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A NOVEL APPROACH FOR THE IDENTIFICATION OF MOST RELEVANT TABLET REGIONS IN THE IMAGE DETECTION OF FALSIFIED MEDICINES

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ABSTRACT

In this paper, we propose a novel image based approach to detect falsified medicines and identify the most relevant regions of the tablet in the task of classification. The framework is based on the propositions of Bernart *et al.* (2016). The original input images undergo an initial pre-processing step, which (i) removes the background to find the region of interest, (ii) clusters individual pixels into super-pixels, and (iii) extracts features containing color and texture information. The classification task is conducted over the set of super-pixels using a Support Vector Machine (SVM) classifier, and the class prediction of all super-pixels belonging to each image is used to define the class the respective image will be inserted into. The task of identifying the relevant regions is performed using the concept of support vectors, generating a heatmap that indicates the regions that contribute the most to the classification task. Two datasets containing authentic and falsified samples of Cialis and Viagra medicines were used to validate our propositions by achieving correct classification rates of 100% on both datasets. Regarding the task of identifying the most relevant regions, our proposition outperformed the traditional LIME (Local Interpretable Model-agnostic Explanations) method by yielding more robust explanations.

Keywords: image analysis, supervised learning, classification, interpretable machine learning.