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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Detection of collapsed buildings due to the 2016 Kumamoto, Japan, earthquake from Lidar data" *by* Luis Moya et al.

Luis Moya et al.

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We acknowledge the referee for the insightful review. The comments have been considered in order to improve our manuscript. The details are addressed below. Please note we attach the new version of the manuscript, which might be subjected to further modifications after the other referee's comments.

COMMENT:

Line 14 in Page 3 The post-event DSM is shifted to match the pre-event DSM by giving the permanent displacement. The displacements are given to every pixels with the resolution of 50cm? In your previous paper (Moya et al. 2017), the displacement is calculated by 100m-grid size. How did you distributed the 100m-grid displacement to

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every 50cm pixels?

Author's response:

The referee is right to point out we did not mention how we distributed the 100m-grid size displacement. We simply applied the displacement to all pixels inside the 100m-grid size. The authors decide it was enough considering that the displacement varies smoothly, as can be observed in Figure 2.

Author's change in manuscript:

The additional information is added in Line 16, Page 3 (See also attached file with the new version of the manuscript): "The permanent ground displacement was calculated by 100m-grid size, which is applied to the ADSM pixels within the grid-size. Figure 2 illustrates the calculated..."

COMMENT:

Line 27 in Page 3 In this study, building polygon is reduced by 1m in order to avoid the errors in matching of ADSM and BDSM. In the right column of Figures 4, the scale of the figures are not included. The reviewer could not judge the effect of the 1m reduction of the building polygon and recommend to add not only the scales but also the 1m-reduced building polygons by dotted lines.

Author's response:

In accordance with the referee's comment, we have modified Figure 4.

Author's change in manuscript:

The modified Figure 4 is observed in Page 13. Besides, the figure is now referenced in Line 29 Page 3: "For this reason, the building footprints were reduced by 1 m (i.e., the reduced polygon is located inside a building footprint), and they were projected onto the same reference system as that of the DSMs (Figure 4)"

COMMENT:

Equation (4) to (9) and Figure 12 In the equation (4) to (9), the subscript number 1 and 2 indicate non-collapsed and collapsed building, respectively. On the other hand, in Figure 12 the index number of the confusion matrix 0.0 and 1.0 indicate non-collapsed and collapsed building, respectively. The subscript number in the equations and Figure 12 should be unified for clearer understanding.

Author's response:

In accordance with the referee's comment, we have modified Figure 12.

Author's change in manuscript:

The modified figure 12 is located in page 17.

COMMENT:

Line 1 in Page 7 The authors found that the K-means clustering provided lower accuracy but did not described the reason. Please describe the reason why the K-means clustering gives lower accuracy than SVM.

Author's response:

The reason of differences in the accuracy rely on the nature of the methods. As it was mentioned. The SVM uses training data to calibrate the classification, while the K-means clustering does not use any training data. K-mean cluster considers only the distribution of the all data to perform the clasification.

Author's change in manuscript:

Additional comments are added in Line 31 Page 7: "Of the three methods evaluated here, K-means clustering exhibits the lowest accuracy. The main reason is that , unlike SVM method, K-means clustering does not use any training data. However, it produced a Kappa coefficient of 0.76 and an overall accuracy of 92%, which is still

quite good. The K-means clustering method can be useful for taking a first glance at the distribution of collapsed buildings because the method does not require any training data. The procedure is well-known and robust, with several efficient algorithms with proven fast convergence."

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2017-186/nhess-2017-186-AC1-supplement.pdf

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