DS 4440: Midterm topic survey
Fall 2020

In lieu of a midterm exam, you are to pick an application or task of interest that has been performed using neural networks and do a bit of research into what the task involves, what dataset(s) exist, and what models have been proposed and evaluated for it. I suggest using the excellent https://paperswithcode.com/ as a reference point to explore potential examples (although see the caveat about this below).

You might, for example, pick “automatic image captioning” as a topic you are interested in, in which case you would survey the architectures/methods that have been used for this, and what the current state of the art (SOTA) approach is. You probably will not yet be familiar with all methods discussed in the literature, and that’s OK (many we will, hopefully, cover in the latter half of the semester).

Ideally, but not necessarily, this survey will serve as the starting point for your final project. For example, re-implementing a state-of-the-art model for automatic image captioning (or an approximation of it, recognizing the limited hardware — CoLab — that we can provide ready access to) would be an appropriate final project. Even better (though not necessarily expected) would be to experiment with a change to the model or approach. That said, you are not required to continue on with the particular topic you choose for this write-up/survey as your final project.

Important note: If you select for your midterm topic survey something from www.paperswithcode.com, we of course do not want you to simply copy the existing implementation for your final project. In this scenario, you will need to either very clearly re-implement the method/application from scratch (and we will check your implementation against the open-source variant; note that yours may need to be simplified or ‘scaled down’ given hardware constraints) or — and this is what we suggest — extend or change the method in some meaningful way that affects the implementation. You are strongly encouraged to discuss with the instructor and TA as you think about extending the midterm survey into a project.

Concretely, for the midterm deliverable, we ask you to:

1. Produce a write-up that introduces the task and explains why it is important (or at least interesting to you). This should also address what potential ethical or societal issues exist concerning this problem or application.

2. The write-up should then describe the dataset(s) available for this task, how they were collected, and what metrics have been used to measure progress. Are there potential issues with the way the dataset(s) were
built? Are the metrics being used appropriate (and telling us what we need them to)?

3. Describe potential changes to existing methods or metrics that you think might improve either the models or their evaluation.

4. You will be present this topic in-class in a brief presentation (about five minutes).

The write-up should be written for a reader like yourself: Someone (now!) familiar with the basics of neural networks, but perhaps as yet unfamiliar with more exotic and “state of the art” architectures. This should include sections describing the background and motivation of the problem, datasets used, prior works and what they found, and discussion of evaluation metrics (basically the aspects enumerated above). The description of prior approaches should be fairly technical, such that one of your peers would be able to implement these based on your description.

You should use whatever amount of length you need to communicate the above, but roughly I would expect this not to exceed, say, 8 pages. Please consult with me (and/or David Lowell, our TA) on the topic(s) you’re interested in; we’re happy to provide guidance!

You will be assessed on: The clarity of your technical writing conveying the problem and prior model architectures that have been explored; Your description and critical analysis of datasets and metrics used in past work; Your discussion of potential ethical issues (as appropriate).

Grading will be based on the write-up (80%) and your brief in-class presentation (20%). The latter will be evaluated on the basis of clarity of presentation and degree of preparedness.