Review of: "A Novel Variable Neighborhood Search Approach for Cell Clustering for Spatial Transcriptomics"

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Potential competing interests: No potential competing interests to declare.

It's a good article; however, it needs some adjustments to become a high-level paper. The level of experimentation is low to generate broader conclusions, especially regarding the stability of VNS and its superiority over traditional ML algorithms.

When it comes to clustering, the state of the art involves using ML techniques such as K-means and DBSCAN. There is a question about the parameterization of these algorithms: how was it done? Poor parameterization can lead to poor results. The paper's focus should be on why such ML algorithms did not perform well compared to VNS (the expectation was the opposite).

Furthermore, considering that the problem was mathematically modeled with ILP, why not solve it in a relaxed form using a market solver like CPLEX or Gurobi? Solving the relaxed ILP could generate a good benchmark for comparison, for example, with VNS.

The abstract should cover aspects of the experiments and the conclusions drawn. The phrase "Our validation showed the superior performance of our method when compared to existing techniques." is vague and imprecise, providing no substantial information. In terms of results, what is the differential of the proposed approach? What sets this approach apart in the literature? Try to introduce these terms in a concise and assertive manner in the abstract.

Terms, acronyms, and abbreviations should be defined the first time they appear. For example, in the abstract, the term Variable Neighborhood Search is introduced and defined as VNS. From that point forward, whenever referring to Variable Neighborhood Search, use the acronym VNS and no longer the full name. Please review the entire article, as there may be more instances like this.

At the end of the introduction, space should be dedicated to discussing the research questions studied and the contribution of this article. It is also necessary to include a theoretical section to position the proposed article in the state of the art. This section is essential to contrast the proposal with other algorithms used. Without it, it is difficult for the reader to understand the scientific contribution of the proposed article.

The section "VNS for the cell clustering problem" is fundamental for understanding the algorithm. However, the section "Variable Neighborhood Search Method" is similar to various books on combinatorial optimization (Algorithm 1). In this case, it is not necessary to present it, as the algorithm remains unchanged. There is no scientific contribution in this

section.