Long Range Iris Recognition: A Survey

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Long Range Iris Recognition: A Survey

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Abstract

The term "iris" refers to the highly textured annular portion of the human eye that is externally visible. An iris recognition system exploits the richness of these textural patterns to distinguish individuals. Iris recognition systems are being used in a number of human recognition applications such as access control, national ID schemes, border control, etc. To capture the rich textural information of the iris pattern regardless of the eye color, traditional iris recognition systems utilize near-infrared (NIR) sensors to acquire images of the iris. This, however, restricts the iris image acquisition distance to close quarters (less than 1 meter). Over the last several years, there have been numerous attempts to design and implement iris recognition systems that operate at longer standoff distances ranging from 1 meter to 60 meters. Such long range iris acquisition and recognition systems can provide high user convenience and improved throughput. This article reviews the state-of-the-art design and implementation of iris-recognition-at-a-distance (IAAD) systems. In this regard, the design of such a system from both the image acquisition (hardware) and image processing (algorithms) perspectives are presented. The major contributions of this article include: (1) discussing the significance and applications of IAAD systems in the context of human recognition, (2) providing a review of existing IAAD systems, (3) presenting a complete solution to the design problem of an IAAD system, from both hardware and algorithmic perspectives, (4) discussing the use of additional ocular information, along with iris, for improving IAAD accuracy, and (5) discussing the current research challenges and providing recommendations for future research in IAAD.

Keywords: Biometrics, iris recognition, long range iris recognition, iris recognition at a distance, stand-off iris recognition, non-ideal iris recognition

1. Introduction

The field of biometrics has witnessed a tremendous surge in activity over the last decade. A number of efforts have focused on improving the performance, scale, and usability of biometric systems. Examples of such trends across commercial and government applications include India's AADHAR program (scale), Apple's Touch ID (usability), NTT DOCOMO's mobile iris recognition

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