PCA Face Recognition

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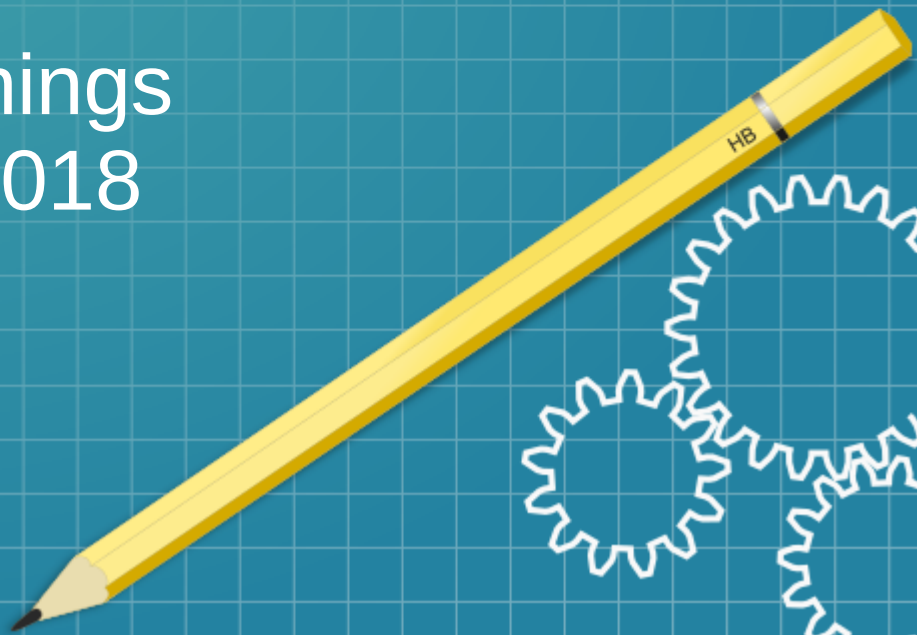


PART 1: Training

- Vectorize training images
- Calculate mean image
- Calculate mean-subtracted dataset
- Calculate covariance matrix
- Calculate eigenvectors and eigenvalues
- Calculate weights of the training dataset

It is a VERY standard approach.

Vectorize Dataset

Matrix to vector

"Vectorizing" a matrix

Eigenvectors and Eigenfaces

- Mathematical models of a dataset

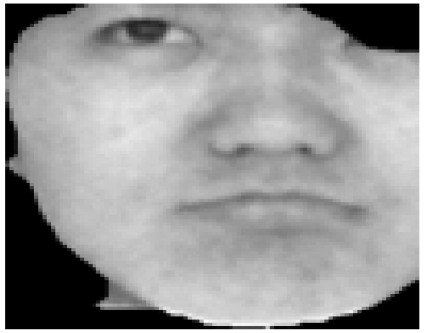
Important Information

- Calculate the covarince matrix under REDUCED dimensionality!
  - The “big” eigenvector can be extracted from the “small” covariance matrix.
- PCA is a technique not unique to image processing, but useful in all signal processing.
  - Voice recognition as well.
- PCA is decently accurate, but not recommended for high accuracy applications like security.

PART 2: Testing

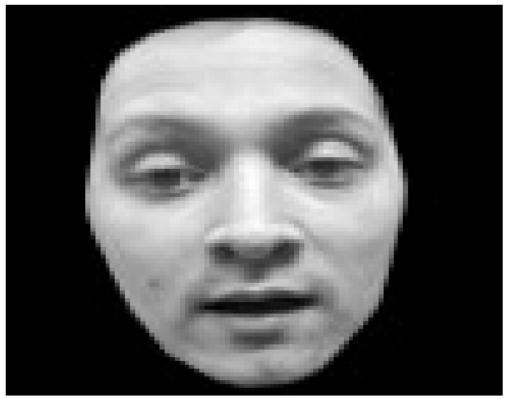
- Vectorize test image
- Project into eigenspace
- Calculate differences
  - Minimum euclidean distance = potential match
  - “Potential match” as in, it is possible to have a false positive.

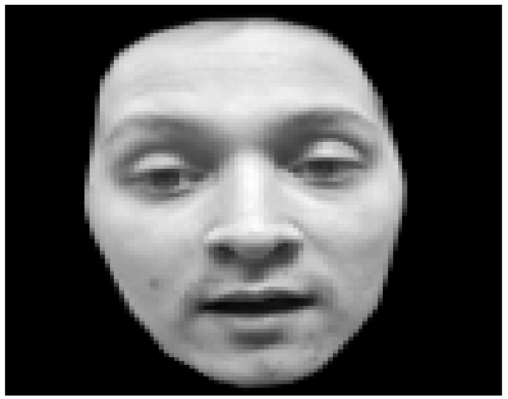
Results



First round match

Results





Results

FALSE POSITIVE!

Results