

Random Forest for Estimating Soil Moisture Based on Remote Sensing Test

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This study used a remote sensing method to estimate surface soil moisture (SM) using images from the visible spectrum in the laboratory darkroom. The uniformity was analyzed in the ring light source from a hemispherical darkroom with a ring light source. The soil sample images were then taken and recorded with weight in a laboratory darkroom using a remote sensing test (RST) for five narrow-range soil particle sizes. Next, a comparison of the validation results for the five different narrow-range soil particle sizes using a Random Forest (RF) regression.

Results showed a uniformity test using the ring source set in the darkroom, and results have illumination uniformity without a hot spot existing. The best parameters for film speed, aperture, and shutter use Color Calibration Matrix (CCM) to reduce error for the digital image. SM analysis results showed that the mean value (red line) of SM versus time for five different narrow-range soil particle sizes is reproducible. Fine sand (0.149–0.250 mm) has the best regression and validation results, proving the feasibility and reference value of the previous regression models. The results of this research prove the feasibility of using the RF model for narrow-range soil particle size.

Keywords: Remote sensing, Soil moisture, Random Forest, Visible spectrum