

Ophthalmic disease influence on iris recognition performance

Mateusz Trokielewicz^{2,1}, Adam Czajka^{1,2}, Piotr Maciejewicz³

¹Institute of Control and Computation Engineering, Warsaw University of Technology, Warsaw, Poland

²Biometrics Laboratory, Research and Academic Computer Network, Warsaw, Poland

³Ophthalmology Clinic, Medical University of Warsaw

contact: mateusz.trokielewicz@nask.pl, aczajka@elka.pw.edu.pl

Abstract

Ocular diseases affect numerous people, some of them potentially being iris recognition system users. This paper aims at answering the question whether the iris recognition performance is weaker for disease-affected eyes when compared to healthy eyes. Two scenarios may be distinguished when evaluating this hypothesis. In the first scenario an already enrolled biometric system user (with healthy eyes) undergoes an eye surgery or some serious disease occurs. In the second scenario, an ocular disease is already present when the user is being enrolled into the system. In both cases we may observe a degradation in iris recognition reliability of different origin. It is thus crucial to assess the extent and nature of the performance decrease in both scenarios and to propose appropriate countermeasures.

There is little research on the topic, mostly incorporating scarce databases that are often deficient in images representing more than one illness. Abundant datasets with images illustrating numerous diseases are crucial to performing a meticulous analysis on the matter, therefore we built our own database in cooperation with an ophthalmologist, acquiring circa 850 images for about 50 patients of the Medical University of Warsaw (the exact number is subject to change, as the data collecting process continues). Those images represent several common ocular diseases, such as cataract, along with less ordinary conditions, such as iris pattern alterations derived from illness or eye trauma. Images were captured in near-infrared light (used in biometrics) and for some cases also in visible light (used in ophthalmological diagnosis).

In this paper we evaluate several iris recognition methodologies (both commercial and academic solutions) to find out the extent to which they are prone to ocular disease influence. We present experimental results showing a significant degradation in genuine match scores for illness-affected eyes (for selected diseases) when compared to match scores obtained for healthy eyes.