Task 20 – Doc – Research Plan

"This credit-level document is required before you undertake a HD research report. This enables staff to give you feedback on the plan and help you succeed in your research activities. The plan counts towards your credit-level outcomes, even if you do not undertake the research work. Additional artefacts created for a HD Research outcome must be submitted or linked in Task 21."

In order to achieve a High HD grade outcome, you need undertake and present (with a report and at the interview) a research project. This is in addition to your custom project completed to a HD level of outcome.

To do a research project you must first create a Research Plan document for this task, that your tutor will discuss with you and approve before the end of week 12. This allows your tutor to give you feedback on the question or topic you have selected, to see if it is appropriate, and give you advice to help you be successful. Your research plan should clearly communicate what your key question (or gap) is, and how you intend to investigate it.

The "Research Plan" document will contribute to your Credit level outcomes for the unit even if you decide not to undertake the research work.

Basic structure for a plan document:

Title: Research Plan
Your Details: Your name and ID
Unit Details: COS30002 – AI for Games

Introduction
Explain the purpose of the document … just a good general habit for writing. Try to include the basic key idea (question) that you are intending to investigate and answer. Research is a structured approach to answering a question. Remember also - this document is just a plan so things can change later. It is not a contract that you must follow exactly.

Key Research Question(s)
Clearly state here (as best you can) an isolated version of what your research "question" is. It may repeat what you said in the introduction, but that is fine. Try to put it formally and clearly. You might even identify sub-questions from a larger question. If so – state that too!

Research Method (Steps you plan)

- Outline the basic steps that you will do for your research. If you are going to use your custom project (good idea) then explain what that program does.
- What you will do to answer your question. If you are going to compare different versions of your program (structure/pattern) explain what you expect.
- Try to clearly identify what data you will be collecting, and how you will collect it. Remember that you might be collecting qualitative or quantitative data – both are valuable. You can also collect data from people using surveys or observations, but that approach is more involved.
- How will you present the collected data? Will you be using a chart or table, or something else? (You might not know yet, but if you can make a good guess, put it here.)

Summary:
Restate simply what you intend to do.

Additional Notes / Resources:

We strongly encourage you to talk to your tutors about your research plan, and how you intend to approach your research question.

There are additional lecture notes on research that you should refer to:

Points to consider to help with your research plan:

- Look for a question where you can compare A vs B (vs C). Not "Yes/No" question which are often too simple.
- You will need a way to present results in a report – so keep in mind what data you can collect for later.
- Look for meaningful criteria when measuring or assessing data. (Qualities, not just numbers, can be useful.)
- Look for numbers / empirical evidence to support any claims you might want to test or make.
- Look for tables, charts, summary, flow charts, quality descriptions, outcome, ideas, discussion points
- Look for other research work (papers, articles) related to your work. Cite appropriately.

Use The Five Question Method

To develop an effective research proposal, and also to communicate research results, we can consider and answer each of these areas/question (see the lecture also):

1. Domain / Context?
2. Gap / Questions?
3. Method / Approach?
4. Results / Outcomes?
5. Implications / Extensions?

Do Research Based On Your Custom Project!

For many people, it is possible to develop a research question that comes out of their custom project work. If you are planning on developing or implementing particular AI features or techniques, you can always compare different versions of your code as you go (or retrospectively). You can consider both the algorithm differences, as well as performance and optimisation measurements, which map very strongly to the ILO's for the unit.

Some Example Topics:

- *Multi-person board game or **puzzle game opponent** AI, and different levels of difficulty. Test the different AI levels against each other to validate the performance. Look for interesting ways to compare the performance. Remember that even a simple (non-optimal or poor performing) AI might have value against humans in the right context. Game examples include: checkers, chess, card games (poker, black-jack etc), battleship, connect 4, dominos, guess who, Chinese checkers, etc.*
- *Single person games (or similar multiplayer) where you can develop **AI approaches that can play** such problems. For example: solitaire (various), mine-sweeper, sudoku, mastermind, Mahjong, flappy birds, bejewelled, candy crush, zombies vs plants, etc. You could try both algorithmic (rule or state) based approaches as well as adaptive learning approaches (neural networks, evolutionary algorithms).*
- *Think about how to use AI in team-based sports games. Take a specific game or context and develop an approach. This could be as an opponent to human players, or as support for the human players.*
- *Consider squad-based military coordination and apply it to a game or demonstration. How would you defend against a horde of zombies? Can you create suitable AI plans for a SWAT team to storm a building?*
- *Try applying various ideas from the "art of war" to a simulation or game, especially strategy games.*
- *… talk to your tutors!*