

CSE 60111: Complexity and Algorithms

Homework 6: Essay Assignment

Introduction and overview: As a graduate, one extremely important skill is technical communication: learning to express complex ideas to colleagues, as well as explaining your work to those with less domain knowledge. The goal of this assignment is to get you to critically analyze a research paper/study, with an emphasis on material we saw in class. While technical in nature, about a quarter of your grade on each essay will also include grammar and professional writing style. (Because style and manner of communication also matters!) In addition to addressing the question asked, please also try to learn something new and to enjoy conveying this information. This ability to communicate technical ideas in an interesting and understandable tone is one of the one of the strongest skills you will use in any career path.

Assignment details: For this paper, I'd like you to select a research paper that involves heaps, hashing, or a related data structure in a non-trivial way. This can be something related to your own research, or can be a more theoretical paper looking at proofs about hashing or heaps. After you read the paper, please write a 2-3 page analysis of the details of what as well as how it used for its data structure, as well as the implications of how they used clustering. (Note that you may want to do a bit more exploring and reading to understand the details of what they used, but the only formal reading assignment is the one paper - just cite any sources you do use!)

Some questions to get you thinking:

- Which data structure did the paper utilize, and how was it used in their research problem?
- If it was not one of the ones we discussed in class, please describe the details so that I can understand what was used, as well as how. In the paper, do they describe it in enough detail for you to understand the assumptions and trade-offs, or do they present it as a black box? How did you learn enough to explain it in your summary, if they did not explain in sufficient detail?
- How would using a different choice of data structure potentially impact their findings or results?
- Which implementation/code did they use, if that information is included, or did they code their own? If you can find more details on that implementation - can you find any reviews or critiques of that choice?
- Knowing how many different variants of data structures are available, do you find any issues in their results? Do you think a different choice would have led to better or more accurate findings?

Again, these are just questions to get you thinking critically as you read, so please don't feel you need to answer all of them. I'm trying to make this assignment flexible so you can learn about something that is used in your research area or in a novel way that is new for you, so please come discuss if you have any questions about the details or need paper suggestions.

Note: While I will not forbid the use of generative AI in the class, I'll note that if you do use it, you should do so critically here. It's not always very good at analysis or review, and again, the purpose of the assignment is for you to engage in a different way. Hopefully you'll find it interesting and helpful!