Learning from remote sensing data: a case study in the Trentino region

Marco Moretto[1*], Luca Delucchi[1], Roberto Zorer[1], Pietro Franceschi[1]

[1] *Research and Innovation Centre, Fondazione Edmund Mach, San Michele all'Adige (Trento), Italy*

[*]*Corresponding author: marco.moretto@fmach.it*

Abstract (250 words)

Recent developments in satellite technology have yielded a substantial volume of data, providing a foundation for various machine learning approaches. These applications, utilizing extensive datasets, offer valuable insights into Earth's conditions. Examples include climate change analysis, risk and damage assessment, water quality evaluation, and crop monitoring. Our study focuses on exploiting satellite thermal and multispectral imaging, and vegetation indexes, such as NDVI, in conjunction with ground truth information about soil type, land usage (forest, urban, crop cultivation), and irrigation water sources in the Trentino region in North-East of Italy. Trentino, characterized by diverse landscapes ranging from forests to crop fields, is notable for its grapevine cultivation, a significant contributor to the Italian wine industry. Our research aims to analyze the past two decades of satellite data (NASA and Copernicus) using supervised and unsupervised learning methods. The objective is to develop models for soil classification, assessing crop health and growth stage (phenology), and optimizing water management practices, specifically in the context of tree crops (mainly vineyards and apple orchards) in this region. This analytical approach seeks to contribute to a more systematic understanding of the environmental and agricultural dynamics in Trentino, facilitating informed and sustainable land management practices.

Keywords: machine learning, remote sensing, Trentino, soil, water.