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Nonlinear Processes in Geophysics
Discussions

Interactive comment on "A Gauss Elimination Method for estimating locations of extrema in gridded data: Applications for Potential Field Data" *by* Dung Nguyen Kim and Dung Tran Tuan

Anonymous Referee #1

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Discussion: Overall, the language is poor and is an obstacle to understand the manuscript, and to showcase your algorithm. I am personally struggling with your algorithm. Why using Gauss elimination on a function of the type Eq. 1 where linear programming and optimization methods are nowadays much more powerful. You need to do a discussion on this point. In terms of results, I think the "Test Cases" are poorly written, and again difficult to follow. The level of noise is a crucial parameter in edge detection. Therefore, you must show differently the performances of your algorithm. The "Real Data" is interesting, but not much is said on the dataset. I am also left with many questions on the conclusions as you wrote some bold statements such as "we believe line 231-232", which is not supported enough. In the results part, I believe that

a statistical test is missing on the edge detection to compare your results with other methods. In summary, the work is interesting, but the algorithm is not showcased with the current state of the manuscript. Therefore, I can only reject it, but I encourage you to resubmit a new manuscript. Below, I have made some comments to help you to improve the manuscript.

Major comments

- Introduction: After reading the introduction, I cannot say what is new in this manuscript. Thus, the introduction should be revised to lead the reader. You could for example makes a Table listing the weak points and strong points of all the methods cited in the introduction. 2/ be precise when using statements such as l.58 "... function that is established by three points on a straight line. or l.58 "the accuracy of the approximated geological boundaries aren't high enough", or "..these functions are very different from the functions that the proposed" – avoid bold statements!

- Introduction: you need to define "Gauss elimination method". That is a generic mathematical definition which has applications in many scientific areas.

- Method: l.76 "paper researches a function of two variables that has pattern" – why? I am not an expert in this field and there is nothing to introduce this type of function. Is it from previous work? Literature?

- Method: Table 1 is interesting. I like it. Thus, I would take this table and put it in the introduction, expanding it with other methods. It can also give a nice introduction to your method.

- Method: l. 103 "However, this paper doesn't detect the critical points ..." I am lost. When I read the manuscript I am confused, because 1/ you estimate the critical point at fx =0, fy=0, why? 2/ l.104 you now speak about extreme points. You need to rewrite the section and show your assumptions, define critical and extreme points, how you detect them or why estimating at specific point in space. The assumptions are crucial

to see if the software will not be biased.

- Method: when I see that you want to solve Eq. (1), you can use much more advanced mathematical tools such as optimization algorithm (gradient descent, second order algorithm > Jacobi-Davidson), convex optimization . . .. Thus, you should justify why using your method, and above all why your algorithm will not be biased due to the basic assumptions.

- Test Cases: I would prefer to rename this section, with perhaps "Results and Discussion" – you should also divide in two parts – "simulations" and "real data"

- Test Cases: you should expend that you know use Matlab (with proper reference) to use your algorithm on simulated data set.

- Test Cases: Table 2 shows the parameters of the models used to do the simulations, but we do not see this model – I believe it is mentioned in line 120 “Mantik Talwni and Maurice Ewing [26]”. Thus, you need to give the model at least in the appendices.

- Test Cases: I think the whole presentation of the results should be revised. The “model hasn’t noise” or “the model has noise” should be fused together with proper words and explain the limits of the algorithm when using higher noise level. Perhaps, a figure showing the statistics testing for edge detection of the figures in various noise levels could be much more understandable. Also, the use of “comments ” (l.161) or “advantage/disadvantage” (l194,198) does break the flow of the paper. Again, proper words and text management can improve a lot the manuscript.

- Real data: You need to properly introduce the data set.

- Real data: to support your conclusions about your algorithm more sensitive to the relief of the image, you need to look in other packages about edge detections and compared with yours. The type of sentence l. 231 “ We believe that the green 231 polylines are a new boundary because it wasn’t shown in the projects “ are not supported – thus we can wonder if there is noise included in the edge detection. . . or else

. . . a full discussion is required here.

Minor mistakes

Please revise the English - here are a few mistakes -

l. 36 revise the sentence “We have many the methods . . .” l.49 revise “Each author, as well as each method, has . . .” l.50 “detect” > to detect l.51 Revise and simplify the two sentences “These methods are very powerful. They confirmed on many papers and projects of authors, . . . ” I have never cited a method or an algorithm by the name of the author, but by references. It is also confusing to add the name and the reference. Thus, lines 47-49 and lines 55-56 should be revised. Avoid double referencing name + reference. Perhaps, you can simply say “method developed by [24] will be referred as the method of Philips in the following ” l.59 avoid using the verbal contraction “aren’t” in any scientific manuscripts, always write the full verbal structure. Also same for “isn’t” (l.61, 65, . . .) and hasn’t (l.127 ..), wasn’t (l.231) l.60 Function > function l.64 “,” before “because” l.69 “the marked differences” – what does that mean? l.113 Revise : “the paper use the built computer program to test on two numerical model”.

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