Local Attention and Global Representation Collaborating for Fine-grained Classification

He Zhang[1], Yunming Bai[2], Hui Zhang[1*], Jing Liu[1], Xingguang Li[1] and Zhaofeng He[3]

1 Beijing IrisKing Co., Ltd.

2 Forenisc Science Center of Guangdong Provincial Public Security Bureau

3 Beijing University of Posts and Telecommunications

Abstract

For practical application scenes, the cosmetic contact lenses detection still facing unsolved problems, due to the low image quality and difficulty in accurately iris localization. We propose a novel framework called Weighted Region Network (WRN) to detect the cosmetic contact lenses. The WRN includes a local attention Weight Network and a global classification Region Network. With the inherent attention mechanism, the proposed network is able to find more discriminative regions, which reduces the requirement for target detection and improves the ability of classification.

Introduction

Cosmetic lenses: easy-to-use iris presentation attack means.

➢ Iris textural pattern is the foundation for iris recognition.

➢ The cosmetic contact lenses over an iris may change original iris textural pattern.
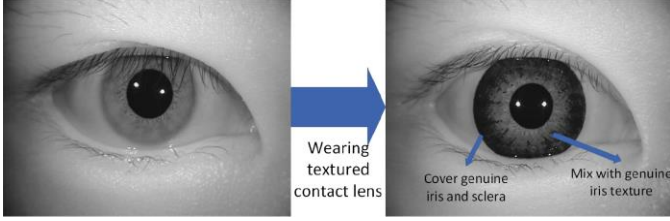

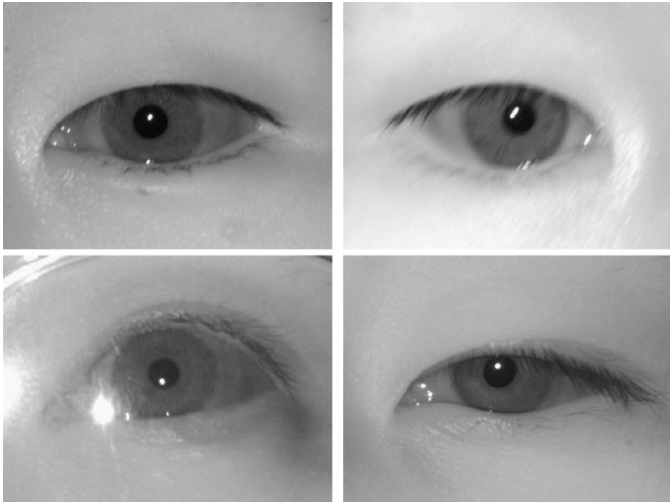Fig. 1. Iris images without and with cosmetic contact lenses.

Fig. 2. Low iris image quality including changes of shooting angle, different texture of the lenses, illumination and other factors.

Approach

The WRN is composed of two sub-networks: Weight Network and Region Network.

➢ The Weight Network is used to evaluate the effect of different regions to classification, which can be regarded as the attention distribution model.

➢ The Region Network is responsible for the whole classification task with the fusion of original image and attention distribution as input.
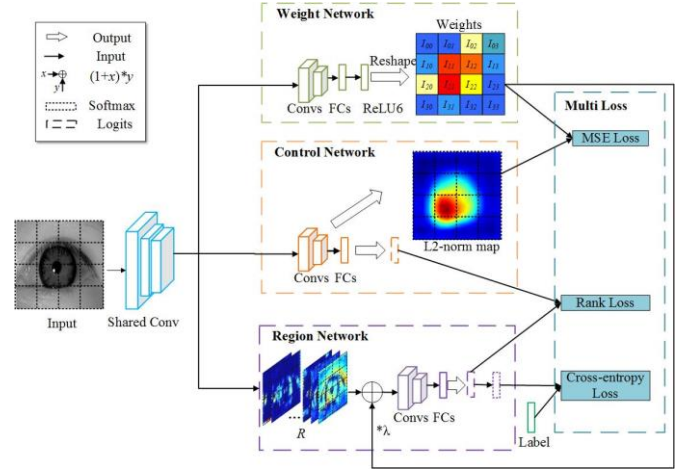

Fig. 3. Framework overview.

Experiments and Results

The proposed method outperforms state-of-the-art fake iris detection algorithms, and is also effective for the fine-grained image classification task.
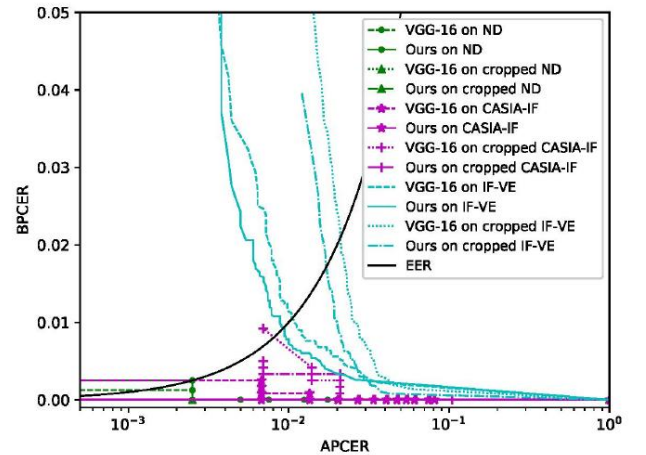

Fig. 4. ROC curves of original and cropped database experiments.

Conclusions

The Weighted Region Network is designed to evaluate the effect of different regions for classification. With the inherent attention mechanism, it is able to automatically find the most discriminative regions, showing advantages in analyzing the low-quality iris images with cosmetic contact lenses.