

1 Overview

Overall the chapter seemed pretty polished to me. If I omitted a section in the notes below it is because I did not have any ideas for changes in that section.

2 misc typos

1. Last sentence of the paragraph at the top of page 407, right before definition 18.1.3, it says "We need a terminology for not much better than $O(n^3)$ ". I would replace this with "We need a definition for..."
2. At the top of page 415 (item 2 of Theorem 18.8.1), the second sentence is a bit awkward at the first comma. I would instead say "There is no ϵ such that there is a $O(m^{2-\epsilon})$ time 1.5-approximation algorithm for the diameter of a graph"
3. Near the top of page 406, the last sentence immediately above the Floyd-Warshall Algorithm is missing punctuation.
4. I think there is a typo at the top of page 414, it says $\text{disgGp}(v_a, u_c)$ but I think this should be $\text{dist}_G(v_a, u_c)$

2.1 Comments on section 18.2

1. **Definition 18.2.2** In the definition of $A \leq_{sc} B$, I think it would be good to explicitly say what the cost of querying B is as far as the runtime of the reduction is concerned since polynomials of degree 3 are not closed under composition.

2.2 Comments on section 18.5

1. **Comments on Theorem 18.5.1:** I personally would not include item (2) as part of the theorem. I think something like that belongs as a note outside of/below the theorem.
2. At the bottom of page 409 it says "We will now look at a diagrammatic view of the various reductions and explicitly mark the ones which are non trivial and the ones that are folklore". The phrasing suggests to me that there is going to be a discussion in the following sections, but as far as I can tell it is just referring to Figure 18.1. Instead I would say "See Figure 18.1 for a diagrammatic view of the various reductions. We mark reductions that are folklore with a dashed line and reductions which are nontrivial with a solid line."

2.3 Comments on Section 18.6: DIAM and PBC are Subcubic Equivalent

1. Comments on Theorem 18.6.1

- (a) Although there is enough information to figure out that this proof corresponds to Figure 18.2, I would explicitly write somewhere in the proof "See Figure 18.2 for an example". Additionally, I think it is a bit awkward to suddenly say "D=10" at the end of the proof with no prior mention to the concrete example in Figure 18.2.
- (b) I think some of the lines in item 2 of the proof are missing punctuation.
- (c) At the end of item 2 it says "Note that $PBC(G_0, x) \leq \dots \leq PBC(G_M, x)$ ". I believe that these inequalities are backwards.
- (d) In item 3 it says "Perform a binary search on D to find the least D such that...", but I think it should say "perform a binary search on D to find the LARGEST D such that...".

2.4 Comments on section 18.7: NEGTRI

- 1. In this proof, the constructed instance of RADIUS does not have directed edges, even though RADIUS was defined for directed graphs in this chapter. My understanding is the reduction works if you just have a version of each edge pointing in each direction, but I think this should be stated explicitly.