

Notre Dame Image Database for Contact Lens Detection In Iris Recognition - 2013

Jay Doyle and Kevin Bowyer
Computer Vision Research Laboratory
Department of Computer Science and Engineering
University of Notre Dame

March 7, 2014

1 Introduction

The images in this database were acquired with an LG 4000 and an IrisGuard AD100 iris camera. The images are 480x640 in size, and are intensity images acquired under near-IR illumination. The database contains images of subjects in three conditions: (1) wearing cosmetic contact lenses¹, (2) wearing clear soft contact lenses², and (3) wearing no contact lenses³. The database is separated into two datasets: Dataset I (LG4000) and Dataset II (AD100). Dataset I is constructed of a training set of 3000 images, with 10 equal folds for testing purposes, and a verification dataset set of 1200 images. Dataset II— is constructed of a training set of 600 images, with 10 equal folds for testing purposes, and a verification dataset set of 300 images.

2 Acquisition

For Dataset I, all images were acquired indoors in one of two windowless acquisition rooms using one of three LG4000 and one LG4100 near-IR iris cameras. The soft lens and no lens data was acquired over the period March 2008 to April 2010. For Dataset II, all images were acquired indoors in one of two windowless acquisition rooms using the same IrisGuard AD100. The soft lens and no lens data was acquired in 2011 and 2012. The cosmetic contact lens images were acquired in August and September of 2012.

¹Labeled “Cosmetic” in the metadata files.

²Labeled “Yes” in the metadata files.

³Labeled “No” in the metadata files.

Manufacturer	Brand	Color(s)
CibaVision	FreshLook ColorBlends	Blue, Green
CibaVision	FreshLook ColorBlends Toric	Brown
CooperVision	Expressions Colors	Blue, Green
Johnson&Johnson	Acuvue2Colours	Blue, Brown, Green

Table 1: Cosmetic Lens Manufacturer and Color Breakdown

3 Demographic Information

At the time of acquisition, subjects were asked for demographic information, including ethnicity and gender. The ethnicity information is used to build a balanced distribution of ethnicities across the 10 folds. The gender information was used to build a dataset that was guaranteed to have an even distribution of men and women.

4 Segmentation

The center and radius of circles that approximate the pupillary and scleral boundaries, as determined by a commercially available iris segmentation program, are provided for convenience. The segmentations are only rough segmentations. Pixel-precise boundaries are not provided. Important - this information is provided "as is" and has not been checked for any particular level of accuracy.

5 Cosmetic Lens Information

The cosmetic lenses acquired for this data set represent a variety of manufacturers and colors. Table 9 contains a list of cosmetic lens manufactures, brands, and colors that were part of the acquisition:

6 Obtaining the Database

The release agreement for the dataset is available at: https://www.nd.edu/~cvrl/CVRL/Data_Sets.html.

7 Dataset I Organization

The 4200 data files are found in the *images* folder and there are two metadata files included that describe the data. Descriptions of the files can be found in Table 2.

Name	Description
images	Folder containing the 4200 images.
train.csv	Lists the images included in the training set, the subject identifier, whether it is the subject’s left or right eye, demographic information, the class (No, Yes, Cosmetic), segmentation information, and the fold assignment. These images are to be used in <i>training</i> the classifier. The 10 folds provided are subject-disjoint, to aid in classifier training.
verification_subject-disjoint.csv	Lists the images included in the verification set, the subject identifier, whether it is the subject’s left or right eye, demographic information, the class (No, Yes, Cosmetic), and segmentation information. These images are to be used in the <i>verification</i> of a trained classifier and, therefore, the <i>Fold</i> field is left blank.

Table 2: Description of files included in the dataset.

8 Dataset —I Organization

The 800 data files are found in the *images* folder and there are two metadata files included that describe the data. Descriptions of the files can be found in Table 2.

Name	Description
images	Folder containing the 900 images.
train.csv	Lists the images included in the training set, the subject identifier, whether it is the subject's left or right eye, demographic information, the class (No, Yes, Cosmetic), segmentation information, and the fold assignment. These images are to be used in <i>training</i> the classifier. The 10 folds provided are subject-disjoint, to aid in classifier training.
verification_subject-disjoint.csv	Lists the images included in the verification set, the subject identifier, whether it is the subject's left or right eye, demographic information, the class (No, Yes, Cosmetic), and segmentation information. These images are to be used in the <i>verification</i> of a trained classifier and, therefore, the <i>Fold</i> field is left blank.

Table 3: Description of files included in the dataset.