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A NEW IMPROVED MACHINE LEARNING BASED ALGORITHM FOR HOTSPOTS DETECTION

Abstract

The wildfires are one of the most dangerous threats of our times, which constantly put at risk our environment. They are most from malicious origin and often they have a rapid forward rate of spread (FROS) which can go from 10 to 22 km/hour, depending on the terrain conditions. In these terms, the authority response time is crucial to contain the wildfires, to minimize the environmental damages and prevent huge humans and animals losses. Nowadays the fire detection is made by fire lookouts and this, in most of the cases, is the only fire monitoring procedure applied by competent entities. This kind of approach is in several cases not enough. Indeed the wildfires could start in a remote zone, which is not visible immediately, causing the wildfire to spread and become very dangerous before it can be detected. To resolve this problem and help the authorities, Nurjana Technologies, in collaboration with University La Sapienza of Rome, has designed a new solution called S2IGI. This project allows to timely detect the wildfires hotspots through satellite images. S2IGI permits an automatic fire surveillance of a region or even of a complete nation. The S2IGI algorithm uses geostationary satellites (MSG) which guaranteed a good observation frequency of 15 minutes to 5 minutes. The innovation introduced by Nurjana in this project is the implementation of a polynomial multivariable model or a machine-learning model based to estimate the mean and the standard deviation of the radiance of the SEVIRI channels in the region under surveillance. In this paper the two approaches will be compared in terms of True Positives, False Positives and not detected wildfires. This study has been conducted using real data of the summer 2019 period in Sardinia (from June 2019 to September 2019). The validation of the two methods has been possible thanks to the collaboration of the Italian Civil Protection, which provided the validation data.