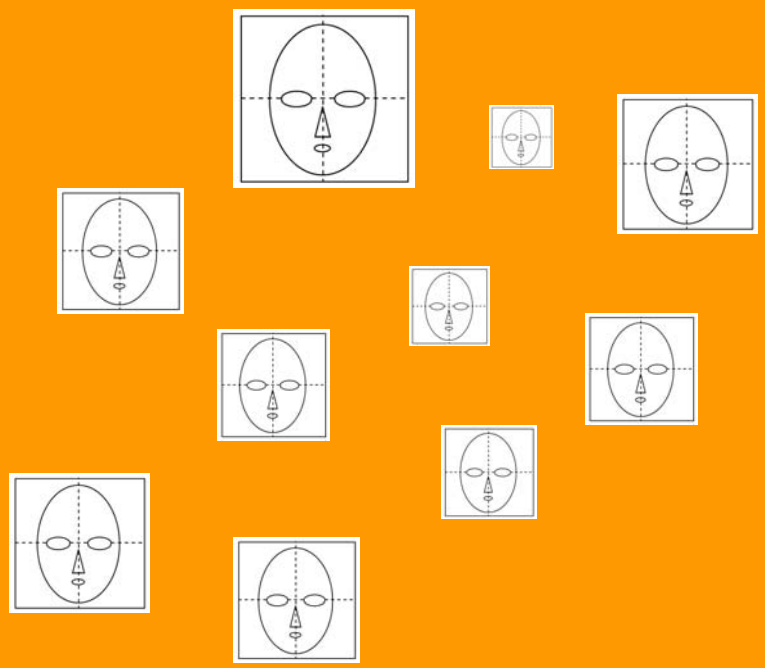
# Face Recognition Using PDE-Textons



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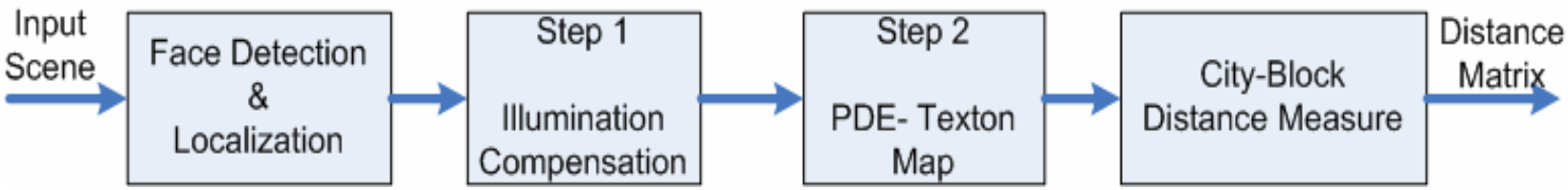
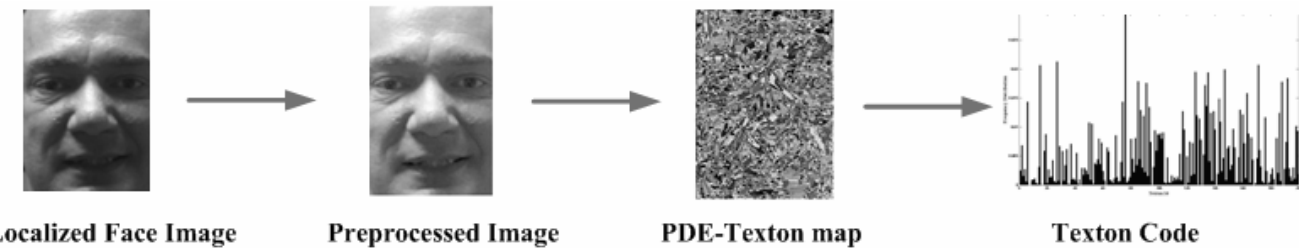
# Preamble

- Steps followed in FRGC v.1
- Results of Preprocessing
- Results of PDE-Textons on AR dataset
  - Comparison results between LBP, Textons, PDE-Textons
- Results on FRGC v.1 dataset – with preprocessing

# Steps Followed for FRGC v.1





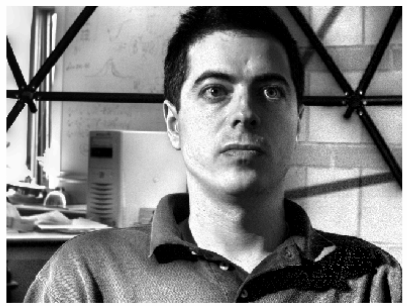
# Illumination Compensation

- Minvariance-Lighting - Novel Technique
  - Handle diffuse and specular reflectance
  - Inspired from the dichromatic color model
- Advantages
  - Low computational cost
  - Improved Performance

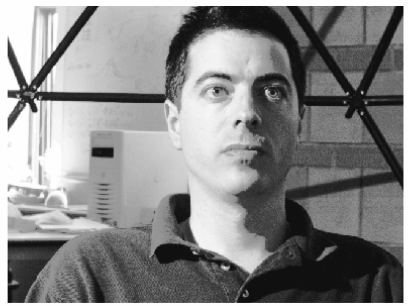
# Results of Minvariance-Lighting

Original Image

Minvariance Lighting



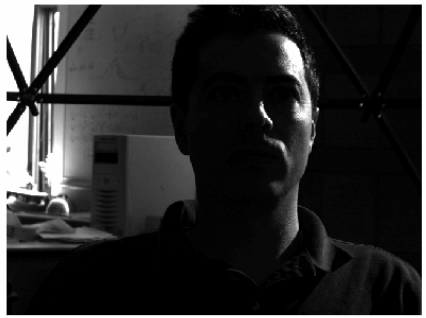
Multiscale Scale Retinex



Histogram Equalization

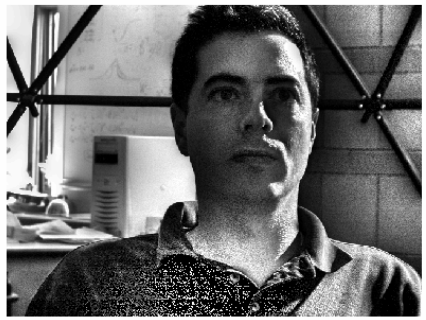
Note: This Multiscale retinex is based on Land and McCann's work

# Results of Minvariance-Lighting

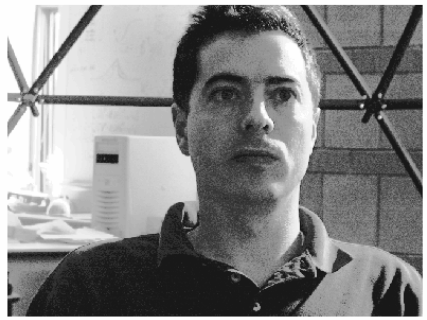


Original Image

Minvariance Lighting



Multiscale Scale Retinex



Histogram Equalization

# Results of Minvariance-Lighting

Original Image

Minvariance Lighting

Multiscale Scale Retinex

Histogram Equalization



# Comparison with LBP and Textons

- Popular texture analysis schemes, namely Local Binary Patterns (LBP) and 3D Textons worked well under varying illumination and viewing condition.
- LBP
  - Works well for micro texture.
  - Very efficient
- 3D Textons
  - Works well under Varying lighting direction and viewing condition
  - Computationally expensive

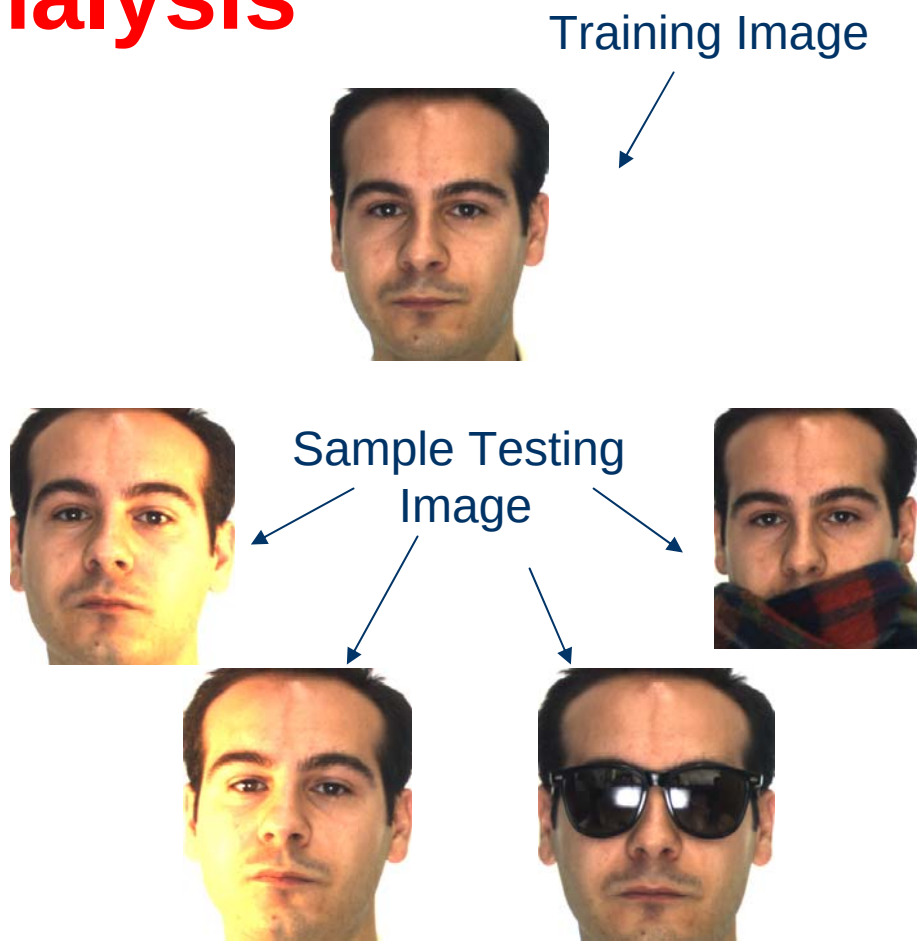


# PDE-Textons

- Computationally cheap
- Better performance than both LBP and 3D textons.
- Requires relatively less learning and less training set.
- Better representation of Facial Features

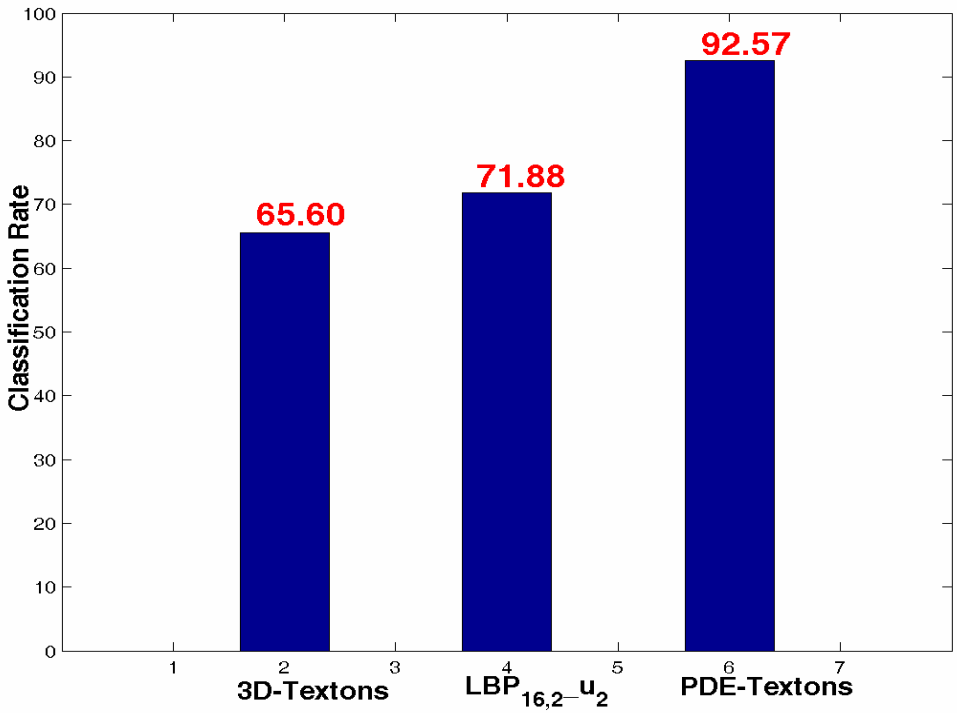
# PDE-Textons - Analysis

- Test performed in AR database [1].
- No of classes: 120
- 1 image/class for Training
- 12 novel images/class for Testing (with expression, illumination variation and occlusion)
- 200 Textons were used to represent the face images.
- k-NN Classifier



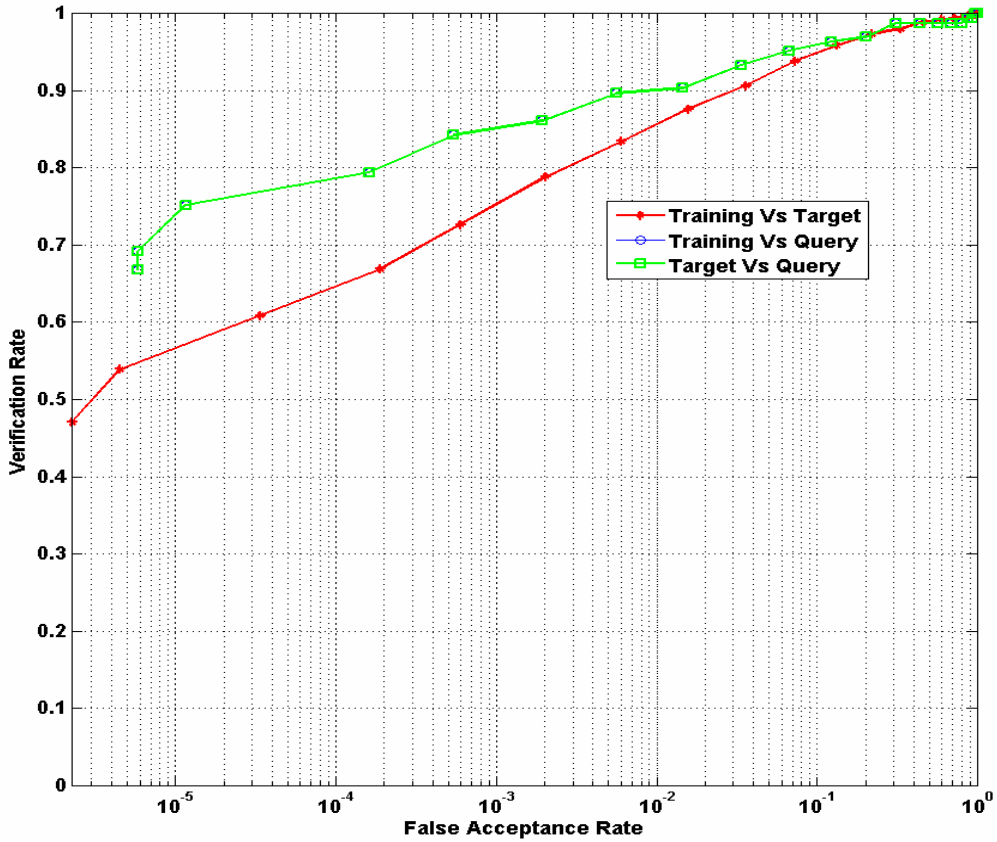

[1] A.M. Martinez and R. Benavente,``The AR face database," CVC Tech. Report #24, 1998.

# PDE-Textons Results

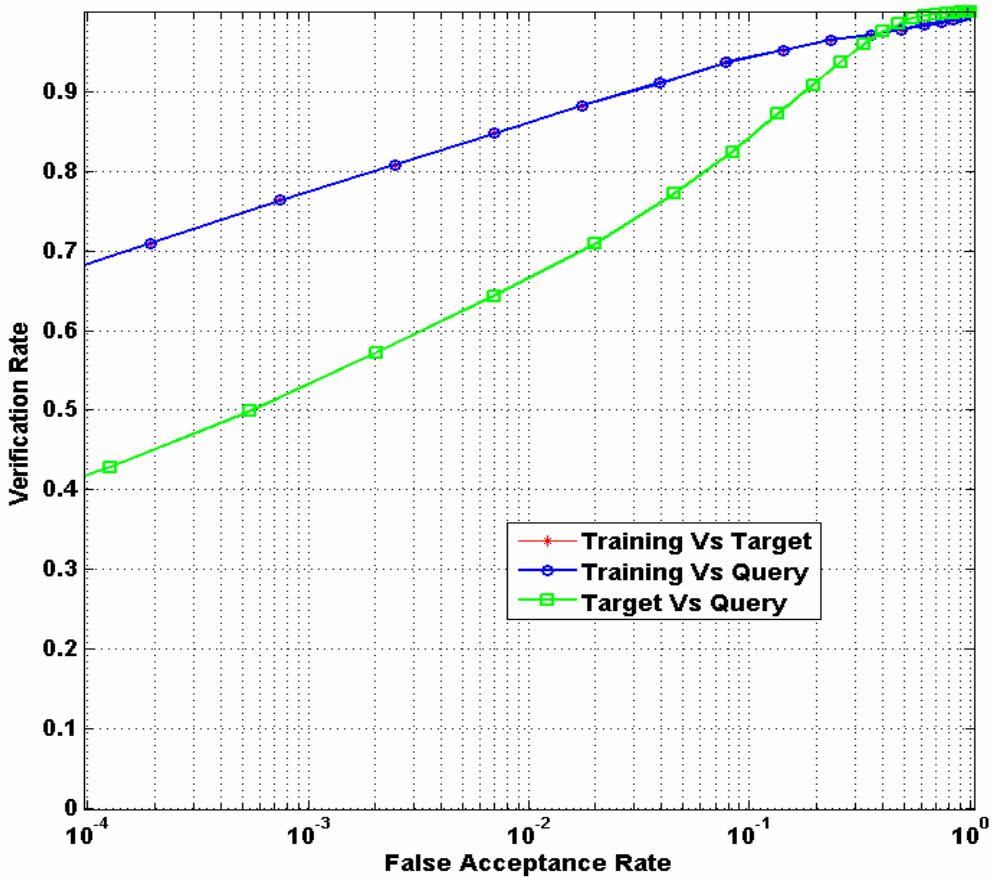



Note: The results are obtained without any preprocessing

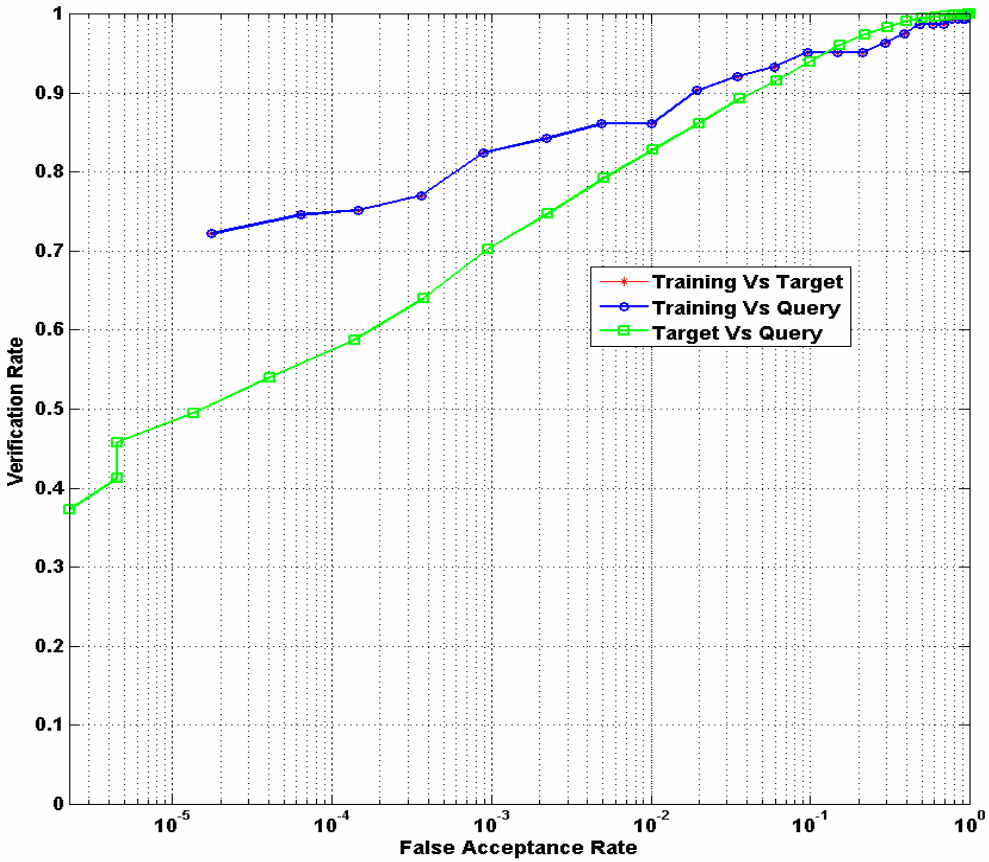
# FRGC v.1 – Experiment 1.0.1



# FRGC v.1 – Experiment 1.0.2



# FRGC v.1 – Experiment 1.0.3





# Currently Studying

- Portability of Textons from set of images to another
- Possible extensions to Motons (to handle - motion blur)
- Face retrieval – (efficient automated retrieval)
- Modeling variations in feature with respect to resolution.
- Applications to Multimodal Biometrics



# Thanks and Questions

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