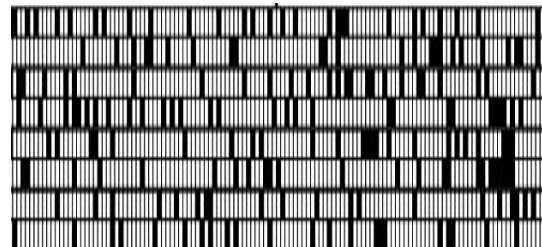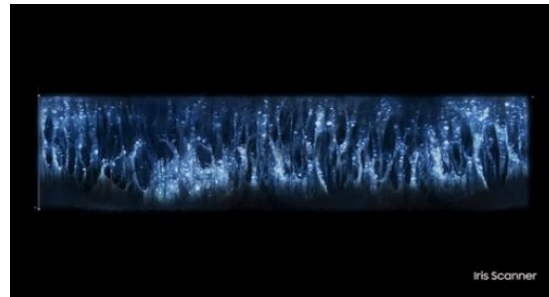# Gender from Iris?

Deeksha Arun

Fig. Eye Anatomy

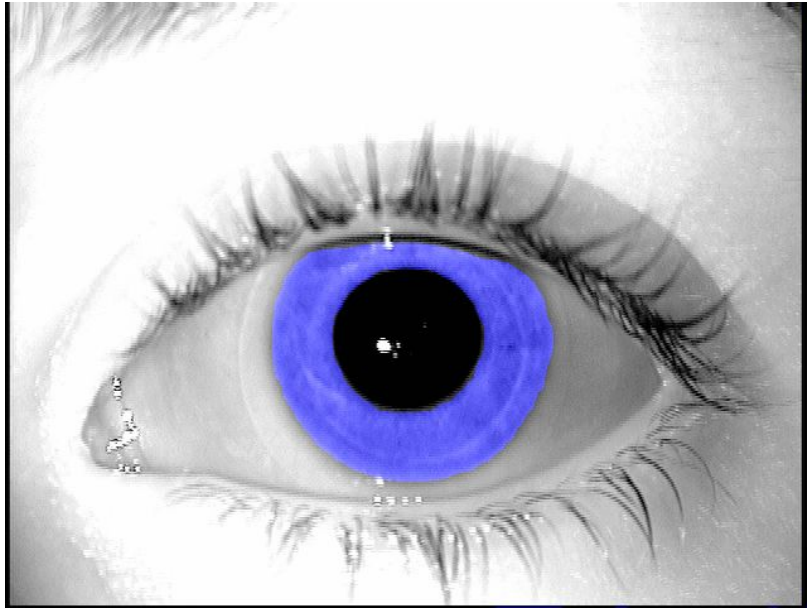# **Introduction**

IRIS RECOGNITION

Introduction

Fig– Periocular region
(Iris highlighted in blue)

Male or female?

Research Paper

A. Kuehlkamp, B. Becker and K. Bowyer, "Gender-from-Iris or Gender-from-Mascara?," 2017 IEEE Winter Conference on Applications of Computer Vision (WACV), 2017, pp. 1151-1159, doi: 10.1109/WACV.2017.133.

Milestones

- Obtained GFI dataset
- Structured the dataset into required folders
- Performed segmentation of Irises
- Applied BSIF Filers and obtained encodings
- Sent the encodings into a Neural Network

Data Collected

- GFI – Gender From Iris dataset (from Notre Dame dataset library)

- 750 left and 750 right eye images– 2 folders.

- A list of male and female iris image names was provided in a text document along with the dataset.
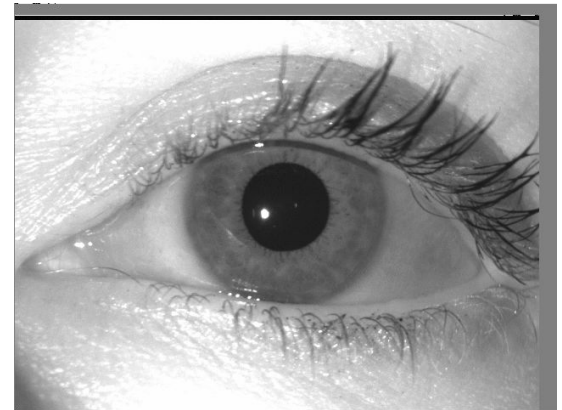
Structuring of data

- The data was split into 6 folders in the ratio– 80%, 10%, 10% respectively
- 1) train_male, test_male, val_male
- 2) train_female, test_female, val_female

1. Periocular region classification

- Periocular region images – sent to Neural Networks for gender classification.
- Neural Networks used– VGG16, ResNet–50
- ResNet–50 performed the best – 77.3% accuracy on the test set.
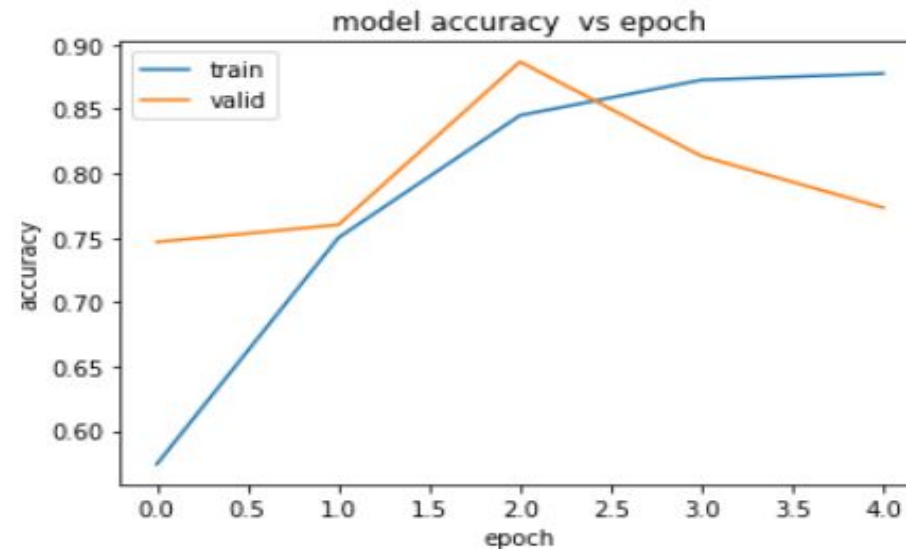
VGG16

- VGG stands for Visual Geometric Group. (Research group from Oxford)
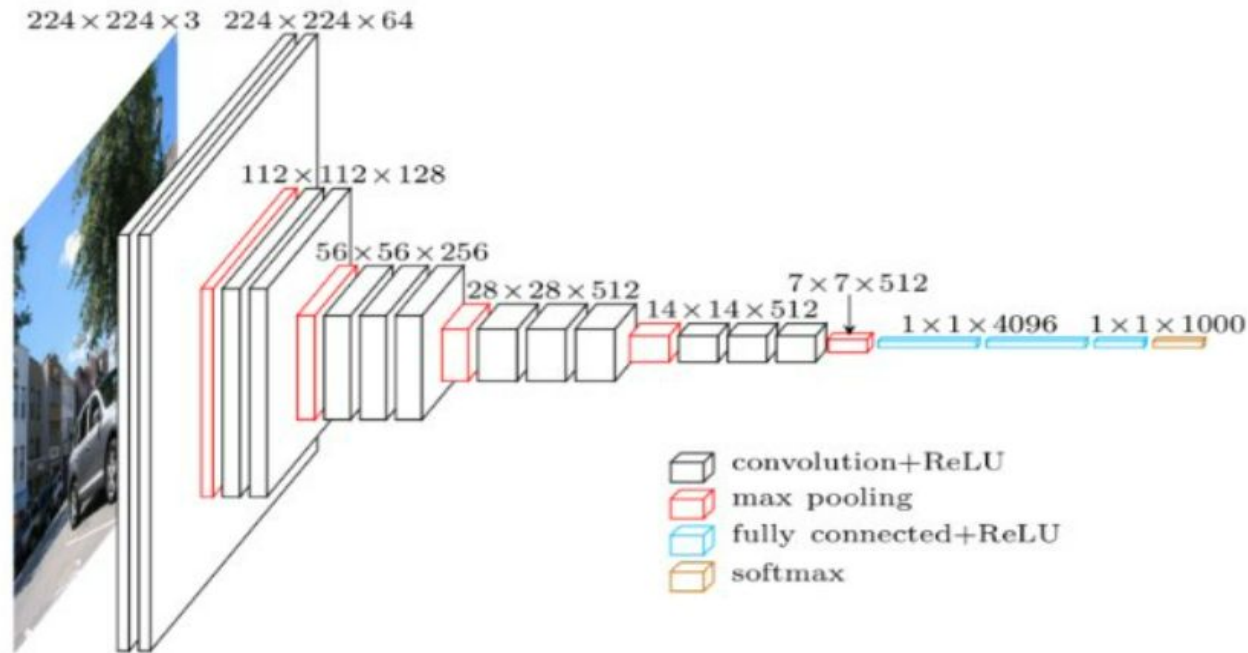- Has 16 layers!

Fig. VGG16 Architecture

Source- www.researchgate.com

ResNet–50

- ResNet stands for Residual Network.
- Has 50 layers!
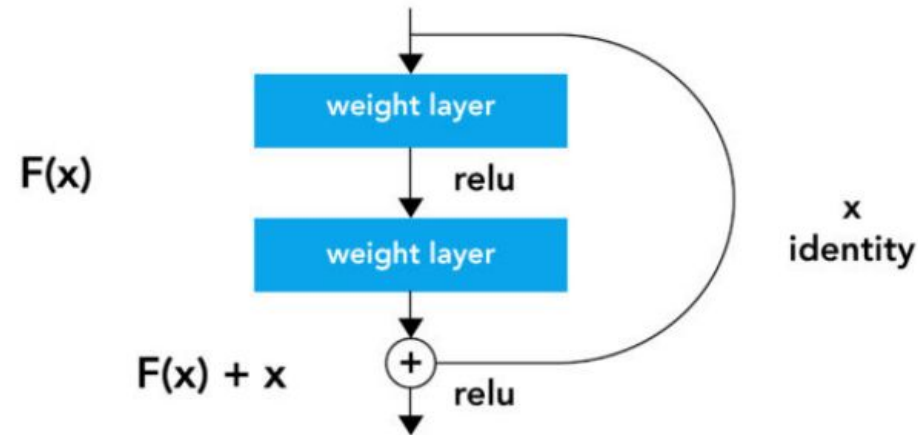- ResNet has a residual block which forms the core of this architecture

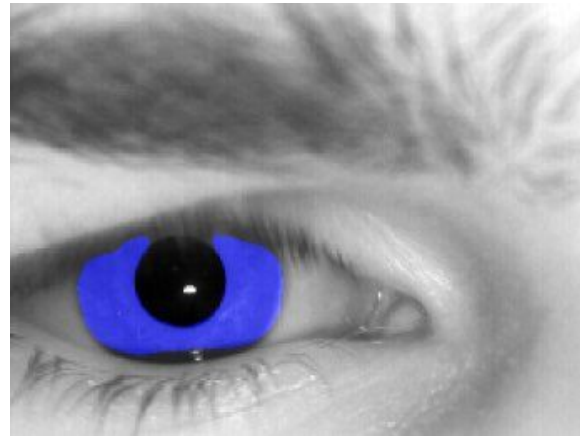Fig. Residual Block

H(x)=f(wx + b)
or H(x)=f(x) – Normal Network

H(x)=f(x) + x – ResNet

Source –
http://ursula.chem.yale.edu/~batista/classes/CHEM584/Resnet.pdf
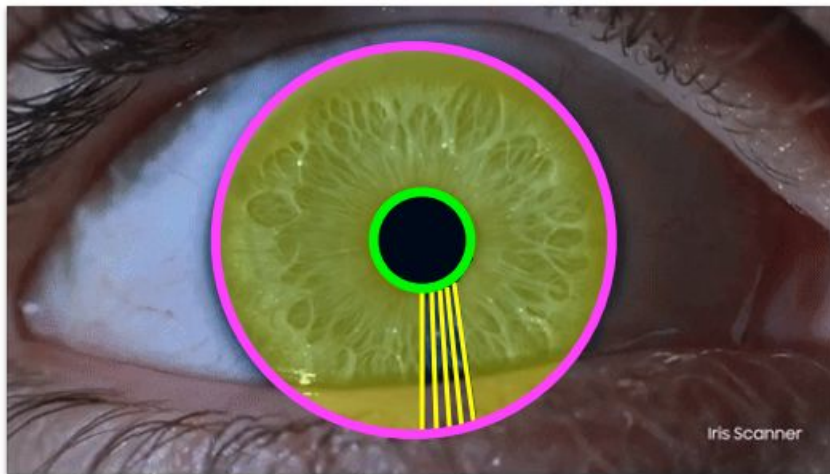
2. Iris based classification

1) Segmentation

Iris localization using Convolutional Neural Networks.
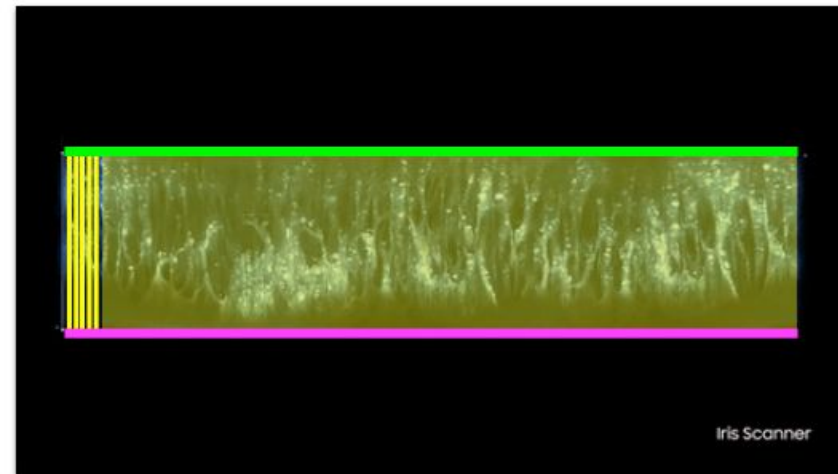(machine learning trained with annotation examples)

2. Iris based classification

2) Normalization

source
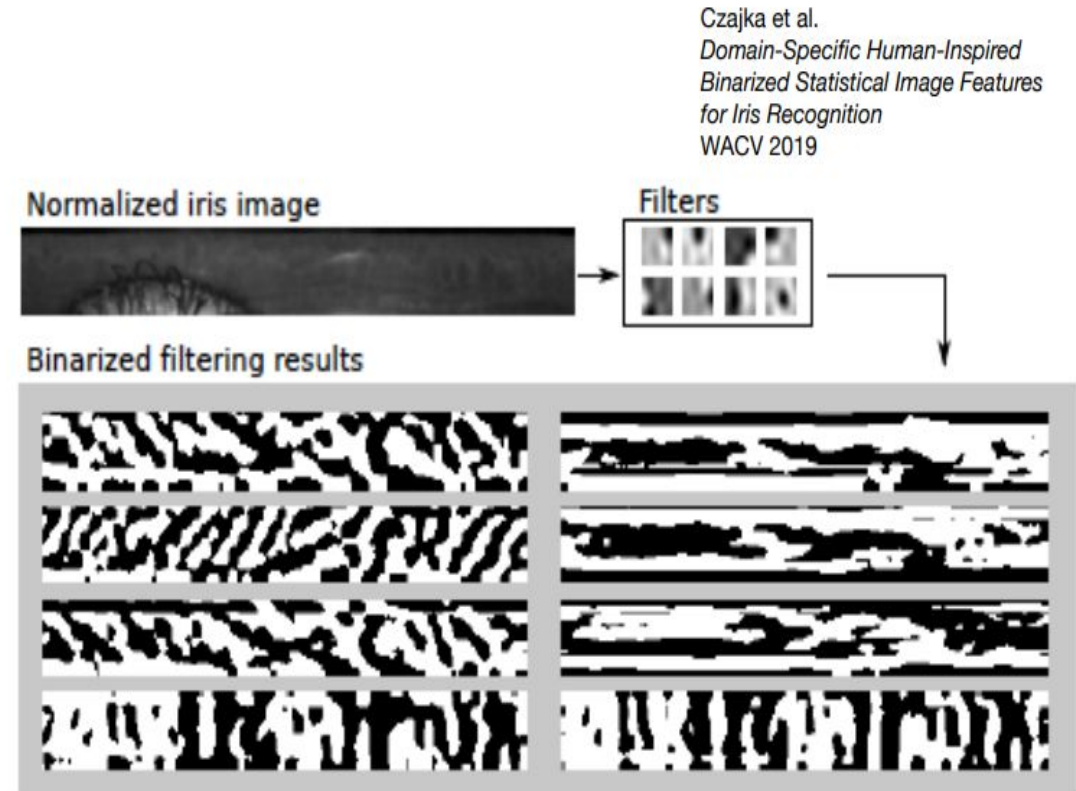
target

2. Iris based classification

3) Feature extraction – BSIF filters (Binarized Statistical Image Features)

Images are convolved with each BSIF filter leading to various projections in the target subspace.

Czajka et al.
Domain-Specific Human-Inspired
Binarized Statistical Image Features
for Iris Recognition
WACV 2019

Normalized iris image

Filters

Binarized filtering results
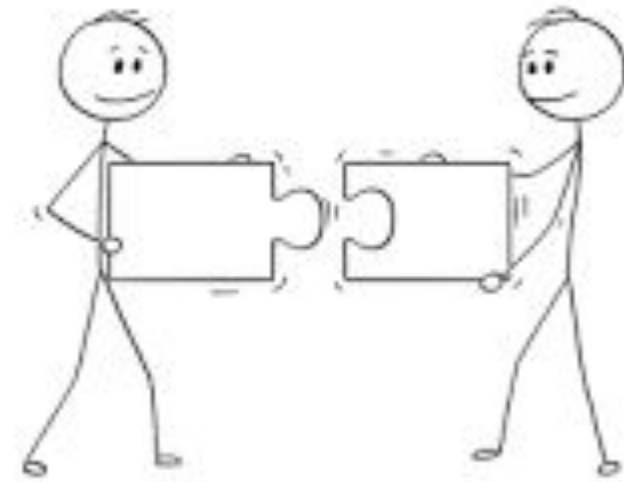
2. Iris based classification

3) Feature extraction – BSIF filters (Binarized Statistical Image Features)
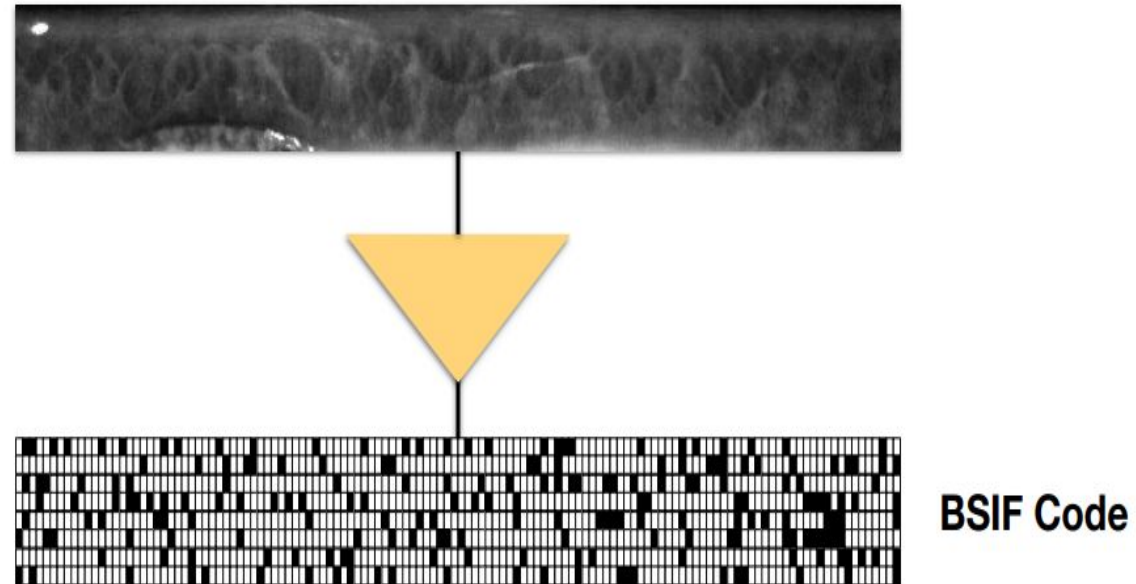
BSIF Code

2. Iris based classification

4) Feature Matching

Distance between BSIF codes calculated– Not much significant difference observed (around 0.13)
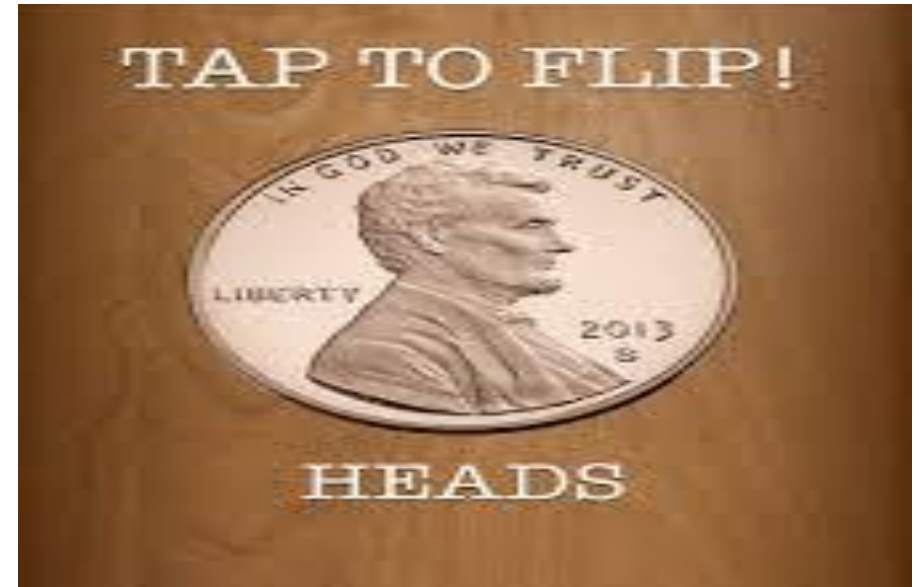
2. Iris based classification

5) Neural Network approach

Finally, BSIF codes sent into
Neural Networks!

2. Iris based classification

5) Neural Network approach

- ResNet50, VGG16 and MobileNet.
- Every model gave around 50% accuracy

Conclusion

- Gender can be determined from the periocular region and not the Iris.

- The Iris texture apparently is the same for both male and female irises.

- One could look at the periocular region and still use gender as a soft biometric.

Thank you!