## COMP813 Artificial Intelligence 2024

# Assignment – 40 Marks

Choose either A or B.

## Choice A

**You can work alone or team up with another student to complete this option.**

Write an essay on one of the AI methods explored in this course. Begin with an introduction to the method's origins, tracing its historical development and recent advancements. Evaluate the method's significance and its limitations. Cover some of the latest related research presented in IJCAI 2024, a top AI conference. To do this, visit the conference papers at [IJCAI 2024 Accepted Papers] (https://ijcai24.org/main-track-accepted-papers) and use the "Filter per area" tool to select relevant papers (pdfs can be download here https://www.ijcai.org/proceedings/2024).

## Requirements:

- **Format**: Use Times New Roman, 11-12 point font size, with 1.0 line spacing. The document can be formatted in either single or double columns. The maximum page limit is 4 pages (references are not included in this page count).
- **Reference style**: IEEE (preferred) or APA.
- **Submission**: via Canvas (in pdf format). Deadline on Canvas.
- **AI usage policy**: see https://canvas.aut.ac.nz/courses/7624/pages/academic-integrity#artificialintelligenceandacademicintegrity

## Choice B

**You can work alone or team up with two other students to complete this option.**

Develop a game playing agent using the AI methods that have been discussed during the lectures. Evaluate the agent playing against different players including a random player. Write a report for the agent design and evaluation.

## Requirements

- The agent should be able to play: either Nine Board Tic-Tac-Toe, or two games (Tic-Tac-Toe + another game of your choice).
- Nine Board Tic-Tac-Toe is described as follows: "Nine Board Tic Tac Toe is a variant of Tic Tac Toe played on nine boards arranged in a 3x3 grid. The first player's can go anywhere on the board; all moves thereafter

are placed in empty spaces on the board corresponding to the square of the previous move. For example, if a move were in the upper-left square of a board, the next move would take place on the upper-left board. If a player cannot move because the indicated board is full, the next move may go on any board. Victory is attained by getting three in a row on any board. This makes the game considerably longer and more involved than Tic Tac Toe, with a definite opening, middle game, and endgame." Try a play in this implementation: http://logicprogramming.stanford.edu/examples/nineboard/demonstration.html

- The methods should include at least two of the following: Minimax, Alpha-Beta Pruning, and Monte-Carlo Tree Search. For Minimax and Alpha-Beta Pruning, there shall be two versions: complete search and depth-limited search (by introducing a depth limit and evaluation function).
- Programming language: Java, Python, C are preferred; for other languages, send an email to lecturer with your rational for approval.
- Evaluation should be done on at least one game by testing the players against each other including a random playing agent (which always selects a random legal move, and serves as a baseline).
- Report shall use Times New Roman, 11-12 point font size, with 1.0 line spacing. The document can be formatted in either single or double columns. The maximum page limit is 4 pages (references are not included in this page count). Reference style IEEE (preferred) or APA.
- **Submission**: via Canvas (Report in pdf format; source code in Zip folder). Deadline on Canvas.
- **AI usage policy**: see https://canvas.aut.ac.nz/courses/7624/pages/academic-integrity#artificialintelligenceandacademicintegrity