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Pseudo-Coloring as an Effective Tool to Improve the Readability of Images Obtained in an Electromagnetic Infiltration Process

Tytuł

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Abstract: The article presents a method of improving the readability of images obtained in the process of electromagnetic infiltration for sources processing information in a visual form (texts, images). The method uses the so-called technique of pseudo-coloring. The proposed method is based on LUT tables using the exponential function mapping the signal level of the compromising emanations into a point of the RGB color space. The conducted analyses showed that the proposed function determining the coefficients of the LUT table is an effective tool in the process of improving the level of visual perception, i.e., it increases the perception of shapes and the ability to extract elements from the background. In image processing, LUT can be identified as a color map, i.e., a structure that reflects the gray shade of an image pixel into its color representation in the RGB color space. The proposed method assumes the use of exponential functions for this reflection. As an assessment of the effectiveness of the proposed methods of pseudo-coloring images, both a subjective assessment based on the visual perception of a group of observers and an analytical assessment, which was carried out by analyzing the contrast of the assessed images, were adopted. This allowed for the same assessment and usefulness of the proposed function in determining the RGB value in the process of pseudo-coloring of images obtained during electromagnetic infiltration. The obtained results confirmed that the proposed method significantly improves contrast parameter of images, which is also confirmed by the visual assessment of these images.

Keywords:

protection of information; electromagnetic emission; electromagnetic infiltration; RGB; digital image processing; grayscale; pseudo-coloring; compromising emanations

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