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SSS9.5

Effect of multi-level and multi-scale spectral data source on vineyard state assessment via spectral vegetation indices

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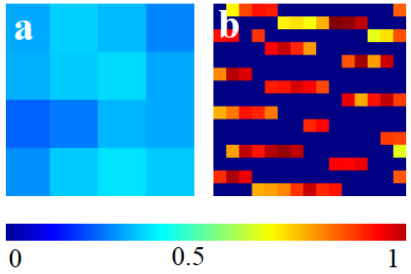
Precision agriculture in the vineyard: how we can improve the plant status evaluation by avoiding monitoring increase for farmers?

Improve Sentinel 2-A resolution (Brook et al., 2020)



NDVI maps scaled from 0 to 1 for a) the original Sentinel-2A data, and b) the reconstructed image via multiscale CNN.

Improve the prediction of plant status

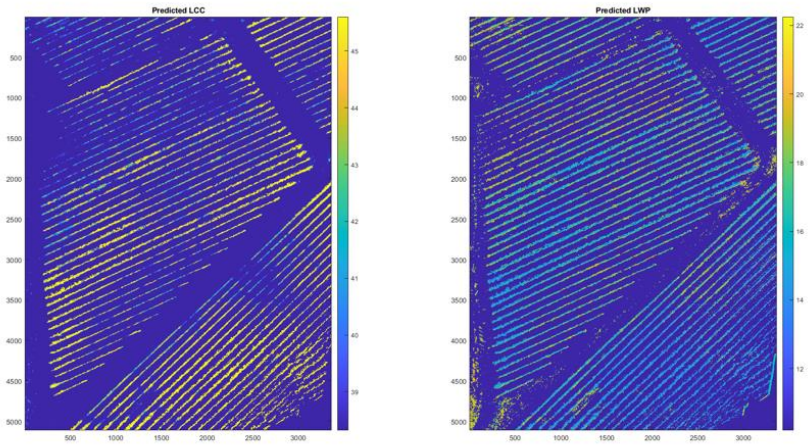
Test: Vineyard in Southern Italy (Greco cv.)

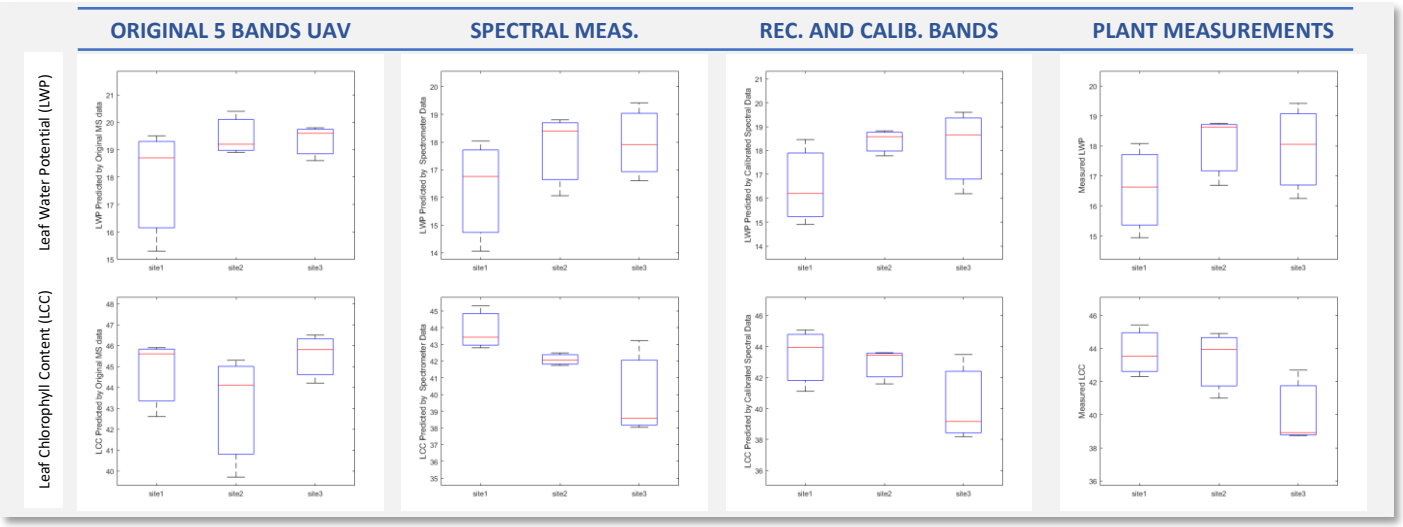
- UAV MS images (5 bands; 7 dates from May to Semptember)
- Spectral meas. VIS-NIR (during UAV data collection, about 240 meas. per date)
- Combined Approach (ANN)
- LCC and LWP meas. (July-Sept.)

The ANN model was trained using the training series with Bayesian- Regularization training function, the hyperbolic tangent sigmoid transfer function, and 1000 training epochs.

Bayesian Regularization artificial neural network for LCC and LWP prediction

	Model CNN output evaluation (R^2)			
	LCC(Vis)	LCC(Vis+Volume)	LWP(Vis)	LWP(Vis+Volume)
Train	0.96	0.88	0.98	0.84
Test	0.88	0.87	0.92	0.83





The realized study has shown that:
(i) CNN approaches can help to increase of UAV MS images spectrum (VIS-NIR) and then the evaluation of plant status
(ii) ANN model is able to well estimate the spatial Leaf Chlorophyll Content (LCC) and Leaf Water Potential (LWP)