

Machine learning approach for predicting seasonal risk of forest fires in Morocco

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ABSTRACT – Predicting forest fire risks constitutes a significant component of forest fire management and combatting strategies. It plays a major role in resource allocation, mitigation and recovery efforts. The purpose of this study is to develop a predictive model of seasonal forest fire risk using machine learning approach. Used data consists on 2130 forest fire events that occurred between 1997 and 2011 and their locations, the biophysical characteristics of such locations are represented by 39 variables derived from a digital elevation model, meteorological variables (including precipitation, wind, evapotranspiration, ...), and vegetation characteristics derived from 288 satellite images (using the normalized difference vegetation index of MODIS and Landsat images). Random forest algorithm was used to link between these predictors and seasonal forest fire risk. The trained model performed a good predictive ability (83% of the accuracy, p-value=0.013). It showed that only hevernal precipitations have a strong influence on fire occurrence and seasonal severity in the fire season. Such fact could be explained by the contribution of the rainfall to primary build-up and for fuel dryness. Then, according to the developed model, it become easier to predict seasonal risk knowing the hivernal precipitation and then to best plan for rational uses of fires combatting means.

Keywords: Forest fire; machine learning; predictive model; random forest; seasonal risk

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