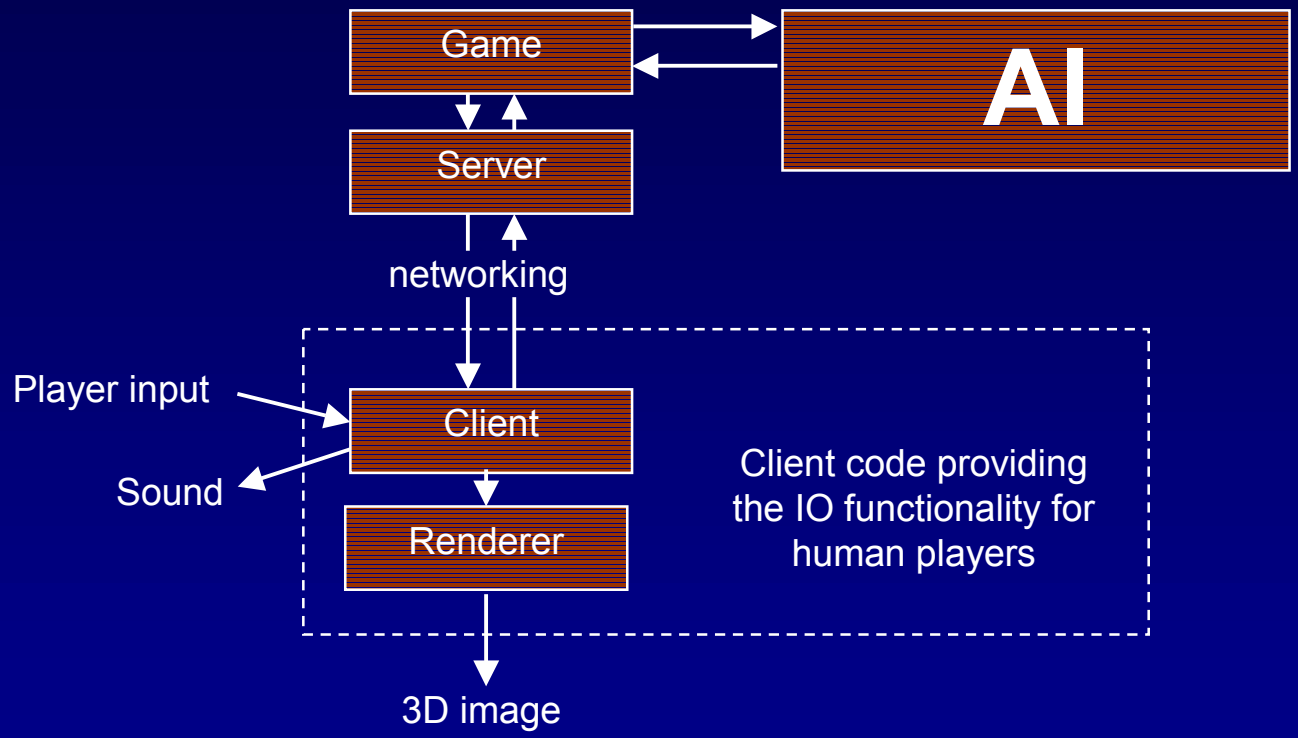
AI subsystems

- Decision making
  - Goal selection
  - Task selection
- Animation
- Movement
  - Pathing
  - Routing
- Tactical environment analysis
  - Identifying tactical positions

Game engine & AI



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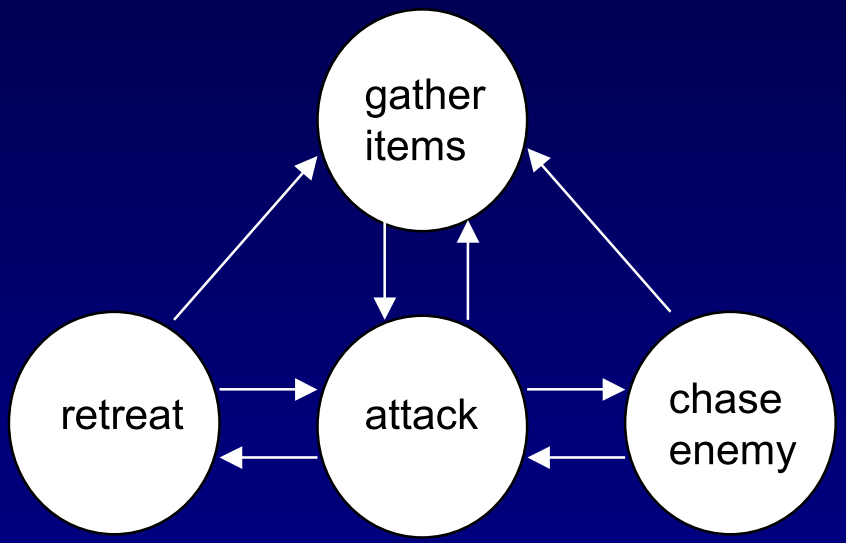
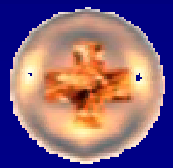
Finite state machine



Fuzzy logic

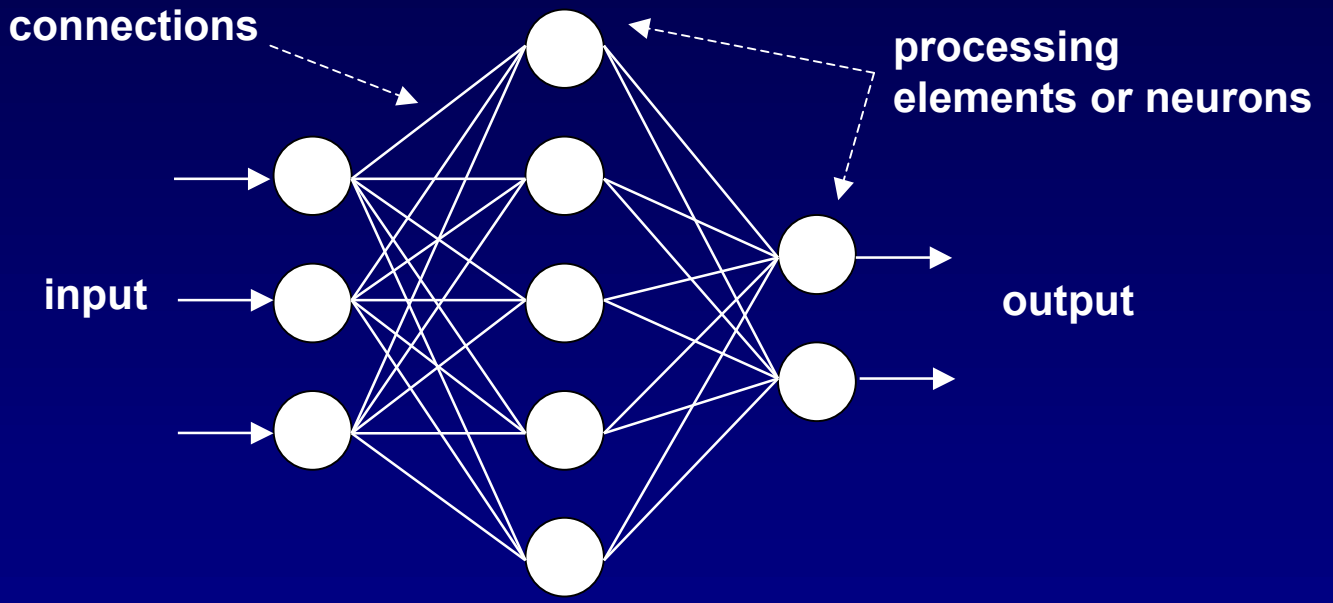
Fuzzy weight = 0.8

Fuzzy weight = 0.7



Fuzzy weight = 0.5

Neural networks

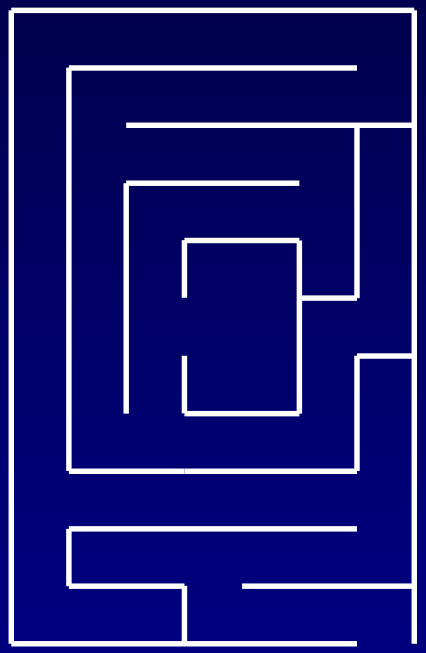


Expert system

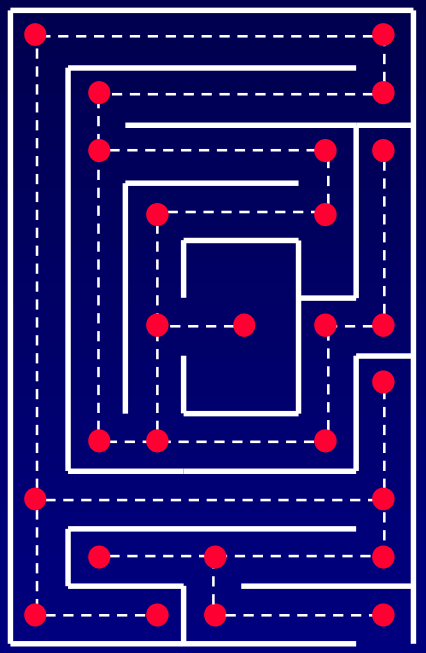
- If – then – else

- If (weapon) and (ammo) and (enemy in sight) then [attack]
- If (enemy in sight) and (out of ammo) then [retreat]
- If (low on health) and (health nearby) then [pickup health]
- If (no weapon) then [find weapon] else [find ammo]

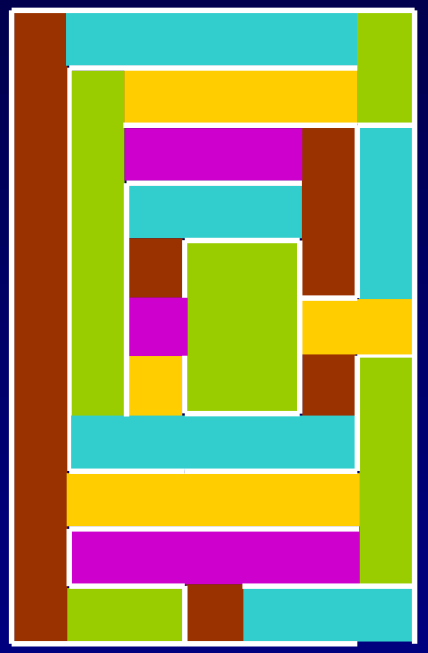
Pathing



Maze

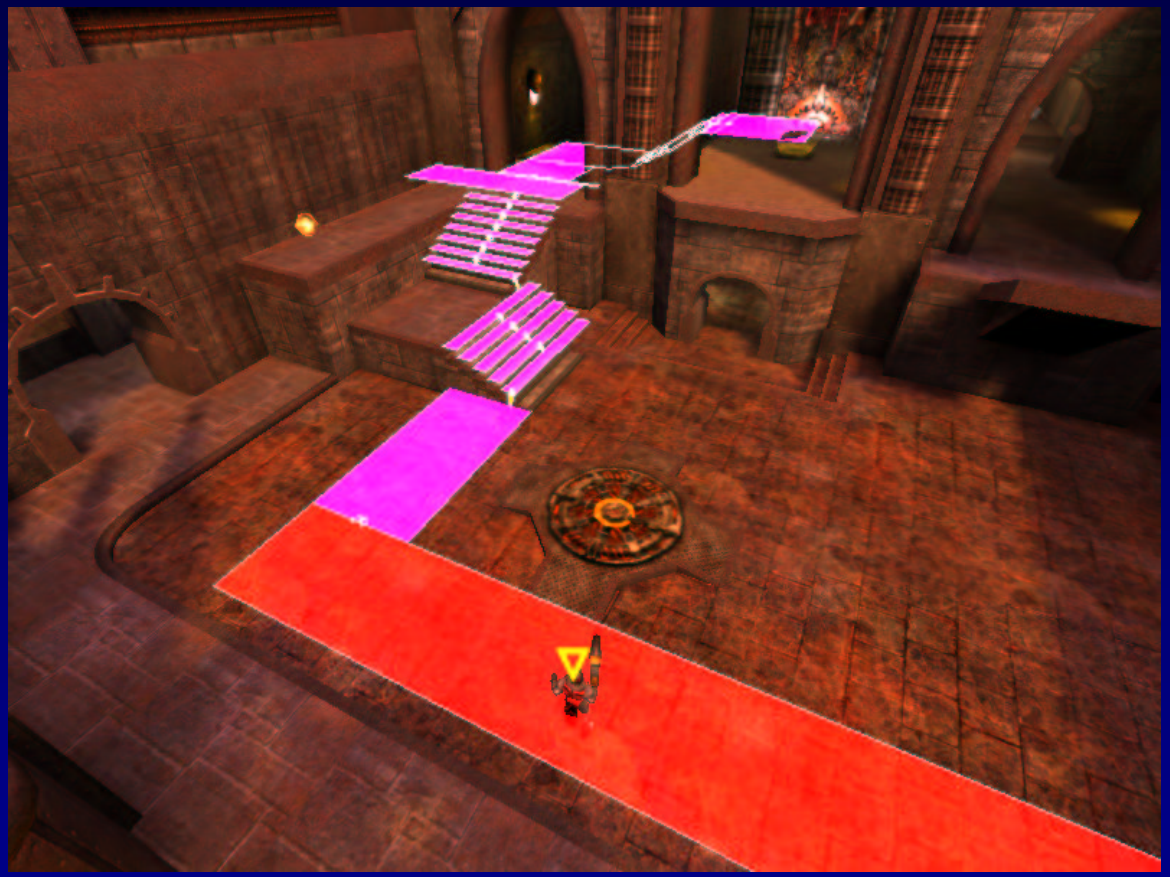


Waypoint system



Area system

Routing



A* / Dijkstra’s

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Development

- Do not add features that players will never notice or recognize as intended.
- Let AI characters deliberately make mistakes.
- Try to make it perfect first and then make it believable.
- Lots of testing and tweaking to make the AI characters interesting for the player.
- Concurrent development of technology and game content.

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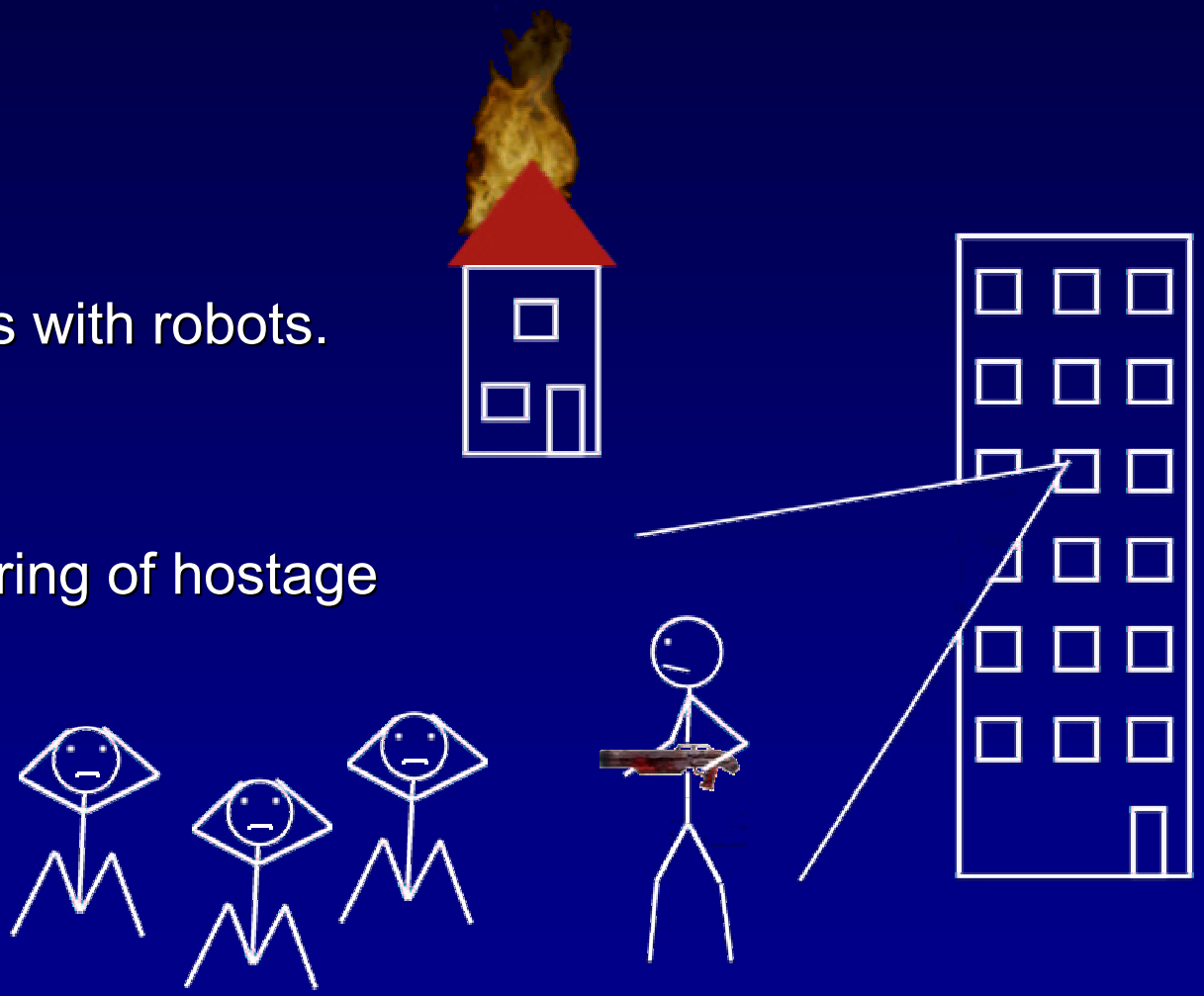
Games & scientific AI research

- Fire fighting in buildings with robots.
- Computer aided mastering of hostage situations in buildings.



Games & scientific AI research

- Gathering data for AI research is sometimes hard and often time consuming.
- Creating environments to test new ideas for AI is time consuming.

Games & scientific AI research

- Games provide ready to use environments to test new approaches to AI and new AI techniques.
- id Software games are easy to modify and part of the game source code is released.

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Conclusion

- In games illusion of intelligence is more important than actual intelligence.
- Variety of common techniques from the scientific world are used in games.
- Games provide excelent environments to research and test Artificial Intelligence.