

# Wojskowy Instytut Łączności - Państwowy Instytut Badawczy

<https://www.wil.waw.pl/wil/publikacje/baza-publicacji/r32867957,An-rgb-pseudo-colorization-method-for-filtering-of-multi-source-graphical-data.html>  
11.10.2024, 08:06

## An RGB pseudo-colorization method for filtering of multi-source graphical data

### Tytuł

An RGB pseudo-colorization method for filtering of multi-source graphical data

### Typ publikacji

[Artykuł](#)

### Rok

2023

### Data dokładna

2023

### Autorzy słownie

### Autorzy

[Kubiak Ireneusz](#) [Przybysz Artur](#)

### ISBN/ISSN

ISSN 2079-9292

### Informacje dodatkowe

Electronics, 2023, 12, 4583, ISSN 2079-9292

<https://doi.org/10.3390/electronics12224583>

Abstract: Artificial colorization (pseudo-colorization) is a commonly used method to improve the readability of images obtained from sources (sensors) that do not reflect the original color of the object of observation (e.g., X-ray). It is designed to

draw the observer's attention to the important details of the analyzed image (e.g., disease changes in medical imaging). Analogous needs occur in the process of assessing the emission security (EMSEC) of imaging devices used to process classified information, which is made on the basis of the analysis of images reproduced from compromising emanations related to the operation of these devices. The presence of many graphic elements in an image may reduce the level of perception of the information contained in it. Such images may be very noisy or contain overlapping graphic symbols, the source of which is devices processing graphic information operating in close proximity to each other. The use of various types of measures enabling data filtration at various stages of their processing, e.g., the use of a directional antenna, frequency filtering, point filtering or contextual contrast modification, does not always prove effective. The solution to the filtration problem is the pseudo-colorization of the image. However, the image colorization used based on the typical "Hot", "Radar" or "Cold" color palettes does not meet the requirements for filtering graphic data from many sources. It is necessary to use a filter that will allow the sharp cut-off of graphic data at the border between the background and the graphic symbol. For the pseudo-colorization process itself, the exponential function as a function of transforming the amplitudes of image pixels from the gray color space to the RGB color space is sufficient. However, the smooth transition of the function shape from zero values to values greater than zero results in a low efficiency of filtering graphic data from noise. In this article, a method of filtering an image based on the pseudo-colorization of its content, i.e., reproduction of a compromising emanation signal level in the RGB value of image pixel color components, was proposed. A quadratic function was proposed as the transformation function. The higher effectiveness of the method based on the use of a square function (compared to the exponential function) was shown by conducting tests on many images, some of which are presented in this article. The proposed solution is a universal approach and can be used in various fields related to image analysis and the need for their filtration. Its universality is related to the possibility of changing function parameters affecting its position on the value axis from 0 to 255, its width, its minimum and its maximum value for each RGB channel.

Keywords:

pseudo-colorization; compromising emanation; data protection; structural similarity index measure; HDMI; VGA

## Powiązane publikacje

-

Adres url strony

<https://doi.org/10.3390/electronics12224583>

Plik

