Natural Hazards
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Discussions

Interactive comment on "Automated object-based classification of rain-induced landslides with VHR multispectral images in Madeira Island" *by* S. Heleno et al.

Anonymous Referee #1

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The Authors apply a SV machine to recognize and map rainfall induced event landslides and to classify landslides into source areas and run outs. The machine is trained by segmentation of a VHR GeoEye image and pre-event DEM. The addressed topic is interesting as highlighted by the huge number of recent publications but this manuscript runs out of depth for more than one reason.

The flow chart (SVM + OB) is not new, and it is applied in a way that does not contribute much to consolidate the technique. In particular:

1) if my understanding is correct, there is an ambiguity in the way the RBF function

is selected among many kernel functions: do the Authors make use of information available in the validation areas (while the technique must be tuned only in the training area) or not? If not, what is the sense to test solutions in the validation areas excluded during the training phase? "The RBF and degree 2 polynomial functions achieved the best prediction accuracy when checking with validation areas, and where used to further test, again by cross-validation between training and validation sets, the penalty and sigma parameters". That sounds like a posteriori choice but since this paragraph is not to me 100% clear, this point must be well clarified.

2) the selected area is small and it does not challenge the technique. In particular the validation areas count very few landslides and according to what I can see from the pictures, quite similar. This choice is actually a kind of habit for people dealing with OB because in heterogeneous environments the segmentation is really hard to control. Proof is the huge numbers of tries that the Authors had to carry out before finding the right set-up, set-up which is deeply driven by a pre-existing inventory. Even if the area is so small, still so many tries must be done to tune the segmentation. There are no comments on this in the discussion.

3) the technique is to me so much pre-inventory dependent and the feeling I got is that without it, nothing can be done, in particular the choice of many parameters. That makes it far from being semi-automatic, since the interpretation of landslides must be done a priori. This point is not addressed in the discussion, and it makes weak some conclusions.

4) I think some data are threaten with a bit of superficiality (or they are not well described), I include the use of pan-sharpened images without a measure of the error introduced by the process and the use of a pre-event dem. How much does the dem contribute? I'm not expert in landslide classification, but what I can see from the pictures is that classified source areas and run outs they seem simply to have two different radiometric responses while they should actually represent two different geomorphological processes. Here what the Authors call run out seem to be like some wash out

areas where probably some material also deposit there (I don't see any deposition at the foot, but that can be because of the images) and not a well channelised structure. If changes occurred due to landslides, then the dem cannot intercept them because pre-event, if no changes occurred (and this seems to be the case because of the event type), it does not seem to me that the geomorphology of the territory can help. A curiosity, why the difference in terms of colours between source and "run out" is so strong?

5) Some conclusions are "ventured": this technique is probably less demanding than CD approaches because it makes use of one image (but for example CD can mitigate the problem of shadows...), but it seems to me that the tuning which must go through so many segmentations is really time consuming. anyway, there is not a comparison in this work, so it cannot be decided.

In attached some punctual comments on specific topics. Just add that sometimes the quality of English should be improved or made a bit more "appealing".

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/3/C1926/2015/nhessd-3-C1926-2015-supplement.zip

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