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Combined Method of the Modified Classification Algorithm for Detecting Burned Areas in Satellite Images

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Abstract. The increasing frequency of natural wildfires has heightened the urgency of accurately identifying burned areas in satellite imagery. Existing methods described in the literature, based exclusively on spectral indices or the use of standard machine learning algorithms, often demonstrate low accuracy when applied to images with heterogeneous structures or complex boundaries between regions. To address these issues, a combined method is proposed that integrates a modified random forest classification algorithm with subsequent spatial post-processing. The modifications to the random forest algorithm include replacing the standard node-splitting criterion with an algorithm using ReliefF and employing weighted voting with the VDM (Value Difference Metric) to refine the boundaries of the areas. An additional region-growing step aggregates pixels into homogeneous zones and filters out small areas, thereby eliminating fragmentation in the results. The paper presents the accuracy of the proposed method on training and validation datasets, as well as a comparison between the combined method and an unmodified approach. This method can be used for damage assessment, monitoring the aftermath of fires, planning restoration work, and generating images with highlighted burned areas.

Keywords: burned areas, satellite images, random forest, region growing, spectral indices
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