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## СТРУКТУРНО-ІЄРАРХІЧНИЙ ПРИНЦИП КОНТУРНОЇ СЕГМЕНТАЦІЇ

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## STRUCTURAL-HIERARCHICAL PRINCIPLE OF CONTOUR SEGMENTATION

Rapid development of digital information processing tools functional capabilities and reduction of their cost led to active usage of video surveillance systems in everyday life: in supermarkets, schools, public transport, parks, etc. It leads to increasing of the data to be processed, which reduces the efficiency of such systems.

Therefore, in this paper, it is proposed to reduce the amount of data to be processed at the stage of image segmentation. The result of image segmentation procedure is a set of contours extracted from the image. It significantly reduces the amount of information to be processed and improves performance of the whole surveillance system. A switch to structural and hierarchical principle of objects identification and classification will improve the system performance [1]. For this, the image must be presented as a set of contours and their relationship to each other with different levels of hierarchy [2]:

$$F(x,y) = \sum_{j=1}^{n} I_j(x,y),$$

where $j$ – number of hierarchical levels, $I_j(x,y)$ – contour of $j$-level hierarchy.

In this case, the algorithm of the video surveillance system work while using structural and hierarchical view of the objects (Figure 1) will consist of the following stages. First, video stream is divided into frames from which the areas of high interest are selected. In case of human being identification, this region will be a face. The next step is to select the contour of the areas of high interest. After that the pyramidal representation of the geometrical shapes objects and its parts (contour shape of the head, the contours of the eyes, nose, mouth, etc.) (Figure 2) is held. This presentation serves as the starting point for calculating the identification vector at each level of the hierarchy.

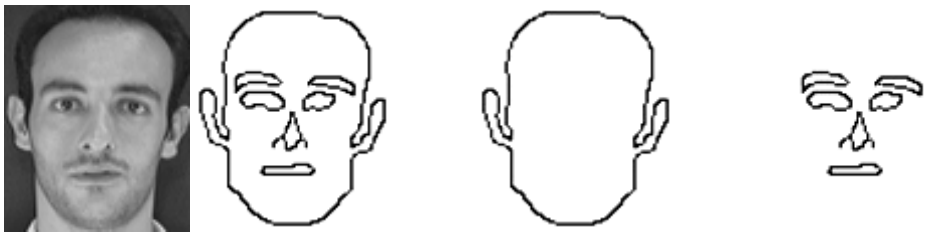

Fig. 2. Structural representation of the object

The highest level of the hierarchy is the external contour (in our case - contour of the head shape). Based on the identification vector that is build on information about feature points of the contour [3], classification is performed and determines a class of the face. Possible classes are: oval, round, square, triangular, trapezoidal, rectangular. If this information is not enough, the switch to the next level of the hierarchy is performed (identification and classification is performed based on the internal contours of the object - nose, eyes, mouth, etc.).

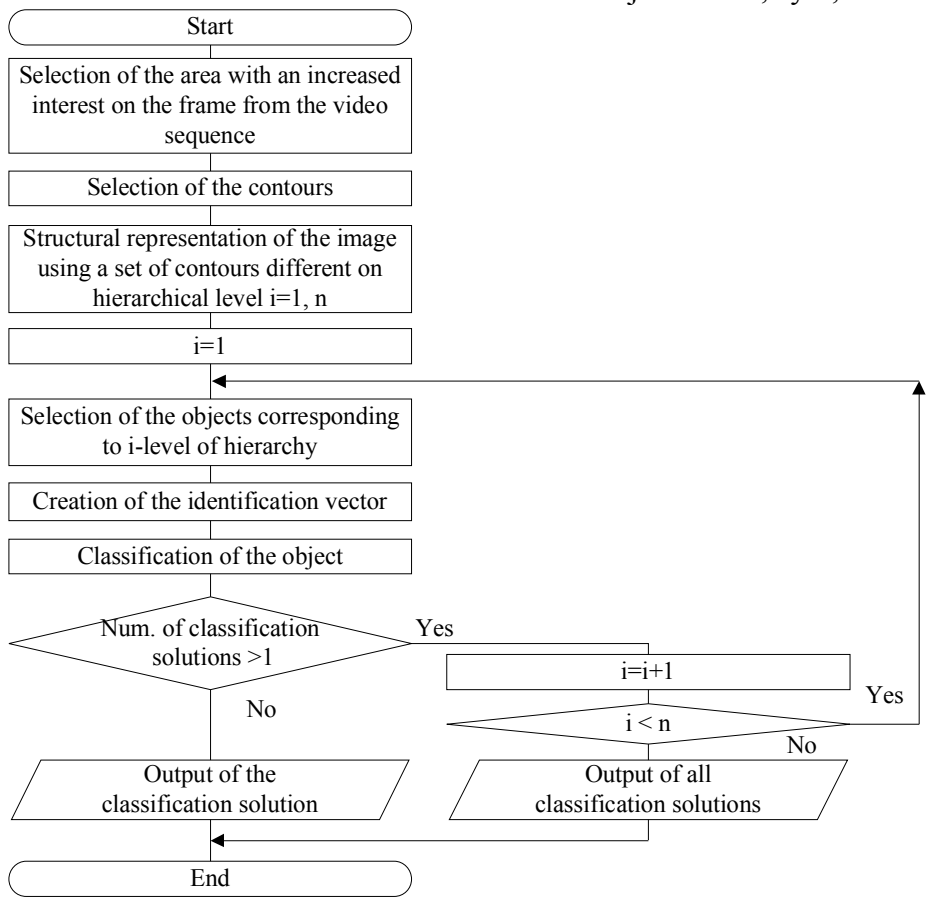


Fig. 1 Algorithm of the structural-hierarchical segmentation

As the result of the conducted contour analysis, on the basis of suggested approach, was obtained the image of the pyramidal representation of the object's geometrical features and its details including a set of contour specimens. This presentation serves to calculate geometrical identification features of the object. Given approach of the structural-hierarchical contour segmentation allows to increase the operational speed of the video surveillance system work by means of decreasing the amount of information needed for processing.

**Literature**

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