

Deep learning Final Project

One of the main goals is to prepare you to apply machine learning algorithms to real-world tasks, or to leave you well-qualified to start machine learning or AI research/job. The final project is intended to start you in these directions. The course project has two deliverables:

1. Project proposal presentation
2. Final report and presentation + Code

The project is team-based. Individual grades will include points for how well they contributed to the team effort.

Project Topics

Your first task is to pick a project topic. You can pick something that gets excited and passionate about or it is related or important for your current or future career! Good projects will be a publish in the university or my website. Also, some of you may want to continue working on your project or submitting the work to a conferences or journals.

Once you have identified a topic of interest, it can be useful to look up existing research on relevant topics by searching related keywords on an academic search engine such as: <http://scholar.google.com>.

After that, you can identify one or several datasets suitable for your topic of interest. The goal is to apply a deep learning technique for classification such as CNN on your dataset and compare the accuracy/timing/results with a "simple neural network" technique on the same dataset.

To not spend a lot of time regarding data you can use prepared datasets (e.g. from Kaggle, the UCI machine learning repository, etc.). No restriction on you to only use methods/topics/problems taught in class. It is necessary to cite and list the references in the report.

Submission:

The submissions are open from 8/1/2018 at 12 and close 8/17/2018 at 2pm. No late submission will be accepted.

Report:

The final report and presentation should cover virtually everything about the project. It should cover the situation, problem or challenge that required attention, the relevant background, related work, data, and technical details of the analysis, conclusions and possible directions for future work. It is recognized that not all of the following sections will pertain to each report. However, it is strongly recommended that these section topics be used as a guideline for your final project reports. Final presentations can follow your final report in text and graphical content.

- Introduction, motivation and general description of the situation, problem or challenge.
 - What is the situation, problem or challenge you are addressing?
 - What preliminary examination leads you to believe analytics could help?
 - What are the shortcomings of the current work/analysis that analytics could help with?
- Related work.

- Provide a thorough background for the project; e.g. about the situation, problem or challenge, about other companies that have undergone similar situations, problems or challenges and how they handled them or did not, etc.
- How does this project relate to other work that has been done on this situation, problem or challenge?
- Provide the appropriate citations/references per the author instructions at: https://www.ieee.org/publications_standards/publications/authors/author_guide_interactive.pdf
- Data
 - Give a complete description of the data you use during the project, including any you reject.
 - Provide a detailed description of your data.
 - Provide any exploratory data analyses you complete.
- Technical Approach
 - Give a detailed description of the process for your entire project.
 - Given a detailed description of your approach to the analytics you have proposed to use including any algorithms, methods, tools or techniques. You do have to describe how you applied the approach you used.
- Test and evaluation
 - Describe how you test your approach to ensure that it is valid.
 - Discuss the validity of your approach.
 - Describe how you will evaluate your results and/or conclusions including any specific metrics, output data, completed analyses, etc.
 - Discuss the baseline you will use to compare your results to.
 - Discuss how well your approach worked to address the situation or challenge, solve the problem or answer the research question.
 - Discuss any potential future work. For example, if you were not able to resolve the situation or problem or answer the research question what will it take to do so? What else needs to be done?
 - Discuss the comparison results with the simple neural network.
 - Evaluate and report whether or not someone unfamiliar with your work could accurately replicate it.
- Written work and Presentation Style
 - Written work will be graded using the rubric provided.
 - Presentation style will be graded on comprehensiveness and inclusiveness, as well as using the rubric provided.
- Projects will be evaluated based on:
 - The technical quality of the work. (I.e., Does the technical material make sense? Are the things tried reasonable? Are the proposed algorithms or applications or approach clever and interesting? Do the authors convey novel insight about the problem and/or algorithms?)
 - Significance. (Did the authors choose an interesting or a “real” problem to work on, or only a small “toy” problem? Is this work likely to be useful and/or have impact?)

- The novelty of the work. (Is this project applying a common technique to a well-studied problem, or is the problem or method relatively unexplored?)
- The final report should follow the guidelines provided by the IEEE at:
https://www.ieee.org/documents/trans_jour.docx

Codes:

Please include a zip file with the code for your final project. The data or additional libraries need to be included.

After:

If you reach to the 90% of the grade for the project, and if you want to submit your work to a machine learning conference depending on the topic of your project, send me the list of 3 potential conferences. We can set an online or in person meeting to talk about it.