Optimization of Several Parameters in Iris Recognition

Extended Abstract

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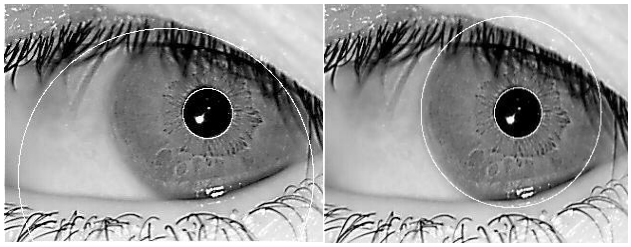
ABSTRACT

Biometric systems are developed under different traits in order to identify one person among others. Iris Recognition is one of them, which uses uniqueness (unique pattern) of the iris in order to develop the algorithms. The whole procedure that includes segmentation, normalization, encoding and matching requires both tricky and intuitive mathematical apparatus. This means that during the implementation, the optimization of several parameters is needed. These parameters can be part of the functions which are used to detect the iris for different iris databases or/and functions in which the quality of the images gives different results. Our work has contributed to the segmentation and encoding stages. We have experimented with the iris recognition algorithms on two databases (CASIA I and IIT) and have been produced promising results following critical modifications in the well-known algorithms. In the segmentation step we use a new metric that allows us to segment the iris after we have preselected the best circle candidates in the Hough space. This metric measures the nonconcentricity of the two circles that bound the iris, i.e. the outer boundary of the pupil and the outer boundary of the iris. This new metric improves the accuracy of the segmentation and has a direct effect on the overall accuracy of the iris recognition rate. In the encoding step we experiment with different encoding schemes from the one which is widely in the literature. The scheme that has been the first choice is the encoding that assigns {[11], [01], [00], [10]} to the four quadrants of the polar space and that results in a 25% difference among any two subsequent quadrants. We use encoding schemes that divide the polar space in eight sections and the encoding is done by bit information that is 25% different among any two subsequent section and bit information that is 33% different among any two subsequent section (See Fig. 2). EER is evidence for amelioration of these algorithms, it has been improved from 3.27% to 0.82% in CASIA I and from 3.88% to 0.34% in IIT.

KEYWORDS

Iris Recognition, Segmentation, Encoding, EER



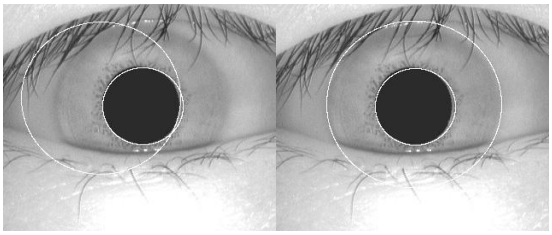


Fig. 1 The improvement of the segmentation using the new proposed metric

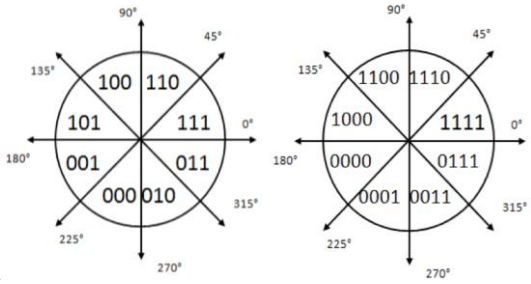


Fig. 2 The two proposed encoding schemes

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