Comments on "Detection of pore space in CT soil images using artificial neural networks" by M. G. Cortina-Januchs et al. from Deyi Xu

Generally, the developing of techniques for pore space detection of soil images is undoubtedly significant. In this research, soil images were obtained by CT technique and features of the images were extracted by the integration of image processing and different clustering methods. At last, pore space and solid soil were classified by means of artificial neural networks, and substantial conclusions were reached. The methodology suggested by the authors is an alternative for analyzing soil structures, which is helpful in Biogeosciences.

Specifically, may the authors give clear explanations about the following two points?

(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.

(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?

Finally, some minor improvements of expressions are needed both in mathematics and in concepts. The following are some examples and the authors should pay attention to other similar aspects and make consistent revision through out the paper.

(1) In equation 1, similar in equation 2 (Page 6178), what does the operation act on (left side), and in which region to minimize or maximize the values (right side)? How to subtract an image I(x-i, y-j) by a structuring element? An image is a matrix and a structuring element is a vector, do their dimensions agree? Is I(x, y) a grey-scale image or the grey-scale intensity of an image?

(2) In the statement "The mayor peak with the lowest mean digital number was taken to be that corresponding to the pore space" (Line20, Page 6179), what's the "mayor peak", and what's the "lowest mean digital number"?

(3) What does the notation h_{c_i} indicate in the following equation? (Line 14, Page 6184)

$$m_i(t + 1) = m_i(t) + \alpha(t)h_{c_i}[x(t) - m_i(t)]$$

(4) Would you please distinguish the three terms: an image, the grey-scale of an image, the grey-scale intensity of an image?