Extended Call for Papers for the
2023 ANU ANNUAL BIO-INSPIRED COMPUTING STUDENT CONFERENCE
also being used for
COMP4660/8420 Assignment 2: Extension of Assignment 1

Submission Due: Sunday 29th October (Week 12) by 11:59pm.

## Context

This assignment extends the previous one in a way that is up to you; there should be some connection to the previous assignment, but remember, don't get too stressed. You should take into account the marking outcomes from Assignment 1, and any peer review comments you may get, to improve the text as appropriate to the new assignment.

So, what do you do? You can either extend you current paper using a deep learning approach OR an evolutionary algorithms approach.

Examples: if you extend the current with an evolutionary algorithm, you could adjust the parameters of your neural network or pruning or input processing or all the weights or … Similarly, you could use a CNN on the larger version of the data set (not all datasets have this) and then apply the same pruning or … to the fully connected layers at the end.

## Deliverables (all similar to before)

1. A report (about 4-6 pages of text content with a MAXIMUM of 10 pages, including references, diagrams, graphs and tables). Remember to keep your report clear and concise. I say that the text content should be about 4-6 pages to signal that we will not be counting lines, but if it is 10 pages long and it is all diagrams then it is very clear that there is too little text. Conversely, if it is 10 pages long and there is just one diagram then there is too much text, but 6 pages with one diagram is fine, and so on.

2. Your assignment 2 is an extension of assignment 1 so we expect a significant proportion of the text to be the same and just extended and improved in assignment It is your own words so re-using the text as we explicitly allow is not plagiarism. Assignment 2 is a new paper so the title must be sufficiently different to reflect that it is a new paper.

3. Support documents in a zip file
a. PyTorch or Python source code file(s), plus the data set you used for your assignment, in original and preprocessed form. In one zip folder. (Please note that if the data set is quite large, please omit the original data set to reduce the file size.)
b. Copies of the technique and dataset papers. This is for consistency, and makes marking easier as it clearly identifies the papers chosen.
c. Source documents for your report. This could be a Word document or a folder of Latex source or …

## Submission Method
Please submit your assignment via the OpenReview conference management system. Your submission will be a second version of your previous paper as far as OpenReview is concerned – I will re-open the site about a week before the assignment is due. Something like this is common in conferences, when your paper is accepted you then modify based on review comments (markers and peer reviewers in this case) and then submit a final version (often called a "camera-ready" version).

## Objectives
The purpose for this assignment is for you to:
• Develop a good understanding of deep learning or evolutionary algorithms, and enhance your skills in implementing them in PyTorch / Python.
• Enhance your approach to investigating and solving a real-world data set / problem.

• Develop improved understanding of reporting investigations in a conference paper.
• Some experience in using Google scholar to find citing/cited papers.

**Task Description**

Your task is to:

1. devise a classification or regression problem to investigate using the data set;
2. implement in PyTorch / Python to solve the problem and implement a method to determine the performance of the technique(s) you used;
3. implement a technique from the literature (paper selected as for assignment 1) and determine its benefit or lack of benefit (to keep it simple, we expect you to simply extend the work you did in assignment 1 simply using DL/EA, rather than doing a brand new assignment);
4. compare your results with results published in the dataset paper reporting results on the data set you chose (dataset paper as chosen for assignment 1); and
5. write a report on your work.

Data set
Either continue with your existing dataset  Your report should indicate which dataset you used, what modifications you made to the encodings if you needed to do so, and cite the technique paper you chose. Other academic papers can generally be found by using Google scholar. Google scholar will have links to one or more paper repositories. You can get access if you do this from ANU campus as the library subscribes to most of the large document repositories. Some papers are in multiple repositories so if you cannot find a free copy then ask your tutor for advice. From off campus, if you log into the ANU Virtual Proxy server then usually you can access the same electronic resources. You should also mention in your report any different topologies and analyses used in your experimentation.

Design of a Problem
Detail in your report what you want to model in the data set and explain what the inputs and outputs you will use to develop the neural network model.

Implementation
Choose an appropriate measure to report the results produced by your extended technique and compare to your results using neural networks. You can use the measure used in the research papers that have the results of their predictions on the data set you have used and would like to compare your results with. Remember to cite the papers in your report.

Report
The report must be in the style of an academic paper and must conform to the Lecture Notes in Computer Science conference paper proceedings format, but with the margins changed to 2 cm and header/footer to 1 cm. The template for the report can be downloaded from Wattle by clicking the link named "AssignmentReportTemplate-LNCS-Office2007.zip" and needs the margins to be modified. Use the Springer citation style

Your report should have a meaningful title, which indicates what you have done. "COMP8420 Assignment" is not a meaningful title. Your title and content should NOT mention the course: we are modelling the assignment so that you are making a conference paper submission. Your u number should be showing in your email address, and only there. Your affiliation would be "School of Computing, Australian National University, Canberra Australia".

A suggested structure for the report:
• Abstract – A paragraph that summarises the work you did, the results you found and whether it was better, same or worse than a published research paper for the same dataset. An abstract is similar to an executive summary of the entire report.
• Introduction – A description of the motivation for the choice of the data set, the problem that you modelled using a neural network and an outline of the investigations that you carried out using the model. This section should also include

a brief background to the problem and the methods used perform the analysis. Remember to use citations!

• Method – A description of the technique(s) you implemented and details of the investigations or tests you conducted using the technique.

• Results and Discussion – Presentation of results from the investigations and detailed analysis of the results including comparison of your results with the results published in a research paper on the data set. Remember to use citations!

• Conclusion and Future Work – A statement on your findings and how your work can be extended or how might it be improved. Even if you have conducted a thorough investigation there is always work left to do. Outlining future work is VERY important as it shows that you have thought about the problem and have a deeper understanding then just stating a conclusion.

• References – You should have a few more than last time, as this is the 2nd version of your paper (or it's a 2nd paper). Don't forget to cite source, target and other papers you got information from.

A comment: you should read papers in relevant areas of the literature (e.g. on similar topics) to get more of a feel for how to write and layout academic papers. This forms part of the learning you should get out of advanced courses such as COMP4xxx/COMP8xxx given that the ANU is a research intensive University.