# Seminary Iris Recognition

BCC448 – Pattern Recognition

# Students:

Filipe Eduardo Mata dos Santos Pedro Henrique Lopes Silva

# Paper

- "Noisy Iris Recognition Integrated Scheme"
- Authors:
  - Maria De Marsico
    - Sapienza Università di Roma, Roma, Italy
  - Michele Nappi
  - Daniel RiccioZhenan Sun
  - Tieniu Tan
    - Università di Salerno, Fisciano (SA), ItalyNational Laboratory of Pattern Recognition

## Paper

- Qualis: A1 (Computer Science)
- Cited by 7
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- Pages: 1006-1011

## Introduction

#### • The main goal: robustness

- distortion,
- blurring,
- off-axis,
- reflections,
- occlusions due to eyelids or eyelashes

## Introduction

- System work over noisy iris images
  - semi-controlled setting,
  - lower user's cooperation,
  - limited performances of the capture device.
- Noisy environments

## Introduction

- Methods:
  - LBP
  - BLOB
  - BBP-BLOB



Combination X single techniques

#### Image Preprocessing and segmentation

- NICE I
  - Segmenting noisy iris images
- NICE II
  Noisy iris matching
- Rectangular region

## Eye with iris marked



### **Rectangular Region**



#### Image Preprocessing and segmentation

• Segmented iris



- Aproximate iris and pupil by circumferences
- Image Cartesian space to region polar space
- Normalize the iris

#### Extracting local features

- LBP
- BLOB

- Local texture descriptor
- Low computational cost
   appropriate to analyze images with high resolution or in real-time
- Identifies quite regular patterns,

• Timo Ojala and Harwood (1996)



- Ojala et al. (2002),
  - Extended to process pixel neighbourhoods of variable dimension
  - Invariant to rotations

- Sun et al. (2006)
  Divide into blocks
  Histogram
- Used:
  Divide into bands



 Number of bands is related to the normalization parameters

#### • Histogram similarity measure

- orrelation,
- intersection,
- Bhattacharyya.

- Uniqueness of the iris texture
  - Irregular distribution of local feature blocks
    - furrows, crypts,
    - spots.
- Identifying lighter or darker regions in the iris
- Chenhong and Zhaoyang (2005, 2008),

#### • LoG filter banks.

- Laplacian Operator:
  - Contour detector
  - Sensible to noise
- Gaussian filter
  - Smooth the image
- Noise reduction(smoothing)

#### • Matrix

- Positive values: dark spots,
- Negative values: light ones.
- Hamming distance

#### • Application the LoG



## LBP-BLOB

- Fusion of LBP and BLOB methods
- Mean
- One method works better than the other on specific images.
- Hamming distance of binary codes of the same size
   Pair of LBP codes
  - Pair of BLOB codes

# Experiments

#### • UBIRIS V1

- 1877 images
- 800x600 pixels resolution
- 241 subjects

#### • UBIRIS V2

- 11102 images
- 400x300 pixels resolution
- Both iris of 261 subjects
- Follow the protocols defined by NICE II

## **Results and discussion**

- Color images were converted in gray scale
- BLOB seems to perform better than LBP
   trend is reversed on low resolution images
- normalization fails in some critical situations

#### **Results and discussion**



Results from LBP, BLOB and LBP-BLOB with different configurations on UBIRIS v1 database.

#### **Results and discussion**



Results from LBP, BLOB and LBP-BLOB with different configurations on UBIRIS v2 database.

## Conclusions

- Future studies
  - focus on the combination of more kinds of features
- Very promising research line that we are following is the use of more local features, able to set off different iris peculiarities,

directionality of extracted patterns.

#### Doubts?

