SOIL Discuss.,
https://doi.org/10.5194/soil-2018-28-AC3, 2018

Interactive comment on "Using deep learning for Digital Soil Mapping" *by* José Padarian et al.

José Padarian et al.

jose.padarian@sydney.edu.au

Received and published: 30 November 2018

Thanks for your comments.

- P5 L4-7: We will re-phrase it to:

A pooling operation merges similar features by performing non-linear down-sampling. Here we used 2x2 Max-Pooling layers which extract the maximum value from a small 2x2 pixels window. Besides reducing the dimensionality of the array, pooling also makes the features robust against noise. After the convolutional and pooling layers, the array is "flattened" to a 1D array (fully-connected layer).

- Is it possible to predict a set of properties at the same time? Eg CEC and Clay and C for example?

It is absolutely possible. We just published a study on multi-task CNNs for soil spec-

Printer-friendly version

Discussion paper

troscopy that shows that (DOI: 10.1016/j.geodrs.2018.e00198).

It is important to consider that predicting more properties usually means having a bigger network hence more parameter and the consequent risk of overfitting if there is not enough data. So there is a limit on how much you can predict simultaneously, but it will depend on the task.

- P6 l13 ReLU?

ReLU is an activation function to add non-linearities to the model, commonly used in CNNs. We will add a short description to clarify that.

- P8 L19

Not an error, just rounding. The original numbers are 10.55761862 and 10.5613898.

- P8 L24 this an important step I think. This should be highlighted in the introduction.

The reviewer is referring to "To incorporate contextual information for DSM prediction, we represent the input as image". We agree that it is an important point, that is why is fully-explained in the rationale section.

- Figure 5: it is very rare to observe lower error in the test dataset than train itself or even validation? Could you comment on that in the paper?

We will comment on that. The error in the test set is lower due to the distribution being different to the training data. We performed 1 random sampling to select the test set and the range OC concentrations is narrower and lower on average. We give a more complete explanation in the response to reviewer 1.

- Section 5.6 The discussion on the prediction of uncertainty needs more global result. I think you can provide a PICP plot using the test dataset to better justify your results.

Very good suggestion. We will include it in the revised version. We estimated the PICP for both methods and we see a change of 9.52, 9.52, 40.00, 33.33, -10.53% (just a

decrease in the last depth range) by going data augmentation.

Interactive comment on SOIL Discuss., https://doi.org/10.5194/soil-2018-28, 2018.