

Extended Call for Papers for the

2ND ANU ANNUAL BIO-INSPIRED COMPUTING STUDENT CONFERENCE

<http://cs.anu.edu.au/~tom/conf/ABCs2019/>

also being used for

COMP4660/8420 Assignment 2: Neural Networks

Submission Due: Sunday 2nd June (Week 12) at 11:55pm via [EasyChair](#).

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.

In either case, you should take into account the marking comments 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 your current paper using a deep learning approach OR an evolutionary algorithms approach. If you want to do a completely different second assignment / fuzzy approach that is ok, but send me an email as I worry those will be too hard.

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. 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.
 - 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 [EasyChair](#) conference management system: <https://www.easychair.org/conferences/?conf=abcs2019>. Your submission will be a second version of your previous paper as far as EasyChair is concerned – I will re-open the site about a week before the assignment is due. You can then just submit using the paper_v2 and support_v2 fields. 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 or fuzzy logic 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 you selected;
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/FZ, 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 or choose a data set from anywhere. Ensure that the data set you choose has a relevant academic paper associated with it to compare your results with. This time you will need to find a modern result to compare to, but you do not need to get a better result – this is just an assignment not a research project.

Your report should indicate which dataset you used and how to get it, what modifications you made to the encodings if you needed to do so, and cite a research paper with results on the data set to compare to your results, and 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. If you prefer to use Latex, there is a link on the ABCs conference website which takes you to Springer's current pages. Any template from there will also need the margins to be modified. Use the Springer citation style as found in the template file you use.

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 "Research School of Computer Science, Australian National University, Canberra Australia". Please do not forget to include your name as the single author.

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 than 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.

Peer Marking

Some of you are participating, some of you are still sitting on the fence. I've started allocating papers to everyone who accepted their invitation by Thurs night, I will allocate papers to anyone who accepts later, aiming to be within 24 hours of their accepting. Because of the numbers involved, I have prioritised papers by those participating, so they are likely to get more reviews than those of you who are not participating.

Conference

Will we really hold it as a physical conference? I hope we do go beyond a virtual conference, but it will be up to you all. We will discuss it during the rest of the semester.

Assessment Guide (/30 i.e. marked out of 30) worth 20% of overall course marks

Abstract (/2)

Clear and concise abstract summarising the work done

Method section / Data Set and Model Design (/8)

Valid reasons for choosing the data set

Good level of problem complexity

Clear and valid investigation aims

Model design that clearly serves the purpose of the investigations

Appropriate measures used to determine the performance of the neural network and predictions

Good explanation of the model design

Appropriate choice for the inputs and outputs of the prediction model with valid reasons

Evidence of good understanding of the relevant literature

Results and Discussion (/6)

Good methods used to evaluate the model including an appropriate split of the train, test / validation data OR evolutionary algorithm cross-over / mutation settings to maintain diversity.

Good level of detail used to analyse results

Conclusion and Future Work (/2)

Appropriate conclusion of the work

Appropriate work suggested to extend and/or improve the work

References and citations (/2)

References used as appropriate

Presentation (/6)

Good report structure

Report is legible, clear and concise

Clear presentation of results including appropriate use of figures, tables and graphs

Report conforms to required style (including the use of appropriate language) and length

Consistent style used for citing references

Correct grammar and spelling

Implementation (/4)

Structure of the code is legible and well organised

Evidence of good code design - appropriate level of modularity, encapsulation and reusability of the code

Code is comprehensible with appropriate names of coding items e.g. code files, functions, variables

Code executes without errors

Good comments in the code