Ref.:  Ms. No. IJCGA-D-15-00014  
Surface Comparison Based on O(n)-Merging Overlapping Delaunay Triangulations  
International Journal of Computational Geometry and Applications  
  
Dear Dr. Natalia Dyshkant,  
  
We have completed our review process on your IJCGA submission.  Two experts have given input and comments (below), both finding that the paper is lacking in many respects, including the presentation and (most importantly) the correctness.  The associate editor and I agree that there is no choice but to reject the paper.  
  
Thank you for considering IJCGA.  
  
Yours sincerely  
  
Joe Mitchell  
Managing Editor  
International Journal of Computational Geometry and Applications  
  
Reviewers' comments:  
(Review #2 is an attached pdf file)  
  
Review #1:  
Surface Comparison Based on O(n)-Merging Overlapping Delaunay Triangulations  
  
Leonid Mestetskiy, Natalia Dyshkant, Elena Tsarik  
  
The authors present an algorithm for merging two Delaunay triangulations  
(DTs). That is, given two sets of point sites S\_1 and S\_2 and their respective  
Delaunay triangulations DT(S\_1) and DT(S\_2), they explain how to obtain the  
Delaunay triangulation DT(S\_1 \cup S\_2) of the union of S\_1 and S\_2. The  
authors argue that their algorithm runs in O(|S\_1|+|S\_2|) time. More  
importantly, they argue that their algorithm is significantly simpler than  
linear-time algorithms known for merging Voronoi diagrams (VDs).  
  
Indeed neither the algorithm nor its analysis seem to be particularly  
sophisticated. I regard several lemmas stated in their manuscript as folklore  
(and could not even give a reference to the first proof). That is, we are  
mostly talking about stuff that, if broken down into pieces that are small  
enough, is suitable as material for assignments in a graduate-level course on  
computational geometry.  
  
But this is not my main concern with this manuscript. I do agree with the  
authors that there still is interest in a truly simple algorithm for merging  
DTs. After all, known algorithms for merging VDs are much more complicated.  
Furthermore, by the very nature of the VD, VD-based algorithms require  
constructors whereas a DT-based algorithm can get along with predicates. And  
this is a significant advantage when it comes to an actual implementation of  
the algorithm!  
  
But precisely since this manuscript does not present rocket science I'm  
puzzled and annoyed by the very rough, sloppy and unpolished way the material  
is presented.  
  
   \* First of all, its English requires significant polishing in order to make  
     it possible for a reader to digest the text without having to resort to  
     guesswork.  
   \* It uses terms without prior definition or slightly differently than as  
     defined.  
   \* It includes fairly straightforward observations in the proofs but, still,  
     leaves out arguments and special cases that require the reader to fill in  
     gaps, despite the rather simple overall nature of the claims and proofs.  
  
In a nutshell, one can either adopt the view that this is easy-to-digest  
material anyway and, thus, skip virtually all the proofs and leave them as an  
exercise to the reader. Needless to say, this would shrink the manuscript to  
roughly half of its current size. If, however, an admittedly simple proof is  
included in the manuscript then I'd like to see it written such that it can be  
understood easily at first reading, without a need to fill in details here and  
there. I ended up doing several proofs myself since I found it easier to do a  
rather simple job myself than to try to follow the authors' arguments.  
  
Summarizing, this manuscript requires a \*major revision\* before its merits can  
be assessed beyond doubt.  
  
In the sequel I list specific comments. I admit, though, that I ended up  
committing less time to the second half of the manuscript once it became  
obvious that the entire manuscript needs to be re-written completely,  
anyway. That is, the mere fact that I have fewer comments on the final pages  
of the manuscript shall not be construed as an indication that only the first  
pages need to be re-written. In any case, please consult a native speaker of  
English to polish the English -- I refrain from making specific suggestions!  
  
Abstract:  
 \* What does "well mixed" mean? And where do you make use of this  
   assumption in the actual paper?  
  
Sec 2:  
 \* What exactly is the input to your algorithm? Do you allow S\_1 and S\_2 to  
   share points? Do you make specific assumptions? E.g., do you assume  
   general position of the input?  
 \* A surface is not "given as a point cloud". BTW, your "triangulated surface  
   model" is known as a TIN in GIS.  
 \* An algorithm might have an O(...) worst-case complexity; a problem does not  
   have an O(...) but an \Omega(...) or possibly \Theta(...) worst-case  
   complexity.  
 \* What is the problem of the VD algorithms by Kirkpatrick and Chazelle?  
   Please elaborate. (The mere fact that they are described in theoretical  
   papers need not imply that they are useless for practice.) BTW, the plural  
   of "polyhedron" is "polyhedra".  
  
Sec 3:  
 \* "A circle is said to be empty if it does not contain sites."  
   Likely, a circle shall be considered empty if it does not contain sites  
   in its interior. Leaving out "in its interior" makes it difficult for  
   interesting circles to be empty...  
 \* "A face of a triangulation is called a Delaunay face if there is an  
    empty circle that is incident to the faces' vertices."  
   This isn't just some circle; this circle is uniquely defined by the three  
   vertices of the face.  
   BTW, this very basic info on DTs can either be omitted, or it ought to be  
   put right at the beginning of the manuscript; stating it on P. 4 of the  
   manuscript makes no sense.  
 \* "Two DTs are called overlapping..."  
   This entire paragraph is a repetition of stuff written previously; it can  
   be dropped.  
 \* "Assume that the sites have two different colores: B sites are black and  
    W sites are white. Suppose that B and W are colored point sets (black and  
    white colors respectively."  
   The second sentence is a repetition of the first sentence.  
  
Sec 4:  
 \* "Subsets of corrupted edges are called cuts of the initial DTs."  
   Why shall we care about a cut as a subset of a corrupted edge? Either  
   an edge is completely in the final DT, or it is not at all in the final DT!  
 \* I don't see a seam in Fib 2b. BTW, please use vector graphics rather than  
   raster graphics for your figures.  
 \* "These definitions are illustrated by Figure 2."  
   This information comes too late. At the time of reading it, a reader has  
   already figured it out on his/her own!  
 \* "A simple seam has two stitches in the Conv(B \cup W). All the stitches of  
    a cyclic seam are internal edges in Del(B \cup W)."  
   What shall this mean?  
 \* "...then go to step (3);"  
   Should read "then go to step (iii);"  
 \* "We use the following notations. Sites B denoted by black points..."  
   Marking a point by a color is not a notation.  
 \* What are "heavy chain lines"?  
 \* "Simple dashed lines": What would be a non-simple dashed line?  
 \* "In example, that we see in figure, triangulation merging realized in 8  
    steps."  
   This refers to Fig. 3, right?  
 \* "This circle without fail incident to some site from set B."  
   Sorry, I don't get the meaning of this sentence.  
 \* What are "cuts of both original triangulations"? This does not make sense  
   relative to the definition of a cut.  
 \* Lemma 1: "... is fulfilled for an arbitrary pair of sites..."  
   Do you really mean "arbitrary pair"? I suppose that you meant "for all  
   pairs of sites". BTW, your proof seems to suggest that this is a necessary  
   and sufficient condition.  
 \* "Its necessary to correct A and B sites bundles in follow cases:"  
   I can only guess what this is supposed to mean. BTW, where is the case  
   analysis? In the sequel you only talk about "Bundle intersection".  
 \* "Bundle intersection. Edges..."  
   It suffices to write this paragraph once; I do not need to read it twice.  
 \* "...Delaunay edge includes into two bundles"  
   How can an edge include an entire bundle? What does this mean?  
 \* "We call a bundle that has been tested and corrected as described above a  
    proper bundle."  
   The test described above this sentence refers to a pair(!) of bundles. So,  
   what does it mean for one bundle to be proper?  
 \* Lem 2: What shall we do if the two angles are identical? GPA assumed?  
 \* Proof of Lem 2: "Therefore, C and D lie outside this circle."  
   Or on the circle!  
   "To the left of AB, one of these circles is also empty."  
   Why?  
  
Sec 6.2:  
 \* "It is known, that the EMST of any DT is a Euclidean minimum spanning tree  
    for the set of the DT vertices."  
   What is the "EMST of a DT"? In the sentence before this one you defined a  
   "DT minimum spanning tree"...  
 \* Lem 5: "The circle of influence of any EMST edge is a DT empty circle."  
   What is a "DT empty circle"?  
 \* Proof of Lem 6: "Then, their circles of influence meet at certain points C  
   and D."  
   Why are they guaranteed to intersect? You seem to miss some argument.  
   (Granted, it's not difficult.)  
   "...the diameters CE and CF of the circles A\_0 and B\_0"  
   A\_0 and B\_0 are points and no circles!  
   "It follows from Lemma 5 that A lies on the arc ED..."  
   Why?  
   BTW, the claim AB < 2A\_0B\_0 and A\_1B\_1 < 2A\_0B\_0 simply follows from  
   the Intercept Theorem.  
  
Sec 7:  
 \* Proof of Lem 10:  
   What does it mean for an angle to be greater than the arc of a circle?  
  
Sec 8:  
 \* This section hardly makes sense relative to the rest of the manuscript.  
  
References:  
 \* It makes very little sense for an English-language publication to refer  
   to three papers written in Russian since those papers are not accessible to  
   most readers.