Assignment 1: Critique of “Stupid Columnsort Tricks”

In “Stupid Columnsort Tricks,” Geeta Chaudhry and Thomas H. Cormen discuss Leighton’s columnsort algorithm and present their methods to improve it. They begin by proving that Leighton’s original algorithm specifies an unnecessary restriction. Then, they present two algorithms that increase the maximum problem size that columnsort can handle. While the paper demonstrates significant results, it lacks coherence, a clear problem statement, and a flowing narrative. This critique presents the paper’s structure, discusses its organization, and suggests an outline to improve the organization.

The structure of “Stupid Columnsort Tricks” most resembles a *chain*, as Justin Zobel describes in his textbook, *Writing for Computer Science*. In such a structure, the background and subsequent results determine the order of presentation. The authors first explain the original columnsort algorithm and prove its correctness. Then, they present an exciting and significant finding: the divisibility restriction in Leighton’s algorithm is unnecessary! Next, the authors explain and prove correct their subblock columnsort algorithm, in which they mitigate columnsort’s height restriction. They also demonstrate a method to remove the divisibility restriction in subblock columnsort. They explain another algorithm, slabpose columnsort, and prove its correctness. Finally, they discuss the implications and importance of their results.

This structure allows the authors to clearly present the material in a repeated explanation–proof format, but it has several flaws. The authors fail to include a clear problem statement, leaving the reader unsure about the paper’s primary purpose. The order of presentation suggests two disjoint purposes: to present a new discovery about Leighton’s algorithm and to provide two new algorithms. This leads to the next observation that the paper lacks coherence. The authors could have divided these two separate results into two different papers but perhaps chose not to because of length requirements. In addition, the organization confuses the reader by shifting the focus back-and-forth from the divisibility restriction to the height restriction, such that the discussion goes from divisibility to height, back to divisibility, and finally ends with
height. This is particularly confusing in Section 4, because the title, “Relaxing the height restriction by subblock distribution,” suggests that the section deals only with the height restriction. However, halfway through the section, we hit a subsection about removing the divisibility restriction. Either Section 4 should be renamed, or the subsection should have its own section. Furthermore, the authors wait until the very end of the paper to state that relaxing the height restriction to \( r \geq 4s^{3/2} \) increases the problem size bound from \( N \leq r^{3/2}/\sqrt{2} \) to \( N \leq r^{5/3}/4^{2/3} \). This increase in \( r \)’s exponent from 3/2 to 5/3 should appear in the introduction.

To improve the general organization, here is an alternative structure. First, the authors should present a clear, overarching problem statement in the introduction to clarify the paper’s purpose: to mitigate restrictions in order to increase the maximum solvable problem size. This improves the coherence by unifying the paper’s two main focuses. Next, Sections 2 and 3 remain the same. Section 2 introduces columnsort, and Section 3 removes the divisibility restriction. Section 4 flows smoothly from Section 3 by presenting the version of subblock columnsort that does not require the divisibility restriction. Section 5 continues the discussion on subblock columnsort but now addresses relaxing the height restriction. Section 6 shifts the discussion to slabpose columnsort but continues addressing the height restriction. In this alternative organization, Sections 3 and 4 cover divisibility, while 5 and 6 cover height. The paper no longer bounces back-and-forth between addressing divisibility and height, and thus flows more like a narrative.

Chaudhry and Cormen’s “Stupid Columnsort Tricks” illustrates multiple significant results but lacks coherence and clarity because of its structure. By clarifying the problem statement and reordering the results, the authors can greatly improve readability. This paper provides an excellent example of how writing and positioning can largely affect how readers receive ideas.