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# IMAGE PROCESSING FOR VIDEO DERMATOSCOPY

**Isaieva Olha Andriivna**

Student

**Avrunin Oleg Grygorovich**

Doc. of Sc., Professor

Kharkiv National University of Radioelectronics

Kharkiv, Ukraine

The main color systems, their comparison. The main aspects of the analysis of the processing of dermatoscopic images and the prospects of using such systems in medical practice are determined. Emphasis is placed on the RGB system and the comparison of this system with the HSV system. The purpose of this work is to determine the features of dermatoscopy imaging and color systems. It is determined that the features of video dermatoscopic image processing are complex analysis of color and morphological characteristics of the studied areas.

**Keywords:** video dermatoscopy, morphological characteristics, color characteristics, image processing, color systems

Topical. Today, the percentage of skin diseases is increasing, so it is important to establish a method of diagnosis and diagnosis on time. At present, video dermatoscopy is one of the primary methods of examination in the diagnosis of skin diseases. This method allows with the help of special optical instruments - video dermatoscopes to carry out a visual assessment of the condition of the skin and to inspect the neoplasms at magnification from tens to hundreds times with different depth of field, with different types of illumination and the use of optical filtration. The method is not invasive and allows the color and shape of the skin to determine its nature and the risk of degeneration into a malignant form [1].

Image processing is key in the method of video dermatoscopy, because it is the analysis of dermatoscopic images that allows you to establish the correct diagnosis and to understand whether there are tumors [1].

Image processing is a form of information processing for which input data is represented by images, such as photographs or video frames. In the method of video dermatoscopy use the concept of digital image processing, which means the use of computer algorithms for digital image processing. As an area of digital signal processing, digital image processing has many advantages over analog processing. It allows you to apply a wider range of algorithms to the input and avoid problems such as added noise and distortion during processing [2, 3]. Because images are defined as two-dimensional, digital image processing can be modeled as multidimensional systems.

**Speaking of digital image processing, we are referring to the system of digital video dermatoscopy (Fig. 1), which consists of:**

- optical image acquisition unit - a device consisting of an achromatic or apochromatic lens optical system for obtaining a magnified image.
- a digital camera that can capture color optical images on a photodetector array.
- an interface module that includes hardware and software for transmitting information to the data analysis subsystem. It can be implemented both standalone (with removable media, such as memory cards), and directly connected via wired or wireless communication channels. In the first case, the most common is the USB interface of different standards, in the second case, the most common is Wi-Fi or Bluetooth.
- subsystem of data analysis, which is implemented on the graphical workstation and consists of the following modules:
  - image pre-processing, including methods of suppression of noise components and histogram correction of the brightness and contrast of the input image;
  - image segmentation, which is to construct a characteristic image function that distinguishes homogeneous areas of objects and backgrounds.

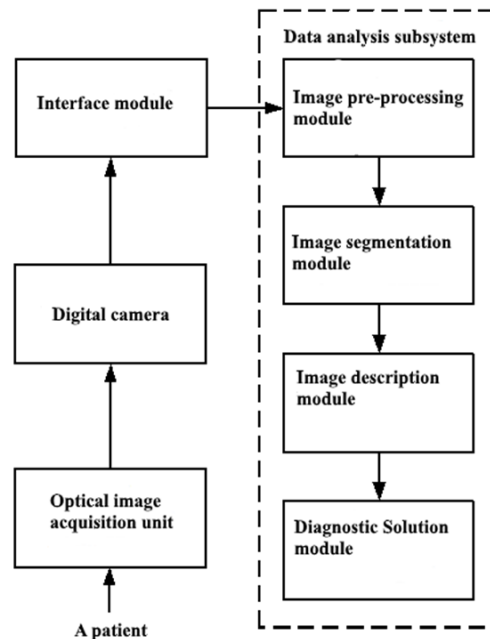


Figure 1 - Digital video dermatoscopy system

- image description - obtaining geometric and optical characteristics of objects segmented in the previous module. These characteristics are usually the color coordinates, as well as the area, perimeter, shape coefficients of the analyzed objects.
- module for the formation of a diagnostic solution, which is classified by the characteristic features of the analyzed objects, in which the most often selected their color and geometric characteristics, taking into account a priori and additional diagnostic information about the patient. It should be noted that this module does not form a final but a preliminary diagnostic solution that helps the doctor to make a final diagnosis.

Features of video dermatoscopic image processing are complex analysis of color [3, 4] and morphological characteristics of the studied areas [4, 5].

A color model is a way of describing color with quantitative characteristics. A color model usually means a term that refers to an abstract model for describing color representations in the form of three- or four-digit numbers, called color components (sometimes color coordinates). The color model is used to describe the radiated and reflected colors. Together with the method of interpreting this data, many colors of the color model determine the color space.

RGB is a color model named after the three capital letters of the names of the colors that underlie it: Red, Green, Blue, or Red, Green, Blue. The same colors form all the intermediate ones. Scientific name - additive model. Used to display images on monitors and other electronic devices. Has great color coverage.

**There is also an HSV system, which is characterized as:**

- Hue is a color tone (for example, red, green or blue-blue). It varies within the range 0-360 °, but is sometimes reduced to the range 0-100 or 0-1.
- Saturation - saturation. It ranges from 0-100 or 0-1. The larger this setting, the "cleaner" the color, so this parameter is sometimes called the purity of color. And the closer this parameter is to zero, the closer the color is to neutral gray.
- Value or Brightness. Also specified in the range 0-100 or 0-1.

As a result of the research it is clear that in the method of video dermatoscopy it is advisable to switch from the RGB system to the HSV system, since the HSV system uses the characteristics of colors, not the colors themselves, as the RGB system.

Conclusion. In the tasks of automated processing of video dermatoscopic data, the perception of the field of view is associated with a priori information about the image being studied. When developing methods for processing dermatoscopic images, it is advisable to choose methods that facilitate the next stages of data analysis. When choosing color systems in digital image processing, it is correct to select the system that is capable of describing the image in terms of brightness, saturation, or color. Errors arising from the analysis of such images are related to the heterogeneity of lighting, the presence of a complex background, local obstacles, the intersection of objects in the image and their high variability. The main indicators of the effectiveness of the developed methods and system are the high stability and repeatability of recognition of skin objects and the ability to process images in real time. This method can be used for diagnostic for mucosa olfactory area [3, 6, 7]. The prospect of work is the development of a complete system for digital video dermatoscopy, its subsequent clinical trials and the ability to analyze dermatoscopic images.

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