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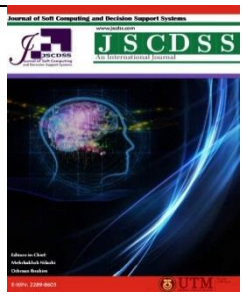

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Morphological-Edge Detection Approach for the Human Iris Segmentation

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Abstract

In the new millennium, technology has become more interesting issues and it has salient progress. Therefore, iris recognition systems attract many attention not only because of its huge applications such as security but also due to its importance in our today's life. Even though, a number of researches have been done in this field; due to the large number of demands from every places like banks, airports, hospitals, market places and so on, it deserves more considerations. In this paper, a new segmentation method is performed in order to segment an exact part of the eyes (e.g., iris area). Then, for extracting the top and bottom texture, calculating the texture images, local entropy of grayscale image is utilized. After that, Otsu's method is applied for globalizing image threshold. Finally, Haar wavelet transform is applied for feature extraction step. We use CASIA-Iris V3 database for our experimental results.

Keywords: Iris recognition, Acquisition, Segmentation, Biometrics, Morphological operators

1. Introduction

In today's life of human, they will face numerous advancements of cutting-edge technologies (Ricanek et al., 2010). Among many of these, individuals need more reliability and security in all of the facets of their life. So, biometric traits brought this for facilitating the usage of almost everything for people (Niinuma et al., 2010). The process of identification by means of biometric traits uses the behavioral and physical features of human (Reid et al., 2013) which it comprises iris (Ahmadi and Akbarizadeh, 2018), vein (Yang et al., 2014), palm (Zhu and Zhang, 2010), face (Park, and Jain, 2010), pupil (Elhoseny et al., 2018), fingerprint (Cappelli et al., 2015) and vessel (Perera et al., 2015). These features gain lots of popularity among many scholars and researchers around the world and they have been utilizing these traits for their researches (De Marsico et al., 2015). Furthermore, by performing new machine learning (De Marsico wt al., 2016) and the other artificial intelligence methods (Alvarez-Betancourt and Garcia-Silvente, 2016), they have been trying to do their best and obtain more applicable and reasonable results for future studies (Raffei et al., 2015).

From the popularity point of view, it is worthwhile to say that, iris trait has gained more attention among the researchers and companies (Othman et al., 2016) and it has appeared as a trustable device in order to distinguish people (Ahmadi and Akbarizadeh, 2017). The reason which is behind this is the factors that made the iris distinguishable among other biometric traits, these features are uniqueness (Raghavendra and Busch, 2015), reliability (Chen et al., 2016), constant pattern (Phillips et al., 2007), genetic independence (Hollingsworth et al., 2011), and so forth.

The common iris recognition framework consists of the following steps (Ahmadi and Akbarizadeh, 2015): (1) Image acquisition (Pillai et al., 2011), (2) pre-processing (Kang, 2010), (3) feature extraction (Ahmadi and Nilashi 2018), and (4) feature matching (Belcher and Du, 2009; Ahmadi and Akbarizadeh, 2017).

The rest of this paper is summarized as follows. In Section 2, background and literature review are described. Section 3 provides our proposed method and results. Finally, conclusion is presented in Section 4.

2. Background and literature review

In this section we provide a literature which consists of the numerous published papers related to iris segmentation, especially with morphological operator. In (Umer et al., 2015), they proposed a novel iris recognition system. Based on their work, the applied Restricted Circular Hough Transformation (RCHT) approach for iris segmentation; then, they applied multi-scale morphologic operator for iris feature extraction step, and finally, the utilized support vector machine (SVM) and fusion for the classification step. They tested their study on four well-known iris databases: (1) UPOL, (2) MMU1, (3) IITD, and (4) UBIRIS. The author of this paper (Wan et al., 2013),