

Carnegie Mellon University in Qatar

AI for Medicine

15-182/282 - Spring 2022

Assignment 1

Name: _____

Andrew ID: _____

Due on: January 25, 2022 by midnight

Instructions:

- This assignment has a maximum score of 100 points for both, 15-182 and 15-282 students.
- You should submit your solution through Gradescope.

How to Read Articles that Use Machine Learning (100 Points)

Here is an introductory paper that may help you start reading articles that relate to AI in general and Machine Learning (ML) in particular:

Liu, Yun, et al. "How to read articles that use machine learning: users' guides to the medical literature." Jama 322.18 (2019): 1806-1816.

The paper provides a high-level overview of ML and illustrates how to assess its applications in medicine. More precisely, it: (1) emphasizes the importance of proper validations of ML models in medical contexts, (2) reviews the basics of ML, and (3) suggests some considerations for clinical implementations of ML.

After reading this paper, you should be able to understand the general terminology associated with ML and identify the most crucial elements related to its validation. As we progress through the course, we will delve much deeper into many of the presented concepts, hence, do not worry much if you realize that some of these concepts are not very clear or hard to understand.

You can download the paper from the course website under the resources tab. Read it carefully and answer the following questions:

35pts

(I) Short Summary:

Write a short objective summary of the paper in your own words (do not copy and paste). Be sure to address the following aspects:

- What was the paper's objective (1-2 sentences)?
- How did the paper fulfil that objective (1 paragraph)?
- What were the main results or concepts presented in the paper (1-3 paragraphs)?
- What was the authors' main conclusion(s) (1 paragraph)?
- In your opinion, has the paper done well in fulfilling its stated objective (1-2 paragraphs)?

65pts

(II) Critical Appraisal:

Critical appraisal is a systematic evaluation of scientific research papers. In this question you will write a 2-page critical appraisal of the given paper. In your appraisal, you should identify strengths and weaknesses of the paper, while specifically addressing the below items given in bullets.

We advise you to structure your appraisal around the usual chronology of the paper. The below items are only meant to guide you while preparing for and writing your appraisal; do not write your appraisal in a question/answer or bullet-point style. Also, you do not have to limit yourself to only the below points. Here are the items:

- Does the study address a clearly focused question?
- How does the authors' specific question fit into what is already known about the subject?

- Do the authors build a logical case and context for their hypothesis?
- How were the subjects selected?
- Was the selected clinical scenario defined clearly?
- Was the provided guide in the paper clear and adequate to soundly resolve the selected scenario?
- Is the provided guide in the paper generalizable (i.e., applicable to any other scenario)?
- Are there any results or analyses missing that you would have liked to see?
- What are the major weaknesses of the paper?
- What are the major strengths of the paper?
- Are the results of this paper important? What implications can they have?