

By changing the Heading 3 above with the following **teal**, **turquoise**, **orange** or **pink** you can change the colour theme of your CloudFirst CloudDeakin template page.

When this page is published the Heading 3 above will be removed, but it will still be here in edit mode if you wish to change the colour theme.

Note: There is no need to delete this instruction or the Heading 3 above - they are only visible in edit mode and will be removed when your page is published.

See the [CloudFirst html template - additional features](#). (right-click and open in a new tab)

Learning goals

- Understand the relationship between Artificial Intelligence (AI) and Computational Intelligence (CI)
- Explain the **rational agent** approach to AI
- **Describe key properties of an agent and environment**, including their applicable data structures (Focus in Practical session)
- Identify different types of **agent architectures**

Pre-Class Self-Study

1. Pre-Class Study Resource - SIT215 Week 1.ipynb

- including a guide for Python installation, Jupyter Notebook setup, and a refresher on Python data structures and key programming techniques. This will take approximately 1 to 1.5 hours, and we recommend using **Google Colab** for an easy, installation-free experience. Ensure you review the role of Python in Computational Intelligence (CI) and data analytics, as this foundational knowledge will be essential for upcoming sessions.
- Available in this unit site for download: [SIT215 Pre-Class Study Resource_W1](#)

2. Recommended reading

- (You have the flexibility to complete the reading either before or after the weekly lecture and practical sessions. However, engaging in pre-lecture reading is highly recommended.)
- { **Chapter 1 & Chapter 2.1 - 2.3** } of Stuart J. Russell and Peter Norvig. **Artificial Intelligence: A Modern Approach, Global Edition**, ISBN: 9781292401133
 - Available at Deakin's library [AIMA](#)
 - Available for purchase at the publisher, Pearson <https://bit.ly/4gyIFsU> . *According to information provided by Pearson's Education Engagement team, an online discount has already been applied to Pearson's website this year, so no discount code is required.*
- Or its **US edition**
- Stuart J. Russell and Peter Norvig. **Artificial Intelligence: A Modern Approach**, 4th US edition, 2021, ISBN: 97801ab34610993

Topics

Computation and AI

An intelligent agent relies on computation for perception, reasoning, learning, and decision-making. **Algorithms** help manage and process data, perform inference, optimise actions, run simulations, and interact with the external environment (including humans). Modern computer hardware (particularly modern GPUs) is essential for the recent success of deep learning systems, including AlphaGo and ChatGPT.

The Nature of Environments

An environment models the application context for the agent to be designed. Understanding the nature of the environment is essential, as it determines the knowledge and reasoning for the agent to operate effectively.

To understand the environment, it is helpful to consider the following classifications:

- Fully observable or partially observable
- Deterministic or nondeterministic
- Episodic or sequential
- Discrete or continuous
- Known or unknown

Agents and environments

Our unit aims to study **intelligent** agents. The framework of **agents and environments** provides a common language for designing intelligent systems. In this framework, an agent lives in its environment (and is a part of the environment). An agent perceives its environment and chooses an action that may influence the environment. In other words, an agent is a computational system that maps **percept** into **actions**.

Rationality

In this unit, we do not aim to build a super-intelligent agent. Instead, we focus on **rational agents**. We want an agent that can do one type of task well to benefit its human users. Therefore, an agent has a performance measure to be optimised.

As an agent is not omniscient, it chooses its action to optimise the **expected** outcome, not the **actual** outcome.

The Structure of Agents

Agent design follows some common agent architectures. The architecture determines the type of agent program that an agent uses to make decisions.

Just like data structures affect the algorithms, state and knowledge representations affect the agent programs. In this unit, we will primarily deal with atomic and factored representations. If you are familiar with databases, they would be easy to understand.

Finally, the performance measure is important for designing more intelligent agents.

Rational agent

We focus on **rational agents**. An agent is a computational system that maps **percept** into **actions**. An agent has its goal(s). It is **rational** if it takes actions that maximise the expected outcome.

Callout

Learning activities

- Conduct the Pre-Class Self-Study including the recommended reading
- Engage with discussions in Lecture and Practical (Workshop).
- Complete the IPython notebook SIT215_Prac_Week 1, including the embedded exercises.

Lecture Slides and Resources for Practical (Workshop) are available under the weekly folder respectively in Learning Resources section. For example Lecture slide is available in Week 1: Introduction to Computational Intelligence, AI and Agents >>> [Lecture](#), (you can also navigate to the next page by pressing the button "Next > " at the bottom, to access the lecture slides and so on)