STAT 453 Class Project

— —Spring 2023, instructor Yiqiao Zhong

Format

A basic format follows the version from previous years

https://pages.stat.wisc.edu/~sraschka/teaching/stat453-ss2020/

but new changes are introduced.

Please read the "Class Project" section on the page and the instructions below. Whenever new changes are introduced, use the instructions below; otherwise, we will follow the instructions from previous years.

A team of **four students** working collaboratively on a project. The project is graded based on three parts.

- Literature review. Each **individual student** is required to submit a short write-up of **2—3** pages (font size 11 or 12).
- Presentation. Each team presents the project (motivation, introduction, implementation, results, discussions, etc.) during lecture time when we approach the end of the semester. **All team members** should participate in the presentation.
- Report. **Each team** submits one final report of **4—7** pages (font size 11 or 12).

Scope of project topics

We are open to a variety of topics. The minimum requirements are the following.

- The datasets, models, and implementations must be at least partially related to this course. That is to say, the major component of your project should be on at least one aspect of deep learning (algorithms, training, generalization, comparison of different architectures, etc.)
- You cannot simply copy and paste code from online resources. Online bots such as ChatGPT are forbidden.
- You should give your personal input in the projects. These inputs can be your thoughts, critiques, personal experience during lectures, connections with prior courses you learned, etc. Making your project unique through personalization is a good indication that you are learning and thinking critically.

Some examples of class projects include, but are not limited to, the following.

- On a standard dataset (e.g., FashionMNIST), use various training techniques to boost the accuracy, discuss how much each technique contributes, and compare the deep learning approach to classical statistical approaches such as logistic regression.
- Investigate a certain popular technique in detail (e.g., batch normalization), study how this technique performs on different datasets and on different neural network models, make measurements when training the neural networks, offer your intuitions that explain why this technique work, and provide critique on existing explanations you find during the literature review.
- Focus on a relevant phenomenon or topic of societal impact (e.g., fairness in deep learning, interpretability, algorithmic robustness), make observations and measurements when training neural networks, explain why certain phenomenon occurs and whether it raises concern, and suggest how deep learning practitioners can avoid such issues.

Grading and assessment

Besides the rubric used in the previous iteration of this course, your class project is graded based on the following additional considerations.

- Literature review: familiarity with the basic terminology, breadth of the literature search, correctness and clarity of your summary, connections to your experience in class
- Presentation: motivation of the topic, familiarity with PyTorch coding, your implementation skills, communication skills, visualization
- Reports: clarity and rigor, significance of your results, potential scientific value or practical impact, critical thinking

These points are highly desired, but we understand that it is hard to achieve everything listed above.