Reviewer Comments

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**Reviewer: 1**

Recommendation: Accept With No Changes

Comments:

The paper is now much easier to read and all my comments have been taken into account.

While I am not a native English speaker, I still have the feeling that the English could be improved a bit, for instance :

p2 l6 : Minimizing the number of portioned parts corresponds to [finding] the least ...

p2 l44 : the mesh is therefore support-free [if] printed along this axis

p3 l35 : if all arcs of its corresponding skeleton (arc) subtend ...

p3 l38 : merits => has

p5 l26 : is still computational[ly] prohibitive

p6 l4 : potential[ly] good

p6 l5 : leads to a [smaller/lesser] value

p8 l33 : separate (the) their corresponding ...

p9 l48 : for (our) humans

The above revisions are correct. Are all revised in the new version.

The paper being now easier to read, I have two additionnal minor comments

that might be added as footnotes :

1) On some models, the constant c (the number of parts required to be support free), might be proportional to the number of skeleton arcs (for example on a shape consisting of a union of spring-link parts), this could be noted page 4 after saying "if c is constant then ...". By spring-like part, I mean, for instance, a shape which medial axis are segments connecting some points defined along an helix.

Youyi--- put the following as a foot note: “c might be proportional to the number of skeleton arcs”

For the example provided in Figure 7 and 9 (i.e. cases where the cut cannot verify

the orthogonality constraint of both adjacent parts at the same time and cases where a single cut is not sufficient to separate the two parts), we could argue that the additional cut required is equivalent to using one more partitioning vertex hence changing the number of components of the resulting shape. While it does not change the fact that the stochastic method provide good results, it could be a good idea to state this point in the paper.

Youyi--- put the following as a foot note: “the additional cut required is equivalent to using one more partitioning vertex hence changing the number of components of the resulting shape”

**Reviewer: 2**

Recommendation: Author Should Prepare A Minor Revision

Comments:

The authors addressed all the points raised at the previous review cycle, considerably improving the quality of the article.

From my point of view results were already pretty good (and so are now). The weakest point of the article was the writing: the paper was hard to follow due to inconsistent notation and poor english. To this end, most of the weakest spots have been fixed, citing the suggested literature and incorporating further discussion to clarify things.

I think the paper is almost ready to be published, subject to the following minor edits:

- I still have some concern regarding the definition of shell model. The new piece of text in which they are defined needs some massage. Specifically this sentence:

“…no existing methods ever consider the problem of partitioning a shell model which we call, whose skins are two meshes: the outer one and the inner one, the component in between the two skins are solid, and the closure of the inner skin is not solid (see Figure 1, right), into the least number of parts whose fabrication is free of support structures.” is not very clear. Something with the english is off here. Please rephrase.

- the survey paper on skeletonization methods mentioned at page 4, line 31, second column is not a survey. Perhaps the authors may change that citation with the most recent survey on this topic (which is [53]).

It is revised. Refer to the 2nd paragraph of the 3rd section.

- a few months ago a survey on geometry processing for AM was presented at EG. I think it’s a very relevant reference to be added:

From 3D Models to 3D Prints: an Overview of the Processing Pipeline (EG2017)

Youyi--- please add this reference. I think the format should be [53, this reference]

**Reviewer: 3**

Recommendation: Author Should Prepare A Minor Revision

Comments:

First and foremost, I think that the authors have done a good job in carefully reading and addressing most of the questions/comments in the earlier review round. Most importantly, more details, definitions, and context (references) are now present in the revised paper; these close many of the questions/gaps outlined in the earlier review round.

There are now, in my view, only a very few open points to solve. The most important is however a careful check of the English throughout the paper. I am not sure I have trapped all issues below, so, a careful reading, possibly by a native speaker, would be recommended.

A list of minor points to consider for a minor revision is below:

Abstract:

"Although there exists some algorithm" -> Although several algorithms exist...

"...which affects the aesthetics" -> which affect the aesthetics

Revised.

Sec. 1

"Therefore, it is desirable to reduce materials ..." -> Therefore, it is desirable to reduce the amount of materials....

Revised. Refer to the first paragraph of the 1st section.

"Autodesk MeshMixer ...." Since this is the first time you mention this tool, adding a reference to it (e.g. in the form of an URL or similar) is needed.

Youyi—please add the following URL to the 2nd paragraph of the 1st section: http://www.meshmixer.com/

"Although there exists some algorithms..." See my earlier comment on the same sentence in the abstract. Also, please consider splitting this extremely long sentence into 2 or even 3 shorter ones, so as to make it more readable.

We have rephrased the 3rd paragraph of the 1st section to make the description clearer.

Fig. 1b: as mentioned I think in the 1st review, adding an annotation to Fig 1b to indicate where precisely the overhand region is, would help the reader. This can be easily done e.g. by coloring that region in a different color and adding the explanation in the figure caption.

We have highlighted the overhang region of the model in Fig. 1b.

"portioned parts" Shouldn't this be 'partitioned parts' or even better 'partitions'?

Agree. We have rephrased it into “partitions” throughout the paper.

"printing objects made of metal powder, resin, or nice plastics, etc" I wouldn't use the vague term 'nice plastics' (just say plastics).

Revised. Refer to the 4th paragraph of the 1st section.

"a minimum set of subgraph..." Shouldn't this be plural (subgraphs)?

Yes, it is. We have revised it. Refer to the 7th paragraph of the 1st section.

"Decomposing a skeleton graph into minimal set of subgraphs..." -> decomposing a skeleton graph into a minimal set of subgraphs...

Revised. Refer to the 8th paragraph of the 1st section.

End of Sec. 1: it would help if a short summary of what the following sections in the paper would be added here, as typical in most journal papers.

We have added a paragraph for this in the end of the 1st section.

Sec. 2

"Although there have been previous work" -> although there has been previous work...

Revised. Refer to the 3rd paragraph of the 2nd section.

For the rest, Sec. 2 is fine in my view.

Sec. 3

"Reeb graph provides a possible choice for the curve skeleton. " First, it should be 'Reeb graphs'. Secondly, since this is the 1st time Reeb graphs are mentioned, a reference should be added to this sentence.

Revised. A reference has also been added for this. Refer to the 2nd paragraph of the 3rd section.

Youyi—please add the following reference: https://en.wikipedia.org/wiki/Reeb\_graph

"Moreover, the determination of suitable slicing direction and representative nodes is an intractable problem. " I am not very sure how to read this. What do you mean precisely by intractable? Definitely, one can make the problem 'tractable' in any sense of that word, if one defines 'suitable' appropriately. Please remove or add more detail so as to make it clear what suitable and intractable mean.

We have rephrased this sentence. Refer to the 2nd paragraph of the 3rd section.

"For example, medial surface based method which contracts the medial axis surface of the model;" Just as for the following sentences, at least one references should be added here to make it clear which method the authors refer to by this sentence.

We have added a proper reference for this (the reference in the first sentence of this paragraph). Refer to the 2nd paragraph of the 3rd section.

"..., such a curve skeleton provides" I think a new sentence should be started here.

Revised. Refer to the 2nd paragraph of the 3rd section.

"The Laplacian Skeleton ..." Please be consistent in capitalization (the Laplacian skeleton was referred to earlier in an uncapitalized version). See also the next sentences where the same issue appears.

We have revised the two places where “Laplacian Skeleton” appears. Refer to the 2nd and 3rd paragraphs of the 3rd section.

", ... efer to Figure 3, consider a Laplacian skeleton..." I think a new sentence should be started here.

This sentence has been rephrased. Refer to the paragraph above Theorem 1 in the 3rd section.

"...is defined as A(ei, ej ) = 2θ|vivj |/D." Maybe I missed this in the previous review, but now I see that the operator | | is used first for denoting the side of a set (such as in |V|) and next for denoting a length (such as in |vivj|). I would use || vivj || to denote the length. In any case, the size and length operators should be denoted differently.

Yes, that’s right. We have revised it. Refer to the proof of Theorem 1 in the 3rd section.

"...we have them following theorem" them -> then

Revised. Refer to the last sentence of the paragraph above Theorem 2 in the 3rd section.

"...and the value of c and d is large" -> and the values of c and/or d are large.

Revised. Refer to the last paragraph of the 3rd section.

Sec. 4

"To guarantee an aesthetical look on..." To guarantee an aesthetical look of...

Revised. Refer to the 1st paragraph of the 4th section.

"we find that the number of cuts affects more" I'm not sure what this means, but I think the intention was to write "we find that the number of cuts has a stronger impact" or something similar.

Revised. Refer to the 2nd paragraph of the 4th section.

"...if its shape is very nasty" Please replace 'nasty' by a more precise description of what the problem is (e.g. complicated geometry?)

We have revised it into “complicated”. Refer to the 2nd paragraph of the 4th section.

"...(2) the total peripheral length Li of each cut ci, i.e., ΣLi." From the expression, what it seems you want to minimize is the total peripheral length of ALL cuts c\_i, and not of 'each' cut c\_i.

Revised. Refer to the 2nd paragraph of the 4th section.

"the BFS process randomly chooses" -> please capitalize 'the' to 'The'

Revised. Refer to the 4th paragraph of “Skeleton Partition” in the 4th section.

"(typically form a cylindrical shape whose central axis lies on a skeleton arc)" Please revise, the English is not correct (shouldn't it be 'which typically form'?)

Revised. Refer to the 2nd paragraph of “Mesh Partition” in the 4th section.

" If any of the constraint is not satisfied" -> If either of the constraints is not satisfied

Revised. Refer to the 5th paragraph of “Mesh Partition” in the 4th section.

"as indicated by minima rule " -> as indicated by the minima rule.

Revised. Refer to the 6th paragraph of “Mesh Partition” in the 4th section.

"and find the one whose cutting length is minimum" Minimum should be minimal in this sentence.

Revised. Refer to the 6th paragraph of “Mesh Partition” in the 4th section.

Sec. 5

"We have run our algorithm on various natural or man-made models" I think 'or' should be 'and' in this sentence.

Yes. It has been revised. Refer to the 2nd paragraph in the 5th section.

on Zortrax desktop printer -> on a Zortrax desktop printer

Revised. Refer to the 2nd paragraph in the 5th section.

'that can automatically counts' -> that can automatically count

Revised. Refer to the 2nd paragraph in the 5th section.

may have exponential amount of choices -> may have an exponential amount of choices

Revised. Refer to the 5th paragraph in the 5th section.

it is hard even for our humans -> it is hard even for humans

Revised. Refer to the 5th paragraph in the 5th section.

stochastic method with a large number of iterations... -> should be 'a stochastic method' or 'stochastic methods'

Revised. Refer to the 5th paragraph in the 5th section.

'examining all the above mentioned models on a super computer under the Linux system' This is not a very informative phrase. Either detail the precise platform type or just refer to it as a super computer (I would favor detailing, since just saying you use a super computer is already very vague).

Details about the computer have been added. Refer to the 5th paragraph in the 5th section.

Sec. 6

'Our approach is devoted to shell models,..." You should add 'Although' at the beginning of the sentence.

Revised. Refer to the 1st paragraph of “Limitations and Future Work” in the 6th section.

'a spatially curved cut' A better way to describe this would be 'a non planar cut'.

Revised. Refer to the 3rd paragraph of “Limitations and Future Work” in the 6th section.

'Refer to the inset figure for an illustration.' All fine, but at this point of reading, one does not know/recall which figure one should look at. Please add the figure number here.

Youyi—please handle this.

As a minor detail: probably formatting the seven points of the discussion as a bulleted or numbered list would make reading much easier. Right now, the entire Sec. 6 is one single large paragraph.

A bulleted list of the seven items has been added in the revision. Refer to the 6th section.

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Overall, as said, the revision addresses many problems of the original paper. However, an extra pass is needed to fix the various remaining English/presentation problems. I trust this can be done in the scope of a minor revision.