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Title of Diploma Paper:

Face detection in color images using morphological methods

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The task of face detection and localization in images and in video sequences is one of the most popular problems of object detection. This is so due to the fact that finding faces is important preliminary step to systems, which process faces. For example, face recognition systems, surveillance systems, biometric-based identification systems, facial expression recognition systems, video conversation systems, etc.

The diploma paper represents an algorithm for detection of one or more frontal-view faces from different races in color image. The faces can be in different sizes, but they must be frontal-view, must not to be turned or sloped, must not to be overlapped and the eyebrows on them must be well-marked.

Due to the following facts: the color in color images brings a lot of information and the face color of people is similar, we decide to employ the color in the first step – skin segmentation in color plane of chosen color space based on fuzzy color histogram.

After obtaining skin color regions, we remove very small regions, apply some morphological operations and determine the number of holes for each region. If this number is more than zero, the corresponding region becomes a face candidate.

After that, having the face candidates, we search for a certain feature (a left eyebrow) in the upper left half of each of them using the fuzzy hit-or-miss transform. If the degree of truth (which is a result of applying the transform) for any pixel is more than 0.5, we consider that this pixel is a center pixel of the eyebrow and thus, a face is found.

The diploma thesis consists of five chapters. The first part is an introduction to the problem of face detection in images and represents an overview of the existing methods of this problem

solving. Here the tasks and goals are set. The second chapter is the theoretical basis of the methods used in the proposed algorithm. In the third chapter detailed description of the steps of algorithm is given and the fourth part is the program realization in MATLAB. In the fifth chapter an overview of what in this diploma paper is done, is made. There is a conclusion and direction for future development and improvement also.

The diploma paper contains also a bibliography and appendixes with figures, block diagram of the algorithm and screenshots of the program's demos.

Keywords: face detection, skin color segmentation, color spaces, fuzzy histogram, mathematical morphology, fuzzy hit-or-miss transform