Iris Recognition

BCC448 – Pattern Recognition

Students:

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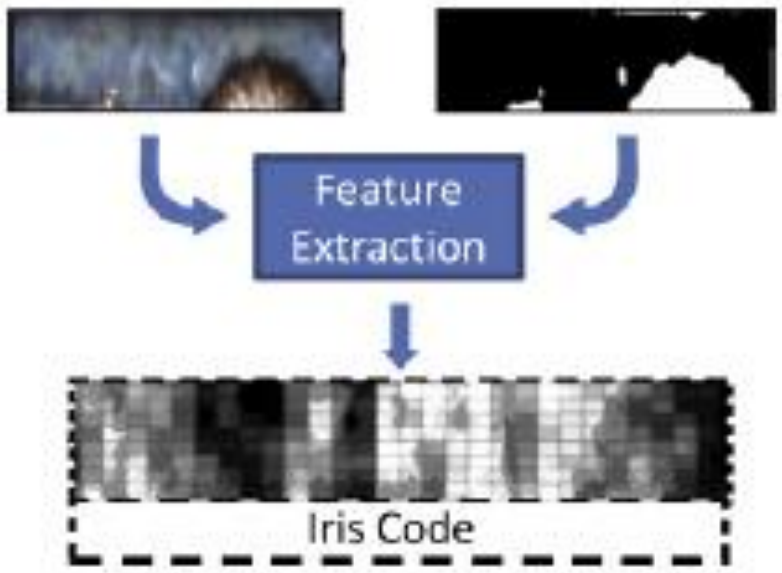
Introduction

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

- Noisy environments

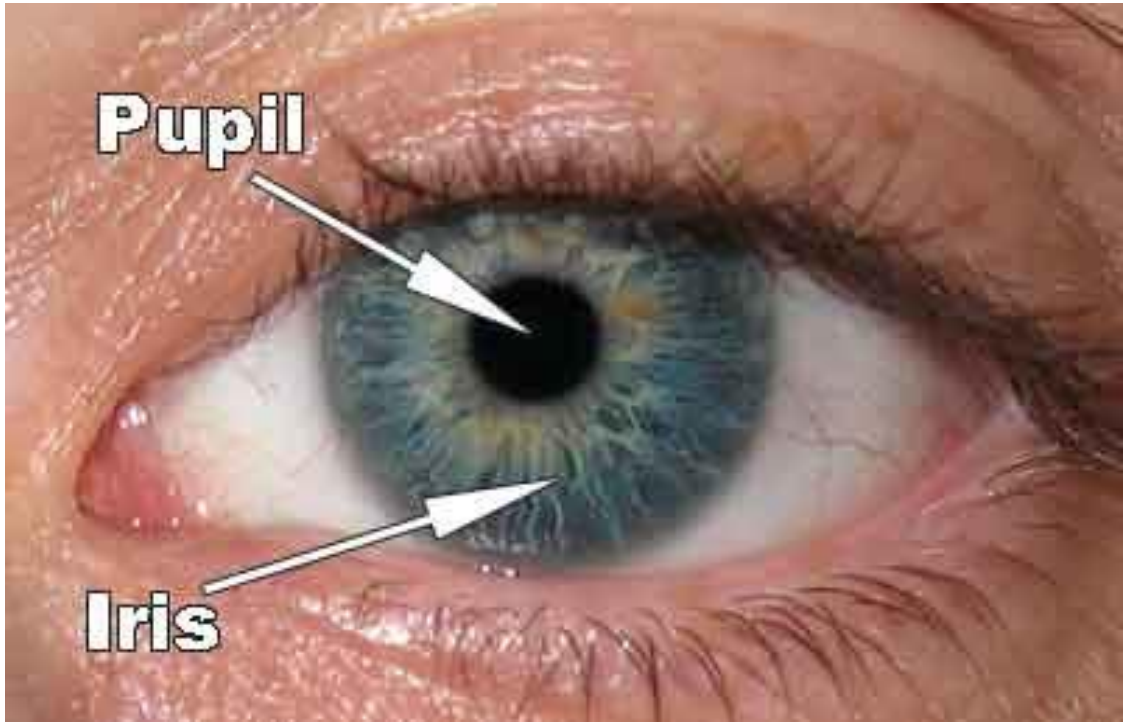
Introduction

- Methods:
  - LBP
  - BLOB
  - LBP-BLOB



- Verification problem

Iris



Rectangular Region

Segmentation/Normalization

- Segmented iris
- Image Cartesian space to region polar space
- Normalize the iris

Extracting local features

- LBP
- BLOB

LBP

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

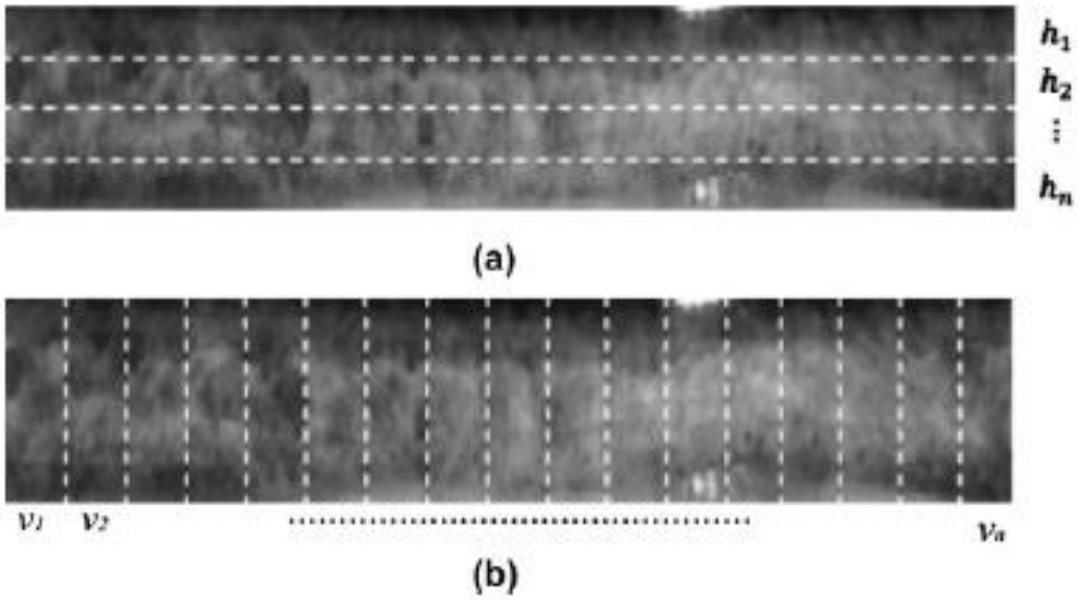
LBP

- Timo Ojala and Harwood (1996)

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

LBP

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



- Number of bands is related to the normalization parameters

LBP

- Histogram similarity measure
  - correlation,
  - intersection,
  - Bhattacharyya.

BLOB

- 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),

BLOB

- LoG filter banks.
  - Laplacian Operator:
    - Contour detector
    - Sensible to noise
  - Gaussian filter
    - Smooth the image

- Noise reduction(smoothing)

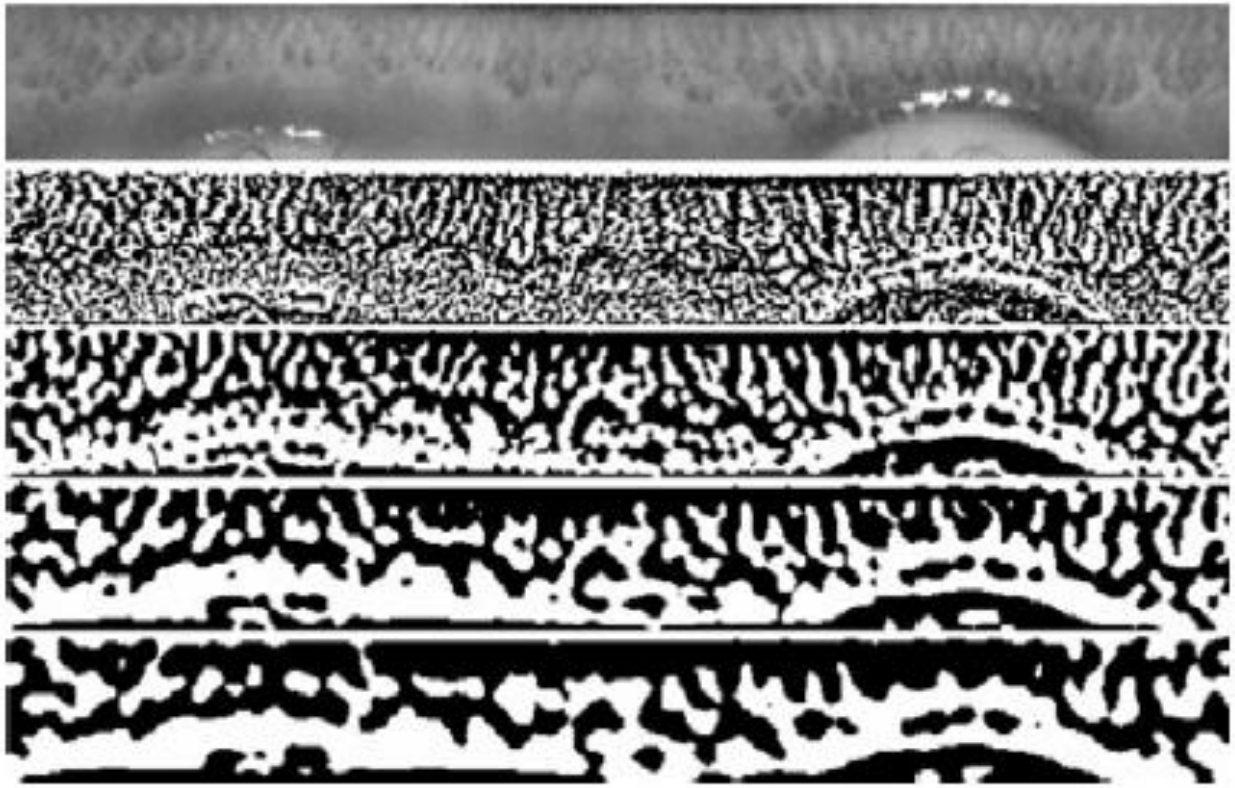
BLOB

- Matrix
  - Positive values: dark spots,
  - Negative values: light ones.

- Hamming distance

BLOB

- Application the LoG



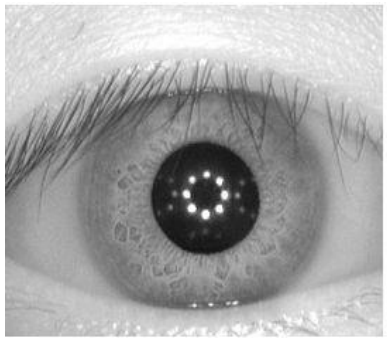
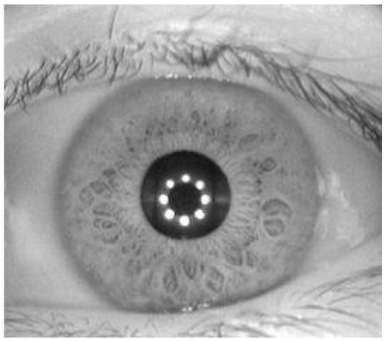
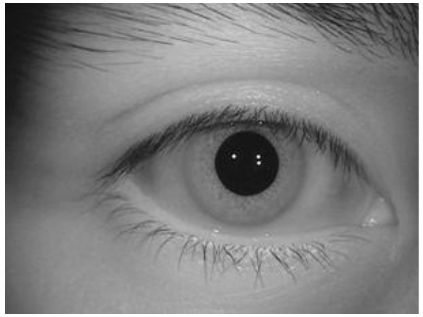
LBP-BLOB

- 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

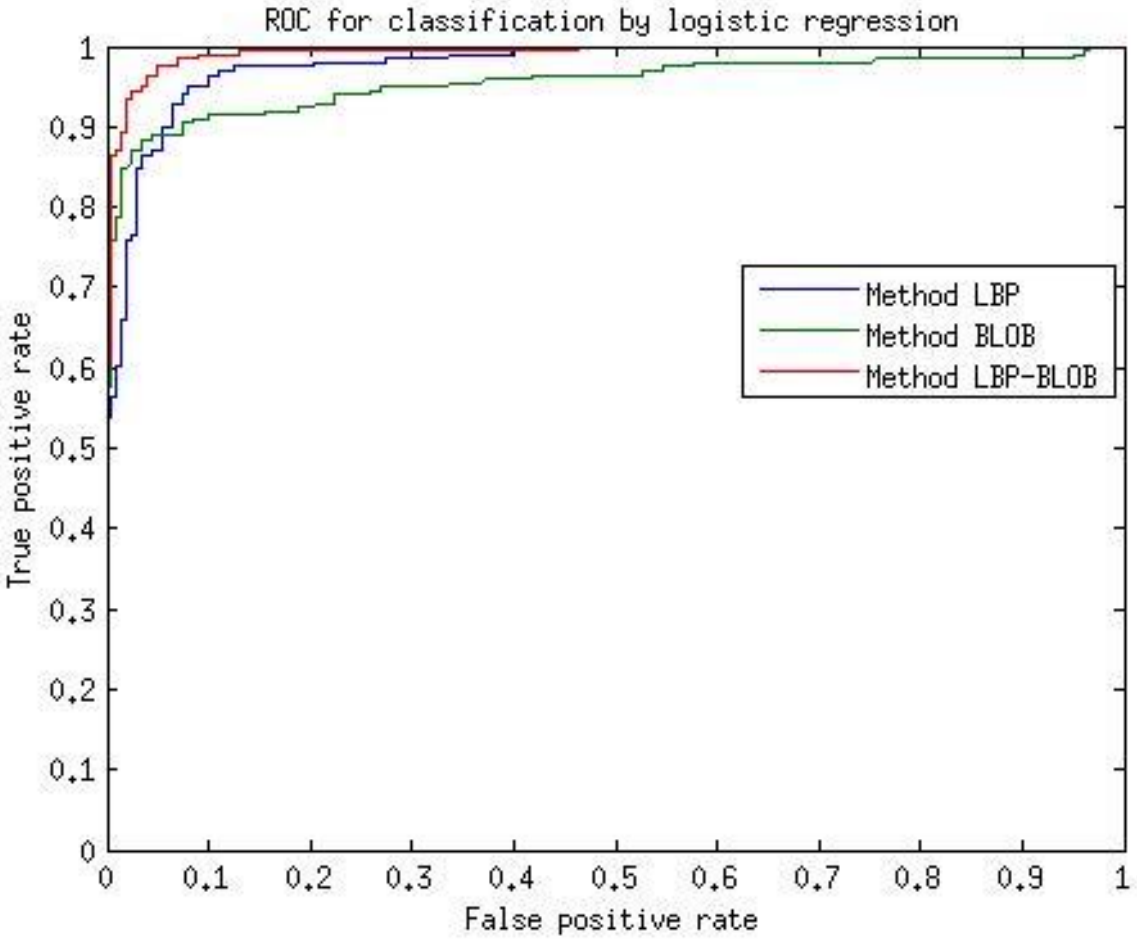
TRAIN	TEST
200	400

CASIA

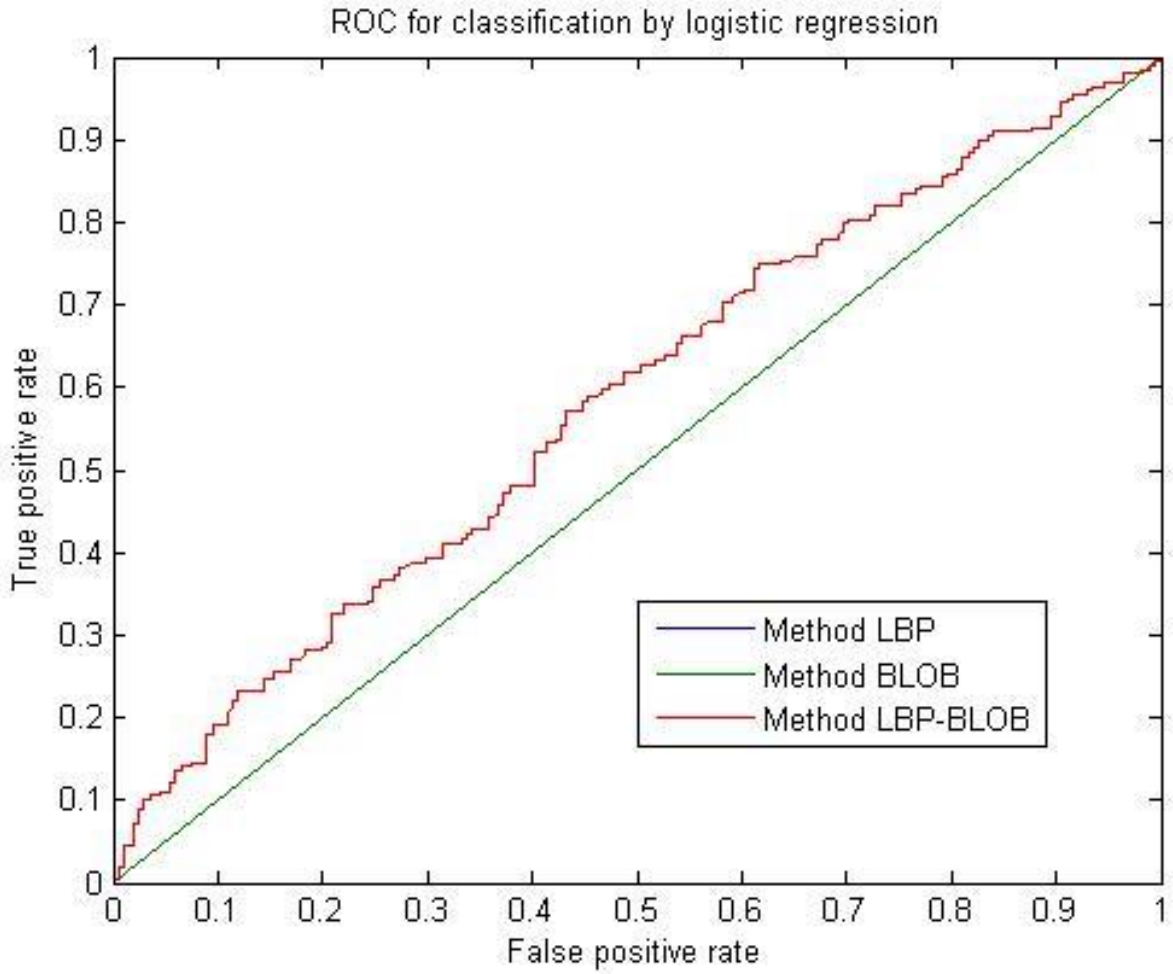





UBIRIS


Results CASIA



Results UBIRIS



Conclusions

- Future studies
  - focus on the combination of more kinds of features
- Use Deep Learning.

Doubts?