Université Concordia University
FACULTY OF ENGINEERING AND COMPUTER SCIENCE
Department of Computer Science and Software Engineering

COMP498G/691G COMPUTER VISION

EIGENFACES

Today's Lecture

- Brief overview of EigenFaces
  - Slides acknowledgment: Victor Larvenko
- Questions

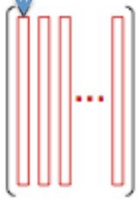
PCA example: Eigen Faces

input: dataset of N face images

face: K x K bitmap of pixels

"unfold" each bitmap to K^2-dimensional vector

arrange in a matrix
each face = column

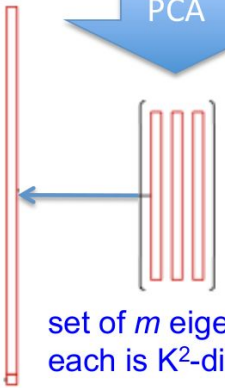


K^2 x N

can visualize eigenvectors: *m* "aspects" of prototypical facial features

"fold" into a K x K bitmap

PCA

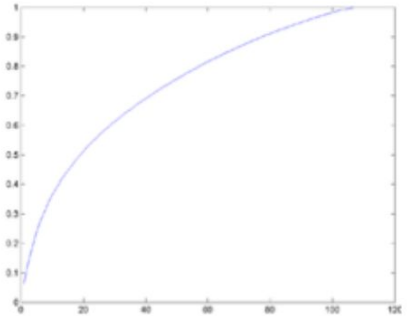


K^2 x m

set of *m* eigenvectors
each is K^2-dimensional

Eigen Faces: Projection

- Project new face to space of eigen-faces
- Represent vector as a linear combination of principal components
- How many do we need?



(Eigen) Face Recognition

- Face similarity
  - in the reduced space
  - insensitive to lighting expression, orientation
- Projecting new “faces”
  - everything is a face

new face (not in training)

projected to eigenfaces

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