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Biogeosciences Discussions

Interactive comment on "Detection of pore space in CT soil images using artificial neural networks" *by* M. G. Cortina-Januchs et al.

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1)in Page 4, it is a little bit confusing for readers about the images. It seems the authors used 3D imagery, but the whole paper does show the 2-D image processing. Thus, could the authors illustrate the image obtaining process more clearly? The images obtained by gamma-ray computerized tomography are slices 2-D of 3-D objects. We used 2D images, these images were extracted from 3D images

2) how to control the cluster number for each technology? As shown in Table 3, the higher the cluster number the lower the pore percentage. It's of interests. How to get the data of Tab.4, needs more details.

The objective of the clustering process used to segment images is to find pixel groups

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with a similar grey-level intensity in order to integrate them into homogeneous groups. Similarity is evaluated according to a distance measure between the pixel and the prototypes of the object or region prototypes, and each pixel is assigned to the nearest or most similar prototype.

In the algorithm implementation is necessary to have information about the images, this information help us to adjust the parameters and number of groups in which the image will be segmented. Once we know how many groups are needed to represent the gray levels corresponding to pore, more images with the same features can be segmented.

Care must be taken not to over-segment the image, therefore it is necessary to have information of the image when the algorithm is implemented. Table 3 shows that the more the image is segmented group that corresponds to the pore is divided, for this reason the percentage of pore decreases.

After the image was segmented, each feature vector is labeled and with this information we train an artificial neural network. Once trained the artificial neural network is tested, the test images were not used in training step. These results are shown in Table 4.

3)Can the authors give more details about Table 5? As shown well, the data between initial percentages and final percentages for Horizon A2, Bt2 and Bt/Bw are very close, with final percentages a little bit lower (generally); but for Horizon AB, the final percentage data are quite smaller. Does it mean some limitations of the methods used for image-data processing? How about the conclusion in this part?

Table 5 shows the comparison results, where the initial percentage obtained in the segmented images is compared with the classifier output. The initial percentage of pore is obtained for each segmentation method in the test images (K-means, Fuzzy C-means and SOM). The final percentage is obtained as output of the artificial neural network used to classify the test images. In the results, we can observe that the final percentages obtained for A2, Bt2 and Bt/Bw horizons are very similar to initial percentage, but

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with the AB horizon, the classifier has a very big mistake.

The method has limitations in the classification of the AB horizon, to improve the outcome in future work will analyze the feature extraction and segmentation in order to improve the classification.

Interactive comment on Biogeosciences Discuss., 7, 6173, 2010.