National University of Singapore
Department of Statistics and Data Science
ST5229 Deep Learning in Data Analytics
Group Project[1]

1 Instructions

- This group project accounts for 15% of your final grade.
- Each group should include 4-5 students.
- All members in the group will share the same grade.
- Each group will submit a initial proposal (2%) by **9 Mar 11.59 p.m.** and a final report (13%) by **13 April 11.59 p.m.**

2 Objective of group project

Deep learning is a rapidly advancing field. The objective of this project is to learn about some of the latest developments in this field by studying some recent publications.

- The group project is based on understanding, illustrating, applying and/or extending a recent publication on a deep learning topic (focus article).
- The focus article should be published in a reputable journal or conference proceedings within 2014–2024. You are encouraged to select an article from the recommended list of journals or conference proceedings in Section 5.
- Articles that have not been peer-reviewed should not be selected as focus article. The focus article may fall in one of following categories:
  - Application (a novel method is proposed to solve a deep learning problem in computer vision, machine translation, etc).
  - Algorithm Development (a novel method is proposed to improve optimization, reguariztaion etc in deep learning).

3 Proposal

In your proposal (maximum length: one page), you should provide

(i) a full citation of the focus article and category that it belongs to (application or algorithm development).

(ii) a short description of the problem that the focus article aims to address and the proposed methodology.

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(iii) a list of four articles (with full citations) that you plan to include in the literature review.

(iv) a provisional plan of the division of work among the group members.

4 Report

In your report, you should

(i) conduct a literature review on the topic of interest in the focus article.

(ii) discuss the contributions of the focus article and how it improves on existing methods.

(iii) explain the methodology in your own understanding, and provide additional details or workings to fill in any gaps in the focus article.

(iv) create simple examples to illustrate the methodology or parts of it.

(v) apply the methodology to alternative datasets or on the same datasets used by the authors but with varying hyperparameter settings, and discuss the results obtained. Some authors may have made their code and data publicly available. However, if you are unable to apply the methodology due to limitations in computational resources or unavailability of code or data, you can try to design some small experiments instead to illustrate parts of the methodology, and then discuss broadly the applications and results obtained by the authors.

(vi) discuss the relevance, significance and limitations of the methodology.

(vii) present ideas on any other possible applications or extensions of the methodology.

The report should be submitted in the form of a single pdf file, which should be 6-7 pages. Penalties may be imposed if the page limit is exceeded.

At the end of the report, please include a section containing the references and a section detailing the role of each member in the project and their contributions. These two sections are not counted within the page limit.

The project will be assessed based on

- clarity of written content (the content should be presented and explained such that it is understandable to a person with basic background in deep learning but without expert knowledge in the discussed topic),
- comprehensiveness of literature review and the citation of appropriate references,
- depth of understanding of technical content,
- effectiveness of designed examples or applications to illustrate the methodology,
- level of insight in the significance of methodology in focus article.

All group members must participate actively in the project. Marks may be adjusted for individual members who refuse to contribute or fulfill their agreed roles in the project.

5 Recommended Jounals or Conference Proceedings

- Journal of Machine Learning research (https://www.jmlr.org/)
- Neural Computation (https://direct.mit.edu/neco)
- Neural Networks (https://www.sciencedirect.com/journal/neural-networks)
- IEEE transactions on neural networks (https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=72)
- Journal of Computational and Graphical Statistics (https://www.tandfonline.com/journals/ucgs20)
- Transactions on Machine Learning Research (https://jmlr.org/tmlr/)
- Proceedings of IEEE International Conference on Computer Vision (https://ieeexplore.ieee.org/document/466933)
- Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR, https://ieeexplore.ieee.org/xpl/conhome/1000147/all-proceedings)
- Proceedings of Conference on Advances in Neural Information Processing Systems (NeurIPS, https://proceedings.neurips.cc/)
- Proceedings of International Conference on Learning Representations (ICLR, https://openreview.net/group?id=ICLR.cc)
- Proceedings of International Conference on Machine Learning (ICML, https://proceedings.mlr.press/)
- Proceedings of International Conference on Artificial Intelligence and Statistics (AISTATS) (https://proceedings.mlr.press/)
- Proceedings of Uncertainty in Artificial Intelligence Conference (UAI, https://proceedings.mlr.press/)