



# COMP250: Artificial Intelligence

## 1: Module Induction

# Module Introduction



# Aim

To research and apply creative computing to the domain of artificial intelligence for games.

# Description

On this module, you learn how to apply artificial intelligence in the context of games. You will gain in understanding and experience of the technical dimension of artificial intelligence and you could leverage it in the particular expressive context within game development. You will apply your learning in a practical context where you will design artificially intelligent agents for a game in a live brief format, taking as your cue the game's concept.

# Learning Outcomes

- ▶ **2: Architect.** Integrate appropriate data structures and interoperating components into software, with reference to their merits and flaws.
- ▶ **5: Research.** Develop an argument on a topic using appropriate research methods, primary and secondary sources, and academic conventions.

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- ▶ Check MyFalmouth for assignment deadlines

# Assignments



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- ▶ Assignment 1: Computing Artefact (50%)
- ▶ Assignment 2: Technical Report (50%)
- ▶ These assignments assess the **architect** and **research** learning outcomes

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- ▶ Must demonstrate an appropriately advanced AI technique
- ▶ You are expected to do research beyond the topics covered in class

# Deliverables

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- ▶ Assignment 2: a poster **and** a web page describing the architecture of the component, with appropriate references to research sources

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  - ▶ Is the scope appropriate for the product development time-frame?
  - ▶ How will you address the architect and research requirement?

# AI in games



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- ▶ In games, AI systems break down roughly into two categories:

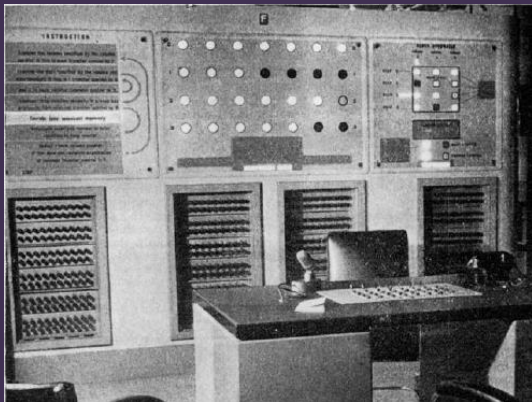
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- ▶ In games, AI systems break down roughly into two categories:
  - ▶ Authored behaviours: AI follows (often sophisticated) rules set out by a designer
  - ▶ Computational intelligence: AI behaviour emerges from an algorithmic system

# Nimrod (Ferranti, 1951)



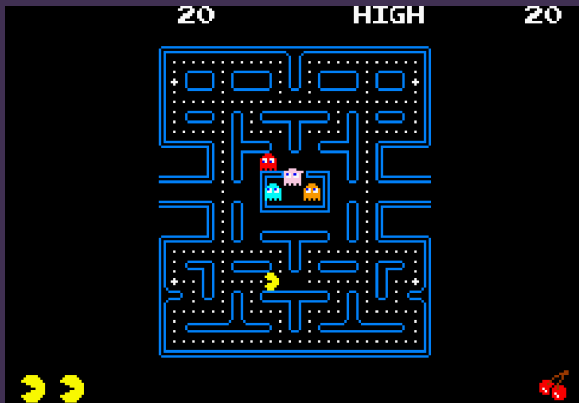
# Samuel's Checkers program (IBM, 1962)



# Galaxian (Namco, 1979)



# Pac-Man (Namco, 1980)

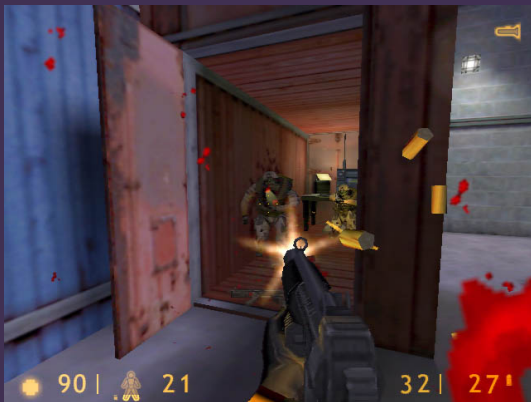


# Deep Blue (IBM, 1997)





# 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)

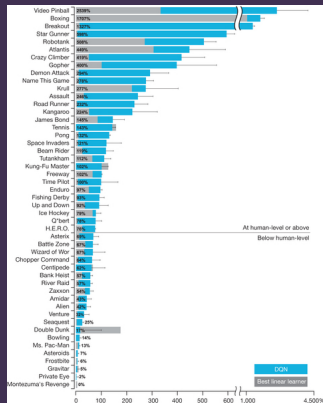


# Watson (IBM, 2011)

A screenshot from the Jeopardy! game show stage during the 2011 tournament. The stage features three contestants: Ken (left), Watson (center), and Brad (right). The background is a large blue screen with the word "THINK" in the center. The contestants' names are displayed on the screen: "ken" (left), "WATSON" (center), and "BRAD" (right). The scores are displayed on the screen: \$200 (left), \$4,000 (center), and \$600 (right). The question is "Maxwell's silver hammer" and the answer is "FRANK SINATRA". The progress bar shows Watson has 96% of the points, Ken has 11%, and Brad has 7%.

Contestant	Score	Answer	Progress
Ken	\$200	FRANK SINATRA	11%
Watson	\$4,000	FRANK SINATRA	96%
Brad	\$600	FRANK SINATRA	7%

# Deep learning for Atari games (DeepMind, 2013)





# AlphaGo (Google DeepMind, 2016)



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- ▶ Artificial neural networks

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