Face Recognition using Tensor Analysis

Presented by
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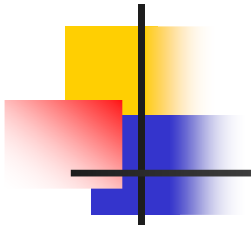
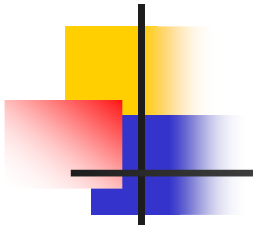


Face Recognition

- Why?
  - Human Computer Interaction
  - Authentication
  - Surveillance
- Problems include change in
  - Illumination
  - Expression
  - Pose
  - Aging

Key Paper 1
Face Recognition through Geometric Features *[brunelli et. al]*

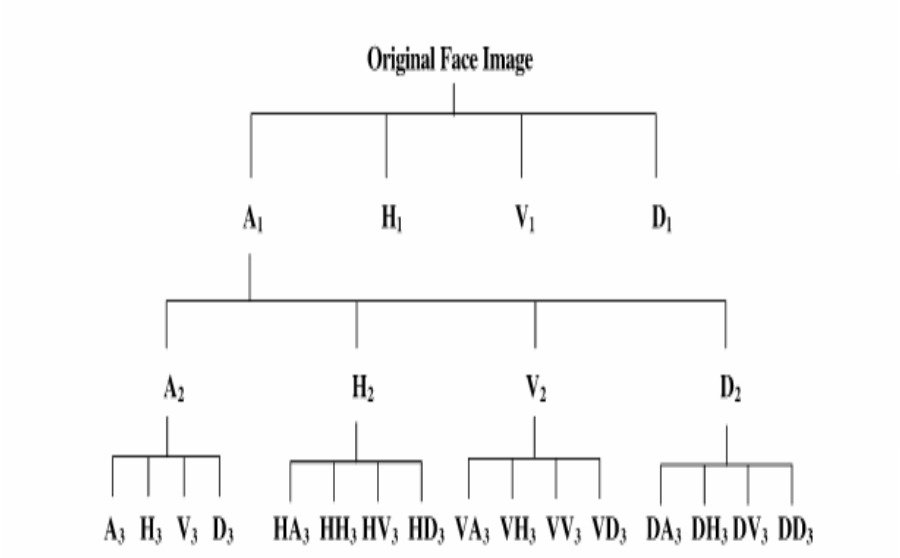


Idea is to extract relative position of distinctive features and use nearest neighbor classifier.

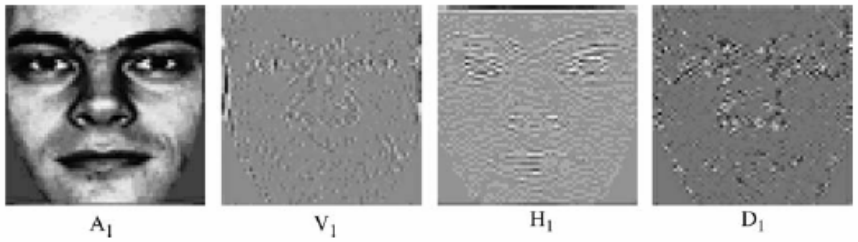
- Advantages
  - Possible at course resolution
  - Dependency on lighting is very less
  - Dependency on facial expression is less
- Disadvantages
  - Works only for a very small database
  - The images need to be only of frontal view.

Brief Review of Wavelet Transform

- It is one of the popular multiresolution techniques



Example of 3 level decomposition



Example of 1 level wavelet decomposition

Key Paper 2
Multi resolution Analysis *[Ekenel et. al]*

- Most popular is Wavelet Transform
- Perform PCA/ICA on vectors from subbands
  - Approximation Subbands are invariant to expression changes
  - Horizontal Detail subbands are invariant to illumination changes
- Robustness against facial expression changes and to some extent illumination.
- Still requires images to be of frontal view

Key Paper 3
Tensor Analysis *[Vasilescu et. al]*

- Tensors define multilinear operators over vector spaces
- Collection of images are represented as higher dimensional tensor
- Tensor is decomposed using N-mode SVD which separates different modes underlying the formation of images
- Advantages:
  - Successfully reduces the influence of Illumination, Expression and view of the image.