**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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Thank you very much for your comments and suggestions

(1)Were the four soil samples collected by yourselves? If yes, how did you collect them and how did you keep the samples in a proper condition before you take the images, so that the geometrical features, the moisture and other characteristic parameters of the samples were preserved and the geological background was correctly reflected? It would be better if some pictures of the samples can be included in the paper.

We did not collect the soil samples.

(2) The composition of feature vectors is the base for the segmentation of the images and subsequently the classification of pore space and solid soil. What is your reason

to construct the feature vectors in this way (Line 23, Page 6177)? Are there any references? To my understanding, the mean and the standard deviation should be of the grey-scale intensity of an image in a predefined window which enclosing a given pixel, is it right? Might you explain what kind of additional information can these two components in the FVs provide, as mentioned on Line 16, Page 6190? Are there any other ways to construct the FVs? For example, is it possible to include the mean and the standard deviation of the grey-scale intensity of the original image? How do these alterations affect the results? As we all know, the mean and the standard deviation are the first and second order moments, respectively, how about using other order moments in the calculation?

Feature extraction is the process of locating information of interest to detect pore space in soil images, this information is used to form Feature vectors (FV). In the case of images with low contrast is necessary to enhance the interest area, in this case pore space. The morphological operations have been used by researchers in the low contrast images. We applied an erosion morphological operation to enhance the dark regions (that is, pore space).

The mean and standard deviation provide information of a pixel with neighboring pixels, these features were extracted from the image eroded, because erosion enhance pore pixels. It is possible to include the mean and the standard deviation of the grey-scale intensity of the original image instead of eroded image, but this does not give as good results as the image eroded. I have never used other order moments, but would be interesting to try.

Dengler, J.; Behrens, S.; Desaga, J.F.; "Segmentation of microcalcifications in mammograms", IEEE transactions on Medical Imaging. Pp. 634-642, 2002

Mahmoud T.A., Marshall S.; "Medical image enhacement using threshold decomposition driven adaptative morphological filter"; 16th European Signal Processing Conference (EUSIPCO 2008), 2008

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