An Artificial Intelligence Approach for Aerosol Situation-Aware Estimation of EVI, based on Landsat8 and Sentinel-2 Time Series Big Data

*Ananjay Kumar Singh[1], Durga Toshniwal[1]

1. Indian Institute of Technology Roorkee

The efficient and reliable estimation of enhanced vegetation index (EVI) is dependent upon coefficients of the aerosol resistance terms (C1, C2), subject to utilize blue band for correcting aerosol effects in red band reflectance. The Landsat8 Surface Reflectance Higher-Level Data provided by USGS corrected from medium resolution MODIS Terra /Aqua Satellites data, contain Quality Assessment (QA) bands for confidence levels in different occlusions via aerosol, cloud etc. The Sentinel-2 also have similar reflectance bands data along with Quality Assessment (QA) bands, however, the spatial-temporal correspondence is non-synchronous with Landsat8. The state of the art approach for EVI estimations is to apply constant values of C1 and C2 parameters (e.g. C1 = 6, C2 = 7.5 in case of MODIS-EVI algorithm). The key objectives of our approach are to represent heterogeneous spatial-temporal bands and their occlusion relations as re-sampled knowledge-base and learn aerosol resistance parameters instead of using any constant terms. With frequently varying spatial-temporal nature of tropospheric aerosol, these measures are necessary to be considered for any significant vegetation index to be relied upon. Our approach also corrects the surface reflectance band values prior to EVI calculation, in the case of occlusion by cloud and varying aerosol artifacts, defusing Spatial-temporal correlations and regressions. The Artificial Intelligence derived process pipeline consisting representation, learning and inference techniques developed on Apache Spark can easily scale for Big Data including many tiles (scenes) and over larger time-scale.

Keywords: Artificial Intelligence, Situation-Aware, Big Data, Time Series, Enhanced Vegetation Index (EVI)

