

## **DEVELOPMENT OF BIOMETRIC IDENTIFICATION USING SYSTEM NEURAL NETWORKS**

With the growth of development and the introduction of information technologies in all spheres of human life and activity, the problems of information protection become ever more urgent, as every year losses from unauthorized access to commercial and confidential information increase. In most cases, information loss is caused by a human factor, since a user who has access to information may lose means to identify a person (logins and passwords, access cards, electronic means of identification, etc.) or they can be stolen or falsified.

Studies conducted in leading scientific centers around the world for several decades, and developments have received high results in the identification of fingerprints and the iris of the eye, used in various systems of protection and identification of people.

Therefore, the most effective means of identification is the use of biometric methods and means of identification, because it is impossible to forge the user. Today, one of the most important areas of biometric identification is the identification behind the face of a person, and there are also many methods of identification according to the geometry of a person's face, based on the idea that the facial features and the shape of each person's skull are individual. [1].

The introduction of biometric identification tools requires a lot of investment in hardware, so they are not available to all public and private institutions. With the development of mobile electronic devices, it becomes possible to use them as readers for identification. In addition, certain mobile device manufacturers equip their devices with fingerprint identification, voice, and face. Therefore, the problem arises of creating an accessible information system for identification by a person of the client-server type. The server part will provide the operation of a database of images of persons, identification modules and maintaining identification statistics. The client part will be implemented as a cross-platform application, it will ensure the reading of the face image, the formation of the sending of the photo in the server part to identify and receive a response about its result. It is planned to implement a client application on mobile devices running the Android operating system and equipped with a camera, as well as on computers of different architectures with a connected webcam running Windows or Linux operating systems. The main task is to develop a budget identification system. To process the image, an open source Open Source Computer Vision Library (OpenCV) will be used, which will work with readers and image processing. This library was created by Intel® to establish a common standard computer vision interface for software products in this area and to promote their greater development, as well as to create new models for the use of personal computers. OpenCV library modules provide [3]: I/O functions when working with standard devices and digital photo and video capture devices; execution of filtering algorithms and transformation of image processing full cycle of using methods of mining for image processing definition and description of flat primitives; analysis of the movement of the object and its tracking; implementation of most algorithms for searching

objects on the image; control devices for reading video information; processing of three-dimensional objects.

The main method of identifying a person based on the image of her face will be the sequence of the following steps: revealing the fact of the person's presence in the image; highlighting the contour of the figure of a person; definition of the angle of the head (full face, profile); highlighting from the face image of the main parameters by templates; comparison of parameters with standards and identification.

To implement the basic steps of the algorithm, the OpenCV library functionality will suffice, but according to the authors, to identify users on the face image it is advisable to use the method of neural networks, it allows to solve complex tasks for identifying visual and audio images. Neural networks are based on parallel processing of information and have the ability to self-learn, that is, to obtain an informed result based on the data, did not occur in the learning process. To the properties and advantages of neural networks should be attributed: mass parallelism; distributed information and calculation; the possibility of self-learning and the propensity to identify common characteristics; allows you to adapt to various input data and tasks; in the presence of certain deviations or errors gives an effective result; minimum requirements. The main parameters in the analysis of the image of a person's face will be the following: the main contours of the face, eyes, eyebrows, mouth, nose, characteristic and similar for all people, but not identical, and serve to construct a specific map of the circuits for primary identification and are characterized by bright transitions in the image; brightness, which allows you to identify the main contours, as well as to identify the characteristics of each person under the same lighting conditions; color, which serves as a sure sign of the object due to the fact that it carries additional information about the shade of the skin.

Based on the studies of methods and approaches to create a biometric identification system, the development of such a system has begun. The system has a client-server architecture. The client part will be cross-platform and will focus primarily on the use of mobile devices with cameras. To process the image, the Open Source Computer Vision Library will be used, which was created specifically for working with video recording devices and complex image processing, as well as modules for identifying objects. For the identification of persons, it is proposed to use the method of neural networks, also created by the authors.

The use of the created system of biometric identification is very broad and focused on state and commercial facilities with limited funding, such as kindergartens, schools, universities, hospitals, etc. One of the directions of using this system is its use for authentication in modern web-applications and for access to commercial wireless local area networks Wi-Fi, which will become an additional protection against unauthorized access.

## References

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