

COMP250: Artificial Intelligence

# **1: AI Architectures**

**What is AI?**

# What is AI?

- ▶ Socratic FALCOMPED
- ▶ Discuss for **5 minutes**
- ▶ Suggest a **one sentence** definition of artificial intelligence (AI)

# What isn't AI?

- ▶ AI implies something beyond “mere computation” — but the lines are sometimes blurry
- ▶ AI is **not necessarily** about:
  - ▶ Mimicking human intelligence
  - ▶ General intelligence
  - ▶ Learning
- ▶ ... although these are all important sub-fields of AI

# Computers vs brains

Discuss:

- ▶ For what kinds of tasks are digital computers “better” than human brains?
- ▶ For what kinds of tasks are human brains “better” than digital computers?
- ▶ For what kinds of tasks are both “good”, but approach the task in different ways?

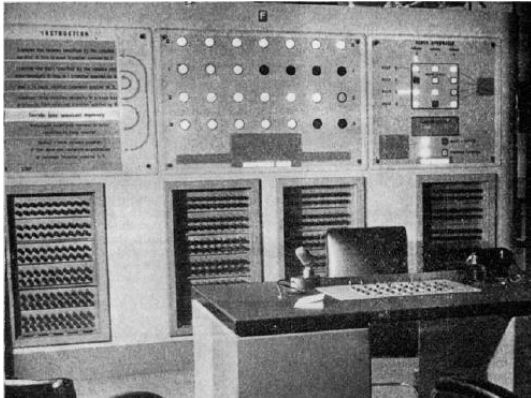
# Is it AI?

Discuss: are these examples of AI?

- ▶ Calculator
- ▶ Computer opponent in a chess program
- ▶ Enemy in a video game
- ▶ Facebook newsfeed
- ▶ Autocorrect in a text messaging app
- ▶ Autocompletion in an IDE
- ▶ Spellchecker
- ▶ Satellite navigation
- ▶ Virtual assistant (e.g. Siri, Alexa, Cortana etc.)
- ▶ Amazon product recommendations
- ▶ Search function in a text editor
- ▶ Google search
- ▶ C++ compiler
- ▶ Robot

**AI in games**

# Nimrod (Ferranti, 1951)

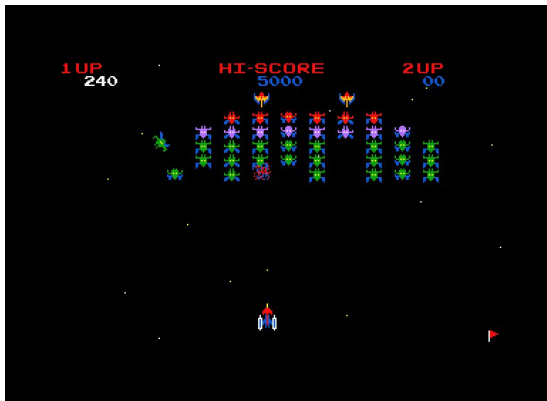




# Samuel's Checkers program (IBM, 1962)



# Galaxian (Namco, 1979)



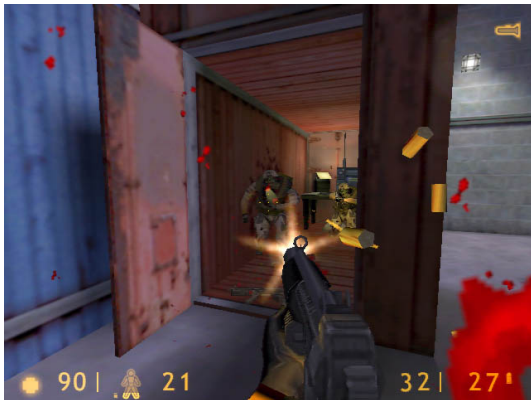
# Pac-Man (Namco, 1980)



# Deep Blue (IBM, 1997)



# Half-Life (Valve, 1998)



# The Sims (Maxis, 2000)



# Black & White (Lionhead, 2001)



# Façade (Mateas & Stern, 2005)





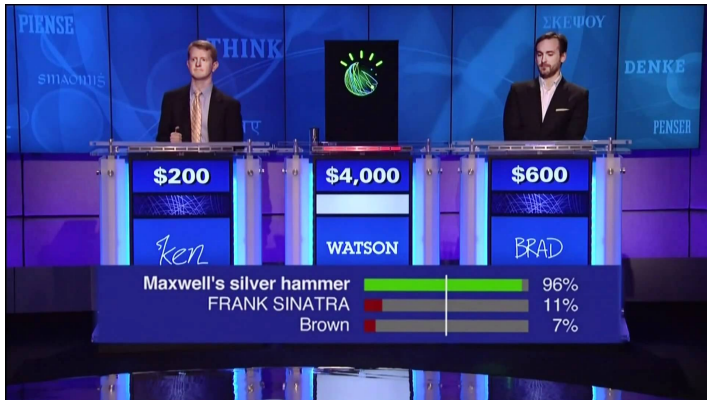
# Chinook (Schaeffer et al, 2007)



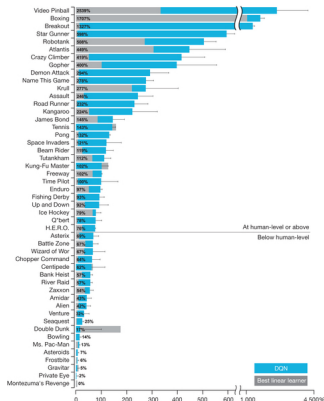
# Left 4 Dead (Valve, 2008)



# Watson (IBM, 2011)



# Deep learning for Atari games (DeepMind, 2013)



# AlphaGo (Google DeepMind, 2016)



# Applications of AI in games

- ▶ Enemies and other NPCs
- ▶ Opponents in {board, card, strategy} games
- ▶ Automated playtesting
- ▶ Directors, hints, adaptive difficulty
- ▶ Procedural content generation
- ▶ Content production tools
- ▶ Procedural narrative
- ▶ Agent-based simulations
- ▶ ...

# Design considerations

- ▶ Creating “perfect” AI is an interesting technical challenge, but may be bad game design

```
procedure ENEMY SOLDIER AI
```

```
    while player.isAlive do
```

```
        AIM AT(player.head)
```

```
        SHOOT( )
```

```
    end while
```

```
end procedure
```

- ▶ A common (and difficult) challenge: creating AI which is **imperfect**, but not obviously **stupid**

# Assignments



# COMP250 assignments

Similar to COMP220:

- ▶ Portfolio task (90%)
- ▶ Research journal (10%)

# COMP250 portfolio task

- ▶ Assignment brief on LearningSpace
- ▶ Basically, develop an **AI component** for a game
- ▶ In the next two weeks:
  - ▶ Prepare a **proposal**
  - ▶ Start **collecting** and **reading** appropriate literature
- ▶ For the rest of today: begin preparing your **proposal**
- ▶ Not sure what's technically feasible? **Ask me!**