



# Photothermal radiometry data analysis with machine learning

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Photothermal radiometry is an infrared remote sensing technique that has been used for skin and skin appendages research, in the areas of skin hydration, hydration gradient, skin hydration depth profiling, skin thickness measurements, skin pigmentation measurements, effect of topically applied substances, transdermal drug delivery, moisture content of bio-materials, membrane permeation, and nail and hair measurements. Compared with other technologies, photothermal radiometry has the advantages of non-contact, non-destructive, quick to make a measurement (a few seconds), and being spectroscopic in nature. It is also colour blind, and can work on any arbitrary sample surfaces. It has a unique depth profiling capability on a sample surface (typically the top 20  $\mu\text{m}$ ), which makes it particularly suitable for skin measurements. Photothermal radiometry is information rich, however to analyze the signal and get the information is often difficult. In this paper, we present our latest study on the photothermal radiometry data analysis with Machine Learning. We have investigated different algorithms such as Random Forest Regression, Gradient Boosting Regression, Support Vector Machine (SVM) Regression, Partial Least Squares Regression, as well as Deep Learning Neural Networks Regression. We will first introduce the theoretical background, then illustrate its applications with experimental results.