**­­­Drought Prediction using Landsat-8 Images and Remote Sensing**

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***ABSTRACT***

Drought conditions often greatly impact the ecosystems and lands for agricultural purposes. This research endeavours to provide a systematic approach to predict the drought conditions of the land areas using the data from *Famine Early Warning Systems Network Land Data Assimilation System* and *Soil Moisture Active Passive Mission* which provide information about soil parameters. The former is used to obtain *soil moisture values* at 4 different ranges - 0 to 10, 10 to 40, 40 to 100, 100 to 200 centimetres. The latter is used to obtain the *Soil Moisture Indices* at Surface and Root Level. This study utilised *Landsat-8* images of the various landsites in Tamil Nadu from 2015 to 2022. Once the images are collected, they are subjected to *cloud masking* and land region segmentation since the drought conditions of the land region are to be estimated. This is followed by extracting 11 bands from the satellite images. In addition to this, several thermal, vegetation and water indices are calculated to establish their relationship with soil moisture parameters. Finally the above mentioned six soil moisture parameters are also collected for the same train sites to create a final dataset with six parameters as dependent variables to train *Random Forest* model while the spectral bands and indices serve as independent features. The trained model yielded an *R-squared score* of 0.71 and was validated using *K-fold cross validation*. When a Landsat-8 image of the test site is provided for the trained model, it estimates the moisture values at four different levels and two Soil Moisture Indices at surface and root level. These Indices are then used to predict the drought levels at both surface and root zone while the 4 values at different depth ranges are used for analysis purposes.

**Keywords:** Drought, Landsat-8, Random Forest, Soil moisture, Soil Moisture Indices.