﻿Dear Editor,

Thank you for taking the time to arrange the reviews of this manuscript. Please find below our responses to the comments made by reviewers. We would like to send our appreciation to them for taking the time to review this manuscript and for making their helpful suggestions for our revised submission. We believe their feedback has strengthened the article.

Where necessary, we have indicated the page number and paragraph of the revised manuscript where changes have been made. We have also highlighted the corresponding text in our revised manuscript in red.

Please do not hesitate to contact us if you require anything further.

Yours sincerely,

A. L. Hawa, R, Lewis, and J. M. Thompson (29th August 2021)

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Comments

The paper was improved with regard to our previous comments. I believe there is still work to be done before it can be published.

* On page 16 “description”

Thank you for this observation – this spelling mistake has been rectified. *Page 16, paragraph 3.*

* Section 4.1: How do solutions are represented?

We were unsure of this statement, as we explain that the solutions are now represented using the definition of a solution $\mathcal{S}$, however we have added a reference to Section 3 in this section which directs the reader to our explanation of a solution $\mathcal{S}$ for an instance $\mathcal{I}$ of the SCPP. *Page 16, paragraph 3.*

* Section 2.2: This section was improved and is almost ready. Some additional details should be added. For example, it isn’t clear to me why the initial matching produced by AHC is sufficient at proving the COP is infeasible when BCR fails at covering all components. Why backtracking to AHC to find another matching isn’t necessary?

Thank you. In Section 2.2. we cite Hawa, A. L. (2020) which contains the full theorem and proof for the sufficiency of the BCR algorithm. The proof for the BCR procedure lengthy, and so we ultimately decided upon including the above citation (which refers to a publication by the main author of this manuscript). However, if the reviewers prefer, we can add the full theorem and proof to the manuscript.

* It seems the reference ‘Hawa, A. L. (2020)’ isn’t available online.

Please accept our apologies for this error. The above publication should now be available online.

* There is a comma missing in the sentence starting by “However, for some instances, although R’’”

Yes, you are correct. We have added a comma in the appropriate place in this sentence. *Page 12, paragraph 1.*

* Authors added some references on the bin packing, cutting stock, and strip packing problems. I suggest putting recent ones as well (2018 and later).

Thank you for this suggestion. We have included additional references in the manuscript dating between 2018-2021.

* Is it important to have 6000 instances? By comparison, the entire set of all BPP instances used in the most recent papers contains far less than 6000 instances. Some of our comments were disregarded because it would require to rerun too many experiments. They wrote ‘over 4 years on a single machine’. This would also mean new research would need to run their experiments requiring years of computation. I suggest the authors to reduce the set to a tractable size. Having 10-20 in each group would lead to 120-240 instances in total which seem more than enough.

Thank you for this remark. We are aware that there are many problem instances, and we were fortunate to have had access to a number of machines to run our experiments. After much thought, we have decided to keep the results from all the experiments, as we feel that this gives a much more accurate assessment of the results obtained. All of our results are available online, which allows future researchers to be able to select a problem instance set size of their choice. We hope that this is acceptable.

* The authors disregarded my comment on the MIP for the covering problem of section 5. My comment was to make their under-performing algorithm CMSA better. I have an implementation that requires 40 lines of C++ code and it can solve set covering problems having several thousands, if not millions, of variables in a few seconds with Cplex. Recent solvers are probably far better than a 20 year old exact method which seems to be the bottle neck. Also, CMSA has a time limit of 1 hour. This is considerable knowing that most exact methods for the BPP and its variants have time limits of typically few minutes. Yes CMSA can find 54 good solutions over 6000 instances, however its performance on instances of size > 500 is quite bad (it is 36% worse for the group a-5000-1000). It is an interesting addition, but the idea of solving set covering problems isn’t new. Therefore, it is questionable to have this algorithm in the paper.

Thank you again for this suggestion. We have run the experiments using an ILP solver (Xpress), however the results from these experiments were worse overall in comparison to the CMSA algorithm using MinDLX. It was noted that the CMSA algorithm using Xpress performed fewer iterations in comparison to the original. We have now discussed this in the manuscript. The addition of this CMSA algorithm is to explore a different avenue for the SCPP, as little research exists on this problem, and we hope that is this admissible for the reviewer. *Page 23, paragraph 1.*

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Finally, we would also like to note that there has been a change in affiliation and email address for the corresponding author, Asyl L. Hawa. This has been amended on the first page of the manuscript.

We would like to thank the reviewers again for their useful suggestions for improving this paper. Thank you very much for taking the time to go over the manuscript, and we look forward to hearing your positive responses soon.