SPATIAL ARTIFICIAL INTELLIGENCE: EXPLORING MACHINE LEARNING FOR SOIL SALINITY MAPPING ON LAJAS VALLEY AGRICULTURAL RESERVE

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Abstract

Classical statistics is beginning to be replaced by computational methods. The field of artificial intelligence is taking hold in all areas of science, and digital mapping is not excluded from this evolutionary phenomenon. In this presentation it will be shown how to run an artificial neural network with spatial data, we will compare how the results change when using classical vs computational statistical methods.

The soil apparent electrical conductivity (EC_a) of eighty fields was measured using an electromagnetic induction device (EM38 from *Geonics Company,* Canada). Soil EC_a thematic maps were correlated with environmental maps and multispectral images of the Landsat 8 and Sentinel 2A missions, with the objective of extrapolate the ECa signal to a regional scale, the Lajas Valley Agricultural Reserve.

Three extrapolation strategies, linear regression models, multiple linear regression models, and artificial neural network models were evaluated. The data were processed using different levels of training and validation, in order to observe the learning capacity of each of these methods.

Preliminary results suggest that simple linear regression models to predict ECa can be very useful in farms on a local scale, however they are insufficient to be applied on a regional scale. Multiple linear regression models have very good prediction levels at local scales and moderate levels at regional scale where they are insufficient. For its part, artificial neural networks turned out to be a very convenient method for prediction both locally and regionally scales, since due to the complexity of the mathematical analysis carried out on its internal layers, this type of model is more capable of understand the variability of the ECa at regional level.