The purpose of this project is for you to explore a deep learning research paper of your choice from one of several pre-specified options You will study the paper, summarize it, and demonstrate numerical and computational aspects from the paper via your own code. In certain cases you will reproduce all the results of the paper. However in most cases this is not possible, and you will only create a partial demonstration of the ideas, results, and methods of the paper.

Your project needs to serve as a companion to the paper such that in the future if a (potentially hypothetical) reader is interested in the paper, they will gain additional insight and understanding by also using your project. As such, after your project is graded, you may opt to make your project available online. However this is completely optional.

In addition to the standard voice recording outlining your assessment experience and non-plagiarism statement (see the hand-in instructions page), your project submission will include:

1. A single page document for the project checkpoint.

2. A two page extended abstract of the paper.

3. A Jupyter notebook, Google Collab, or R Markdown notebook with code, output, text, and formulas, outlining your numerical demonstration.

4. A short video outlining the content of the Jupyter notebook, potentially demonstrating the execution of the code, or analyzing the output.

5. A project submission (and grading) form.

Here are the details:

(1) Checkpoint: A checkpoint for your project is due on February 8 and the rest of the project, (2)–(5), is due on Feb 15 (all submissions prior to midnight AEDT). You may receive feedback on your checkpoint by no later than Feb 10, giving you additional information on how to carry out the project in the best possible manner. If you don't receive any feedback then it is an indication that your plans are on track and you should proceed with the project. If you do receive feedback, then use it to revise your plans for the project accordingly.

Prior to preparing for the checkpoint you should choose a single research paper from the "Further deep learning papers" list. Do this by considering all (or most) of the papers on that list and selecting the paper that interests you most. You can do that be reading the abstract of each paper and flicking through the body of the paper. A specification of your selected paper is one of the main goals of the checkpoint.

After selecting the paper you should carry out a first complete read of the paper. You don't have to dwell on every minor technical detail but you should get an understanding of the paper's contribution, main methods, and key results. Most papers also point to additional source code, videos, or other content and you should explore this additional content as well.

At this point you should **plan out** a computational demonstration, (3), which will be part of your project. The demonstration can do one or more of the following (typically one if enough):

- Reproduce some of the results of the paper.

- Use some of the tools created by the paper on other data of your choice.

- Demonstrate the validity of theoretical or empirical results of the paper.

- Carry out a simpler version of some of the methods presented in the paper.

- Carry out data analysis related to the methods of the paper - for example further analyzing output of the methods available elsewhere.

- Serve as a pedagogical aid to understanding the methods of the paper.

You should plan your demonstration so that it can be carried out in 5-15 hours of work and does not require excessive compute. You should also choose if to use Python, R, or Julia.

You can then prepare your checkpoint submission which should fit on no more than a single PDF document. The submission should include: Your name. A specification of the selected paper (please use unambiguous referencing and provide a hyper-link to the paper from your submission). A brief summary of why you chose this paper (1 paragraph). A specification of the computing language you will use (Python, R, or Julia). A plan of the computational demonstration that you wish to carry out. The writing of the plan can span 1-4 paragraphs and should highlight a clear plan and path for the content and purpose of your computational demonstration.

(2) Two page extended abstract: This PDF document describes the contributions of the paper in detail and also refers to your own numerical demonstration. It is a self contained document that one can read without having to read the research paper or your computational demonstration (although clearly there are more details in both the research paper and your demonstration that are not in this abstract). It refers to the research paper as "the paper" and provides a reference and hyperlink to the paper. It may refer to the authors of the paper in third paper, e.g. "the authors". It refers to you in first person plural e.g. "we demonstrate" and should also include your name in the title. It refers to your computational demonstration as "our demonstration" and after highlighting the contributions of the paper, refers to the contribution of your demonstration. It may contain hyperlinks to the demonstration's GitHub (or other web location) if you choose to make it public at the time of submission. It can be created using LaTeX or other means, and may use two columns if you prefer. Any formatting is acceptable as long as it is organized and makes good use of space. With space permitting, it can also include output (figures/graphs/tables) from your computational experiment. However this isn't mandatory.

(3) A notebook (Jupyter, Google Collab, or R Markdown): This interactive document should contain source code for your computational demonstration as well as text and formulas describing the demonstration and properly documenting the source code. Like the extended abstract it should contain your name and a link to the research paper with proper citation. You should hand in a single PDF of this document including output (evaluate the cells) as well as an indication of the run time of the cells (when significant computation is involved). This dynamic document does not have to document all the claims, algorithms, formulas, and results of the research paper, however when considered in conjunction with your two page extended abstract it should summarize the bulk of the contribution of the research paper such that one would only need to refer to the research paper for extra fine details or secondary contributions. In addition to the PDF document, hand in the source code for the notebook. In cases where data files or other source files are needed, encapsulate the source code and the additional files in a single Zip file (keep the PDF version out of the Zip file for easier marking). Using Google Collab, NBViewer, or similar platforms and providing a link (in addition to the PDF document) is also ok.

(4) A short video: This is a YouTube video (or similar) spanning 3-8 minutes (8 minutes is a hard upper bound). The video's aim is to overview the notebook (3). The main content of the notebook is to be presented in a way such that a viewer of the video can get a feel for your

computational contribution in the notebook in light of the research paper. Make sure to start by stating your name and the research paper and then highlight the key parts of the notebook. There is no need for fancy video editing. All that is needed is a voice and screen recording while scrolling over the notebook. However feel free to add basic elements such as a "splash intro" if you wish (however this is completely optional). In the recording you can also flip between the notebook to the research paper and your extended abstract if you wish. However this is optional. Make sure to have a clear narrative letting the viewers of your video know about the research paper, its importance, and then moving quickly to the computational demonstrations that you created.

(5) Submission grading form: This is a template document where you write your name, your home institution university, your research paper (provide full citation). You then provide a working link to your video and to any additional resources. The marking criteria for the whole project is implicit in the submission grading form.

Note: All submitted documents and the video should also contain a link to the course website.

Good luck.