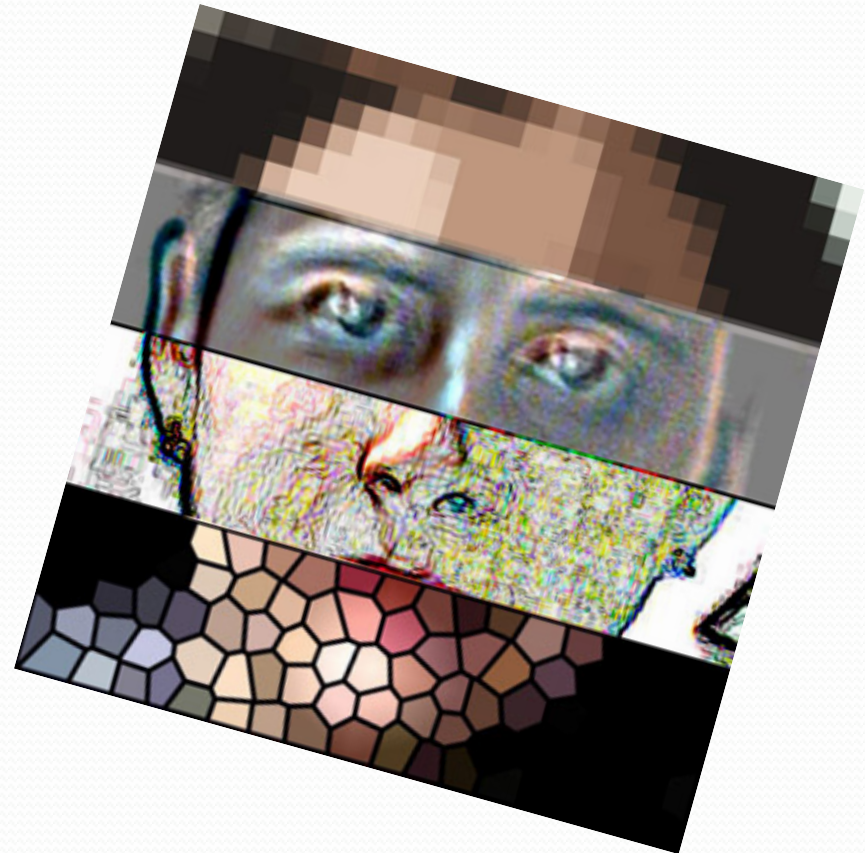# FaceFinder

By

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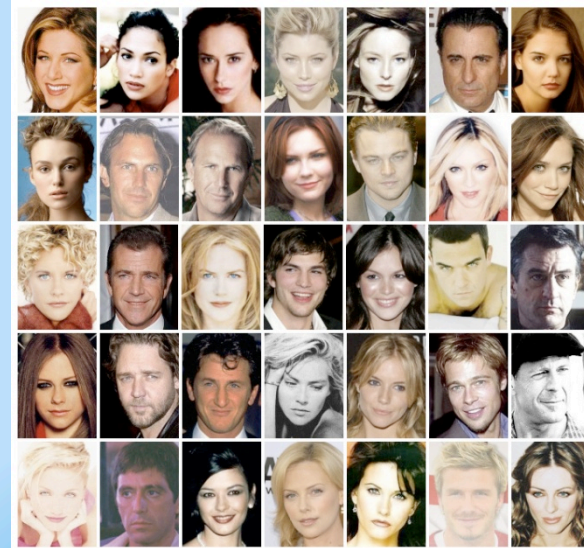
RETINA Vision and Learning Group
Department of Computer Engineering
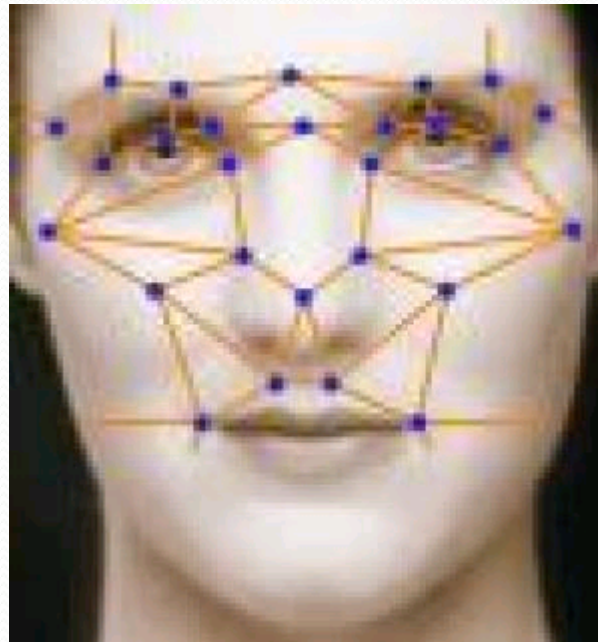Bilkent University

Motivation

Motivation

Face Recognition ➡ Face Matching

What is Face Recognition?

- Identifying/verifying a person from a digital image or a video frame from a video source

Why Face Recognition?

- Very important task in many applications:

  - Robotics

  - Security access control systems

    - Airport security

    - Criminal recognition

  - Content-based indexing video retrieval systems

    - News archive and video indexing

  - Personal usage

    - Photo and video collection organization

    - Searching a famous, friend.

Problems

- Traditional face recognition algorithms
  - require controlled images in terms of pose, illumination etc.
  - work with small and restricted dataset (Max ~100)
  - require manual work
  - have higher level error prone

- Various amateur images in various applications (Facebook, Picasa, MySpace, YouTube etc).

FaceFinder Library

- A flexible open source library to be used in various applications:

  - find your pictures in Facebook
  - tag the people in your photo album in Picasa
  - person tracer at airports
  - criminal recognition using police sketchs
 - find your famous twins

Our Approach

- Based on observation that each person has distinct facial features that do not change.

- The distinct feature concept is commonly used with interest points for object recognition.

- Adapting the distinct feature concept for face recognition.

Our Approach

- Lowe's SIFT Keypoint Detector:[*]
  - Finds the interest points of the objects and matches these points between images.
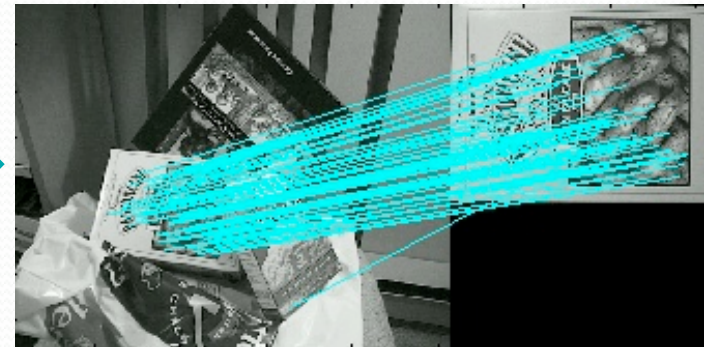
[*] David G. Lowe, "Distinctive image features from scale-invariant keypoints," International Journal of Computer Vision, 60, 2 (2004), pp. 91-110.

Our Approach

- Deformation of the objects is much less compared to faces.

- Using only object recognition gives poor matches for face images.

Project Steps

1) Face detection

2) Interest point extraction

3) Finding matches between face pairs

4) Elimination of wrong matches with unique match constraint

5) Ranking the output

Project Step 1

1) **Face detection**

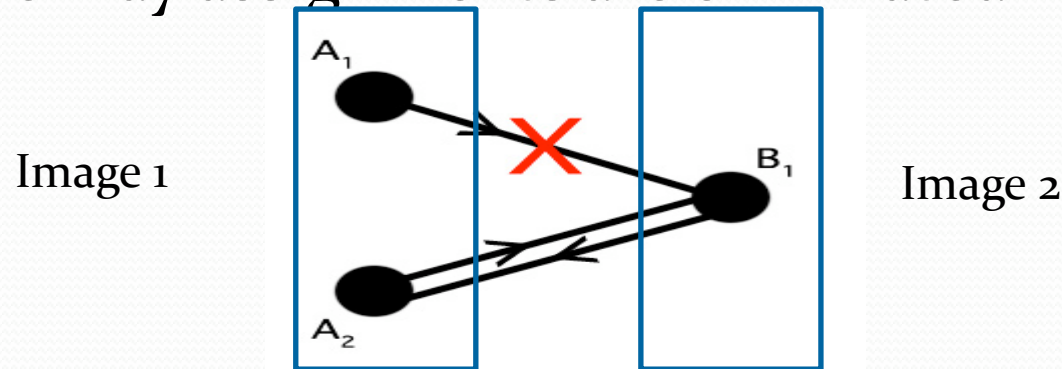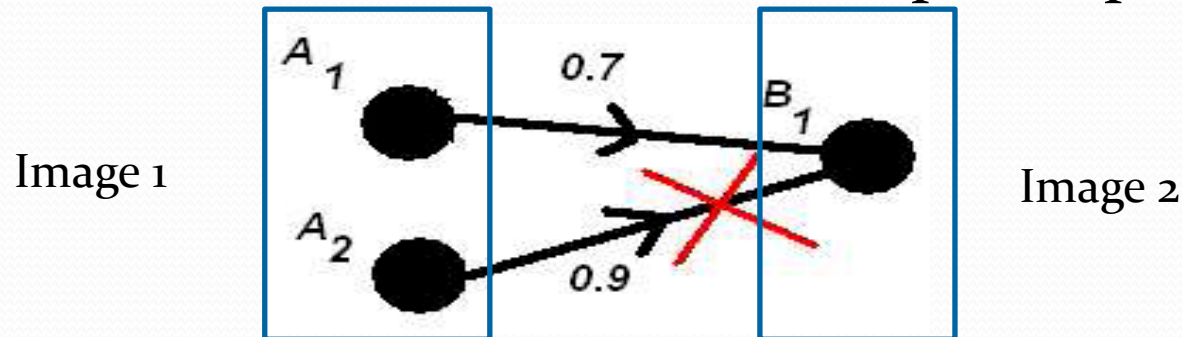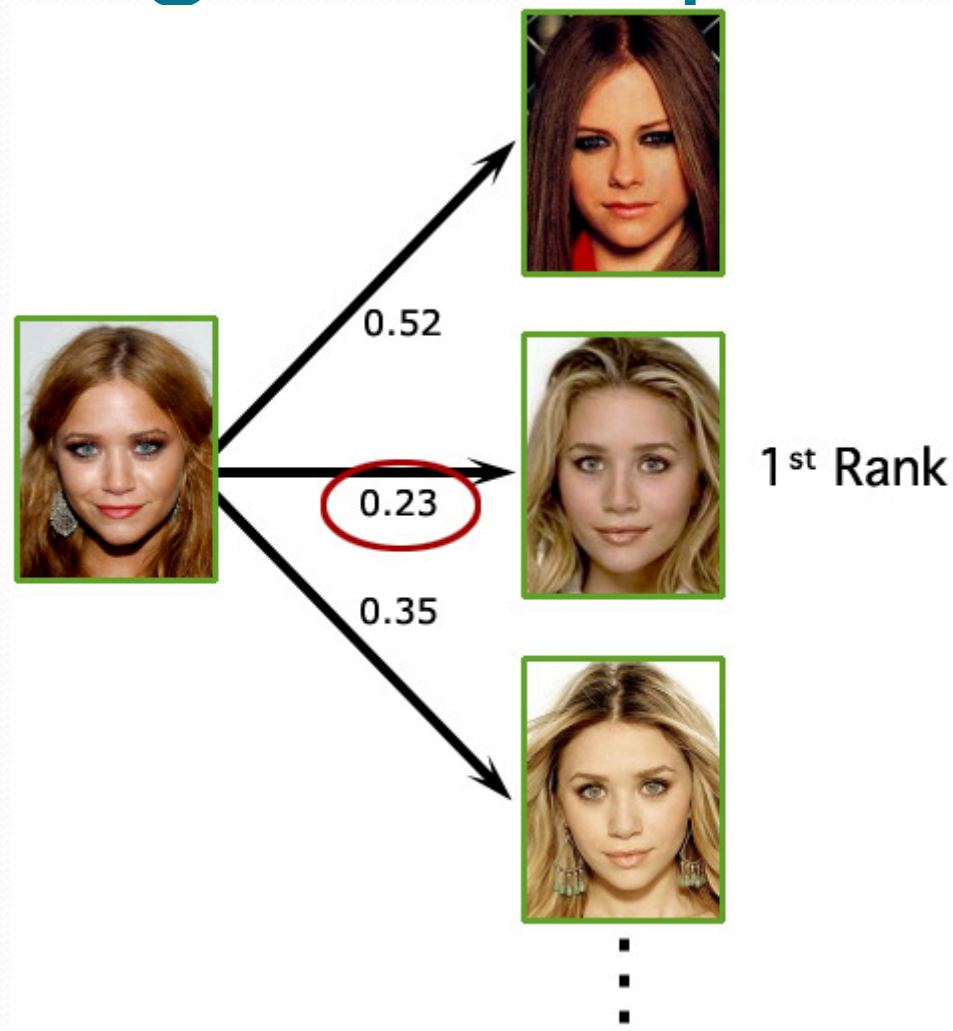2) Interest point extraction

3) Finding matches between face pairs

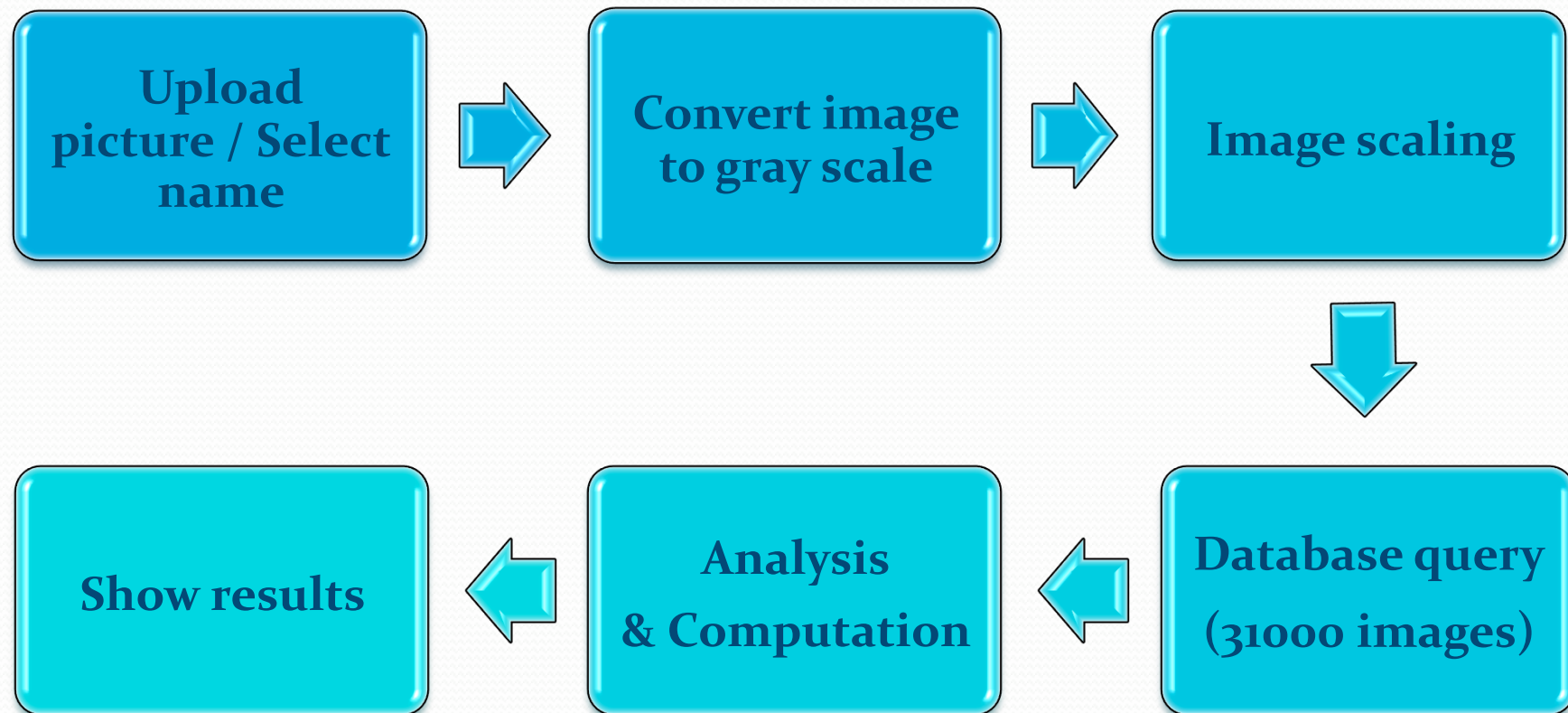4) Elimination of wrong matches with unique match constraint
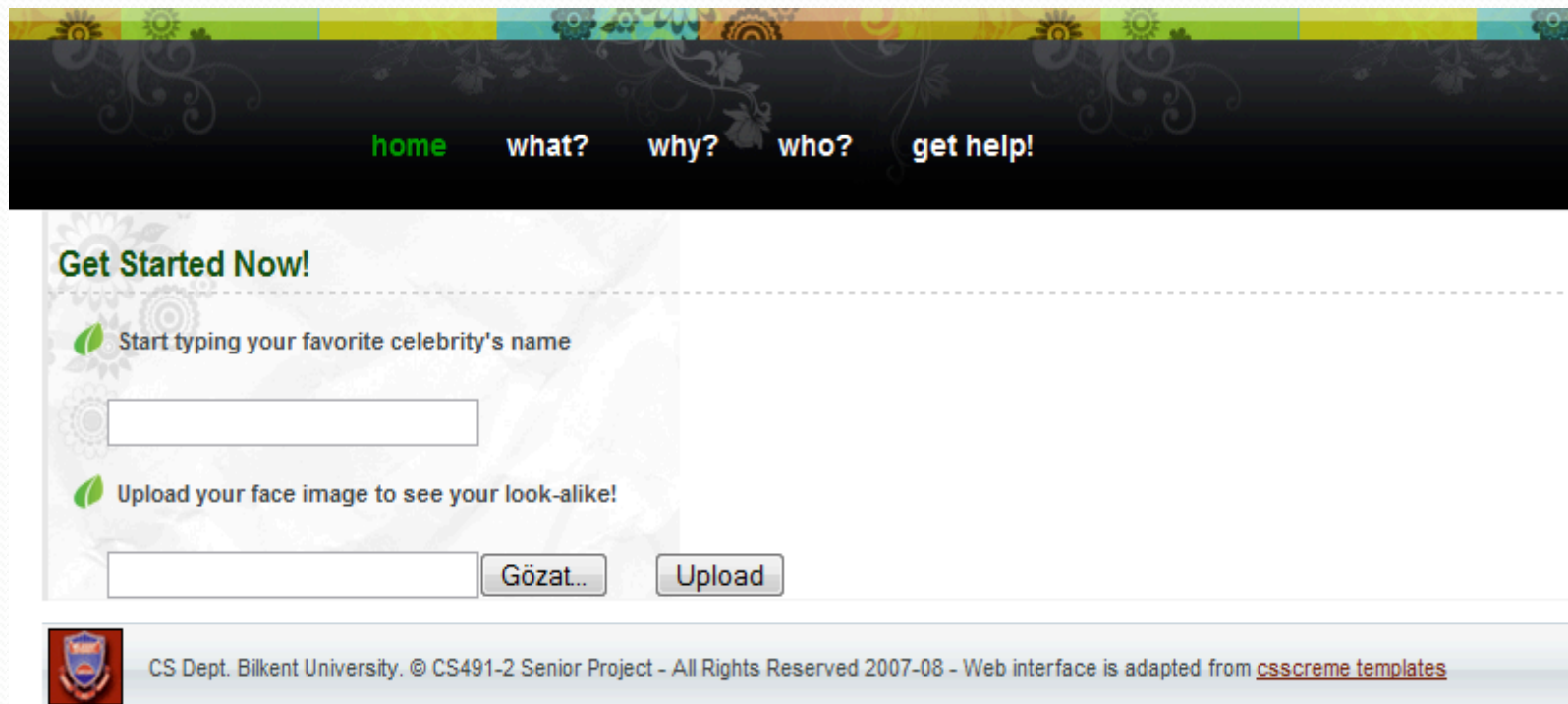
5) Ranking the output

1) Face Detection

- Finds the face from the given image
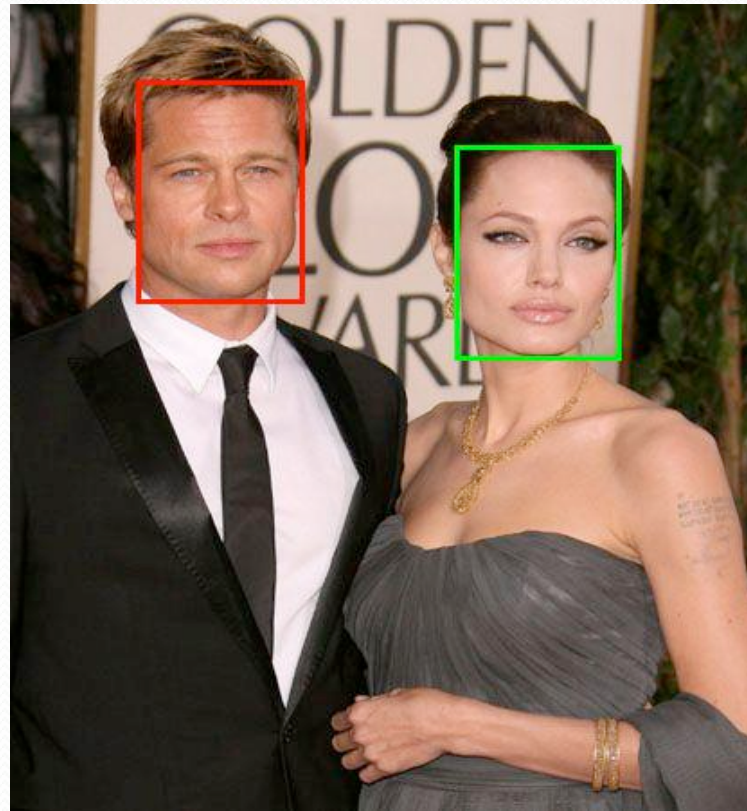
Project Step 2

1) Face detection

2) **Interest point extraction**

3) Finding matches between face pairs

4) Elimination of wrong matches with unique match constraint

5) Ranking the output

2) Interest Point Extraction
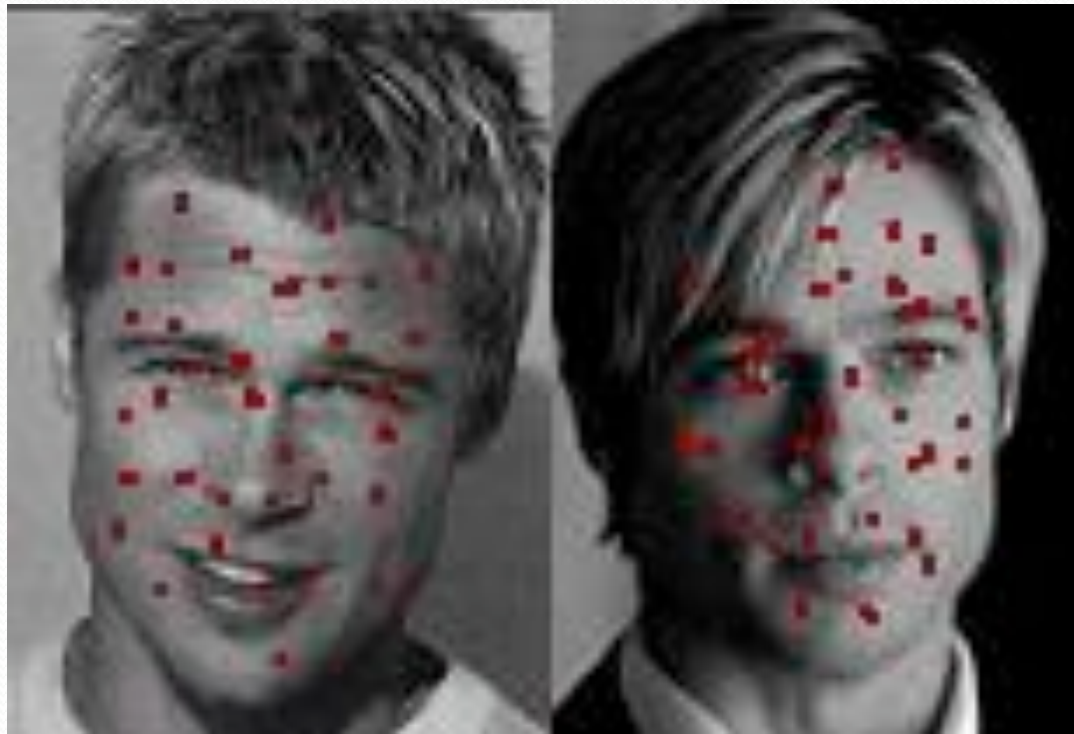
Project Step 3

1) Face detection

2) Interest point extraction

3) Finding matches between face pairs

4) Elimination of wrong matches with unique match constraint

5) Ranking the output

3) Find Matches
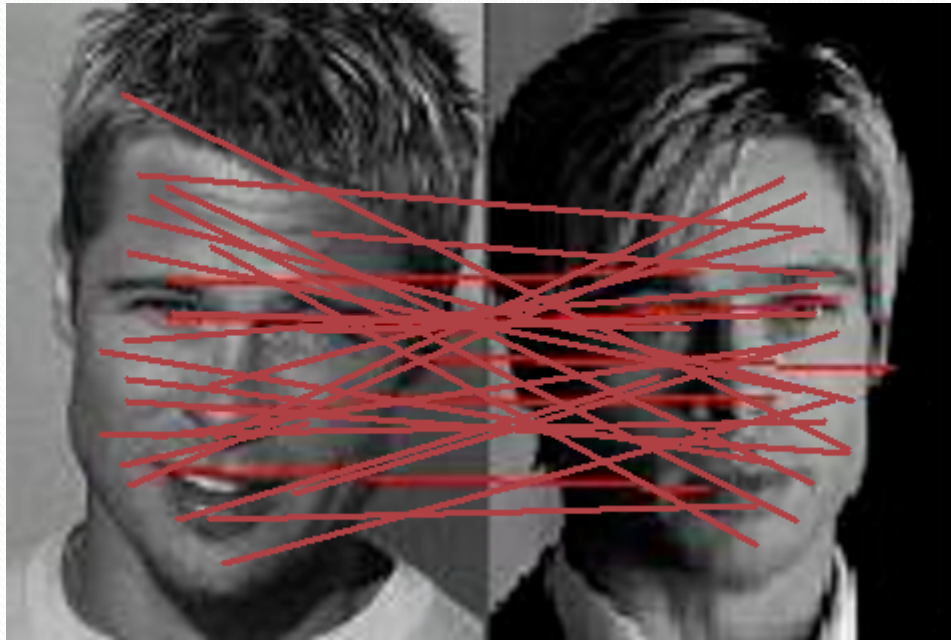
Project Step 4

1) Face detection

2) Interest point extraction

3) Finding matches between face pairs

4) Elimination of wrong matches with unique match constraint

5) Ranking the output

4) Unique Match Constraint [*]

- One-way assignments are eliminated

Image 1   Image 2

- Several matches to same interest point prevented

Image 1   Image 2

[*] Ozkan, Derya. A Graph Based Approach for Finding People in News. Bilkent University. 2007. 24-28. Nov.-Dec. 2007

4) Unique Match Constraint (cont'd)

Project Step 5

1) Face detection

2) Interest point extraction

3) Finding matches between face pairs

4) Elimination of wrong matches with unique match constraint

5) **Ranking the output**

5) Ranking The Output

0.52

0.23

0.35

1st Rank

Application Details

Application Interface

Application Interface (cont'd)

Test Cases

Current look

Age Difference

Makeup Difference

Morph

Tests & Results

- Current look
-

| | Given Image | Result |
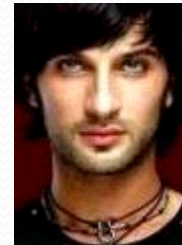
Tarkan → 1st Rank

Bruce Wills → 1st Rank

Test Criteria

Current

look

Age
Difference

Makeup
Difference

Morph
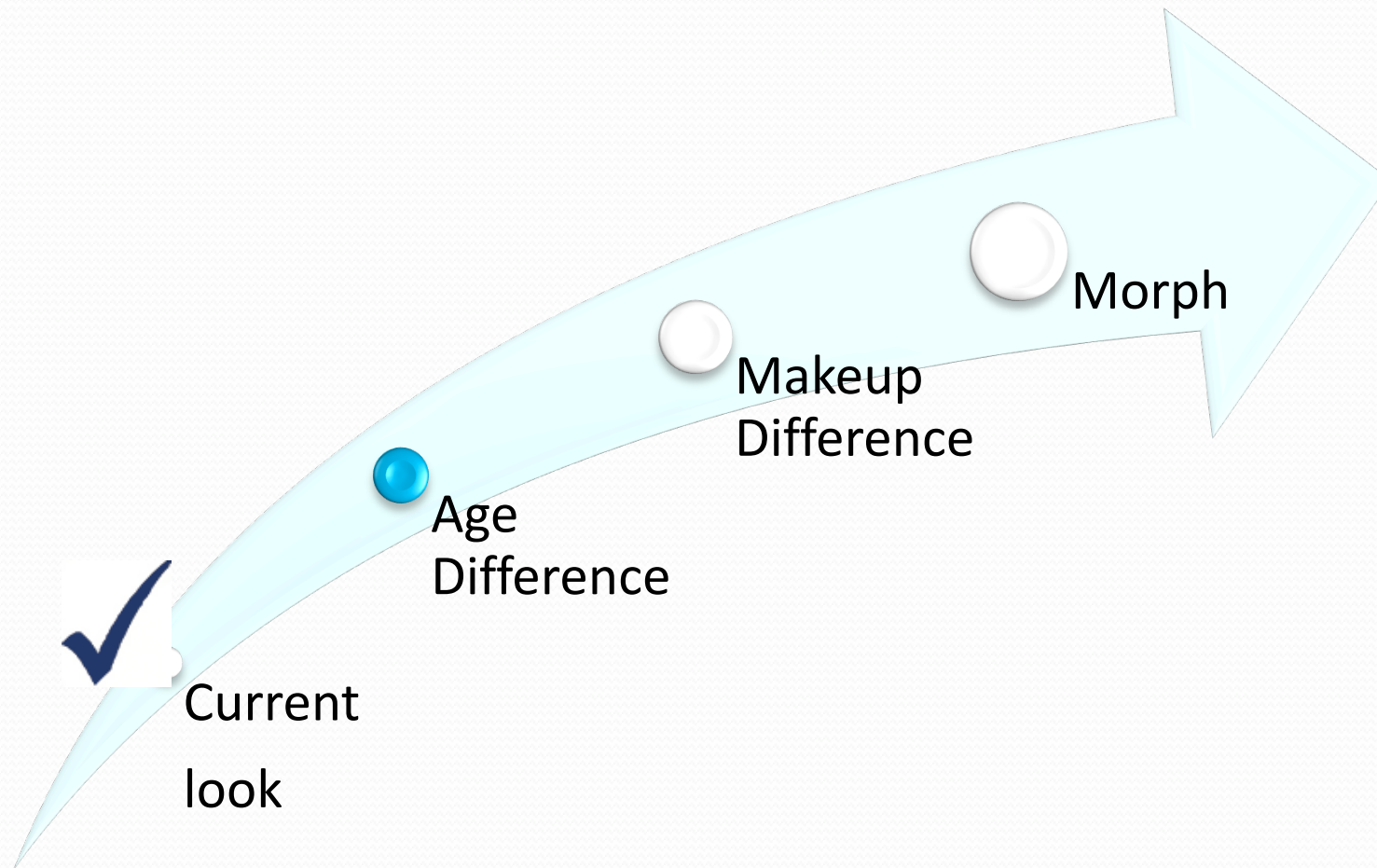
Tests & Results

- Age Difference
  - Given Image   Result

Elizabeth Hurley   1st Rank

George Clooney   1st Rank

Nicole Kidman   2nd Rank

Test Criteria

Morph

Makeup
Difference

Age
Difference

Current

look
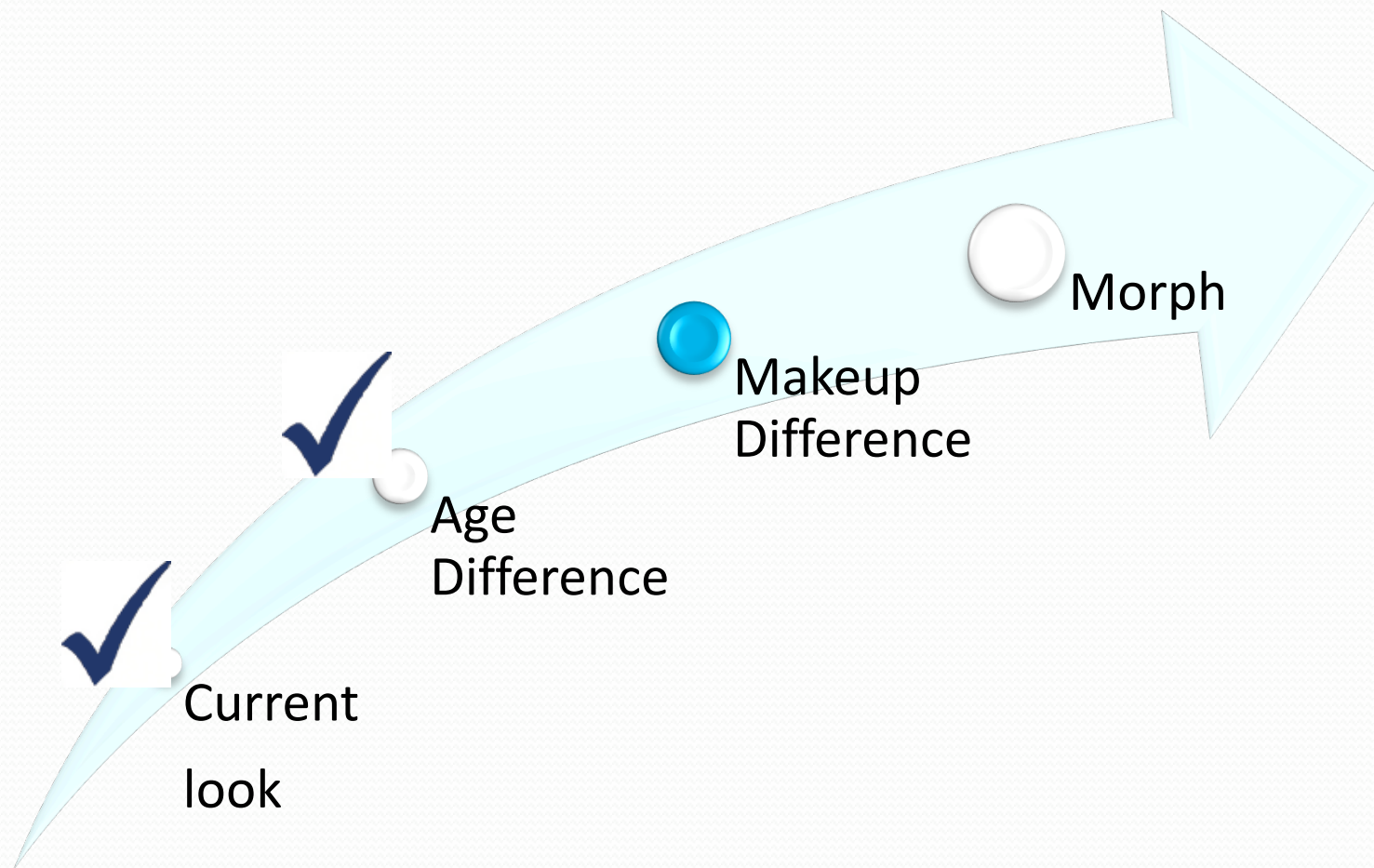
Tests & Results (cont'd)

- Makeup difference
-

	Given Image		Result
Jennifer Lopez		→	1st Rank
Halle Berry		→	3rd Rank
Courtney Cox		→	3rd Rank

Test Criteria

Current
look

Age
Difference

Makeup
Difference
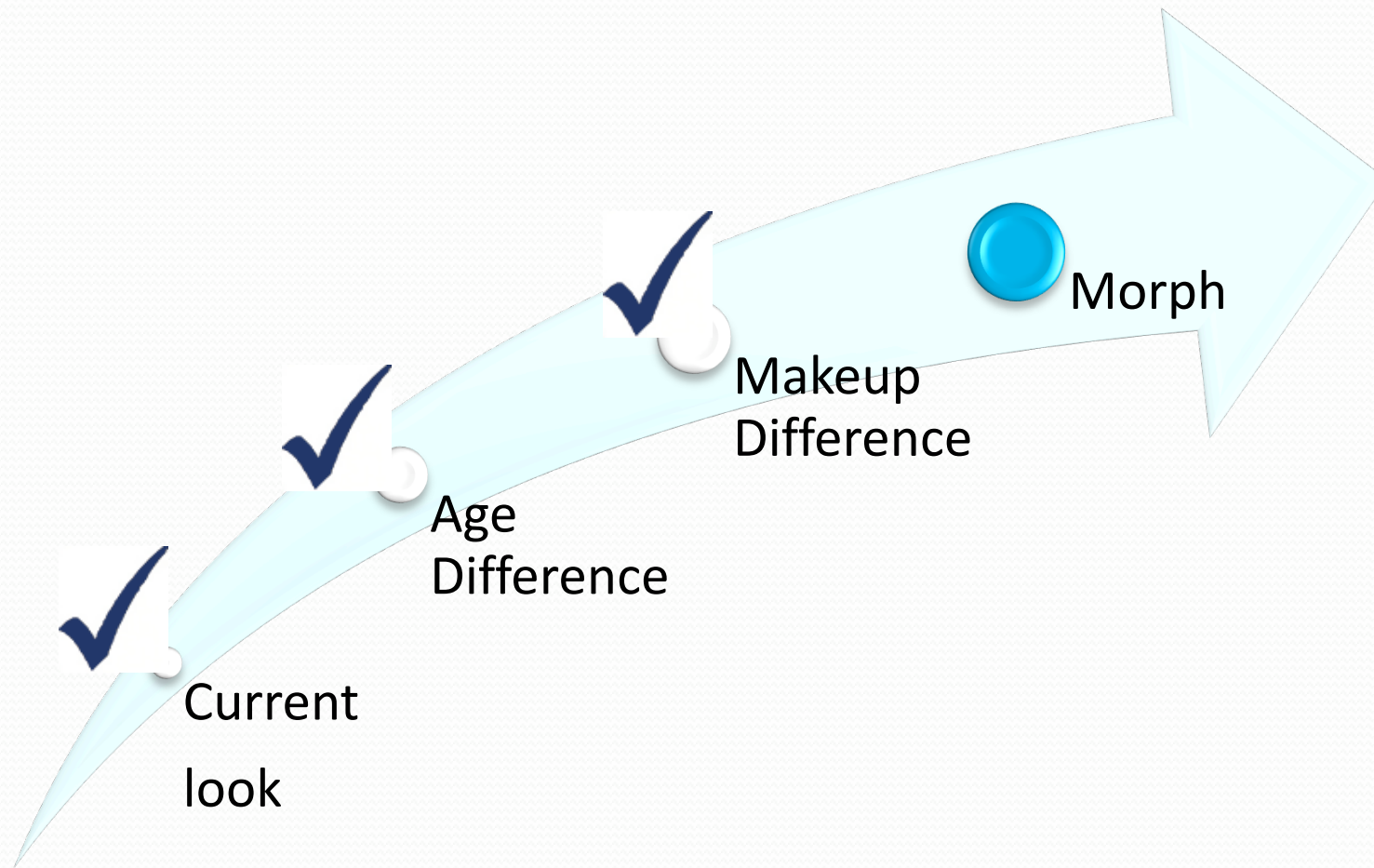
Morph

Tests & Results (cont'd)

- Morph:

Given Image   Results
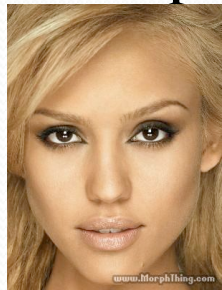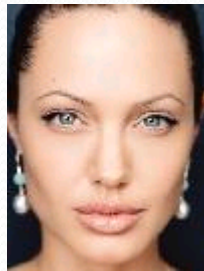
Jessica Alba   Angelina Jolie   Morph   1st Rank   7th Rank

Jennifer Lopez   Jennifer Aniston   Morph   2nd Rank   10th Rank
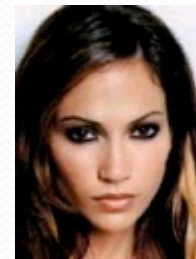
Test Criteria

Current look

Age Difference

Makeup Difference

Morph
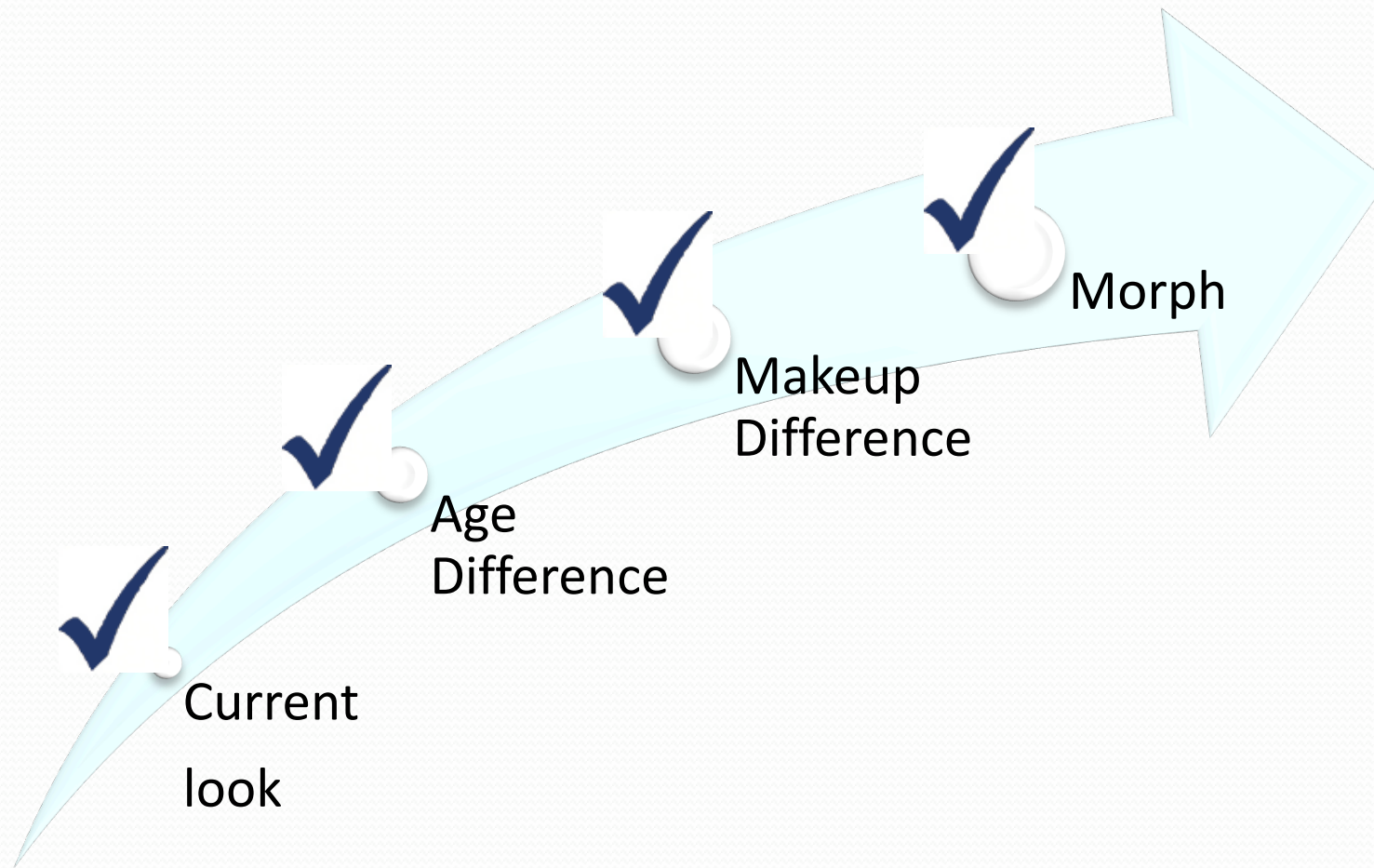
Implemented Library

- Performance: Recall – Precision Graph

Correctness Ratio
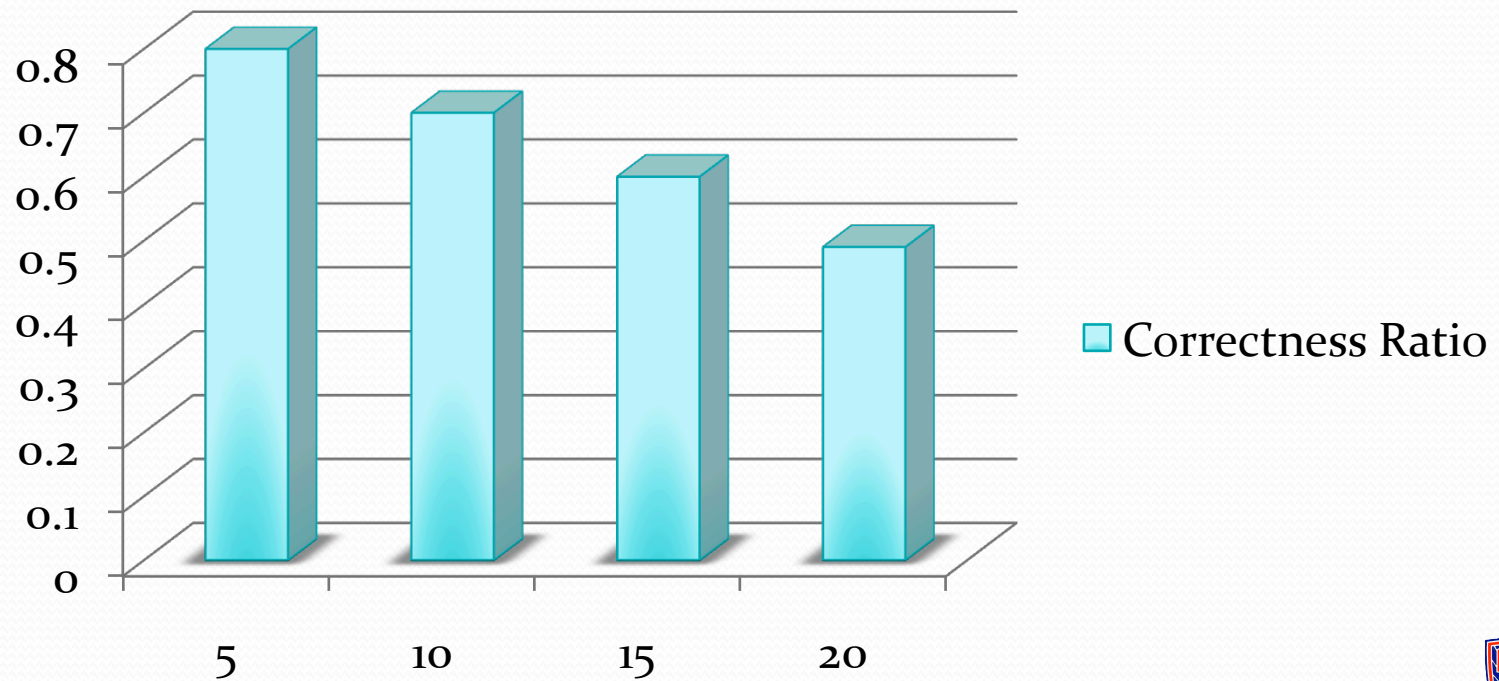
Demonstration

- Select a name from the database

Demonstration

- Upload a picture

Dosya   Düzen   Görünüm   Geçmiş   Yer İmleri   Araçlar   Yardım

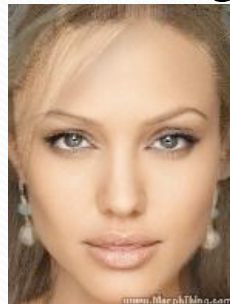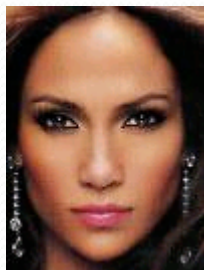http://retina.cs.bilkent.edu.tr/~rtorun/demo/index.php

Google

home   what?   why?   who?   get help!

Get Started Now!

Start typing your favorite celebrity's name

Upload your face image to see your look-alike!

Gözat...   Upload

CS Dept. Bilkent University. © CS491-2 Senior Project - All Rights Reserved 2007-08 - Web interface is adapted from csscreme templates

Conclusion

- Importance of face recognition is increasing day by day with millions of face images

- A different approach to the face recognition problem by using interest point matching

- Many applications can be developed based on FaceFinder library in the near future

Thanks & Questions

Query Face   Ben Affleck

Ata Gür   vs.

Query Face   Orlando Bloom

Mert Korkmaz   vs.

Query Face   David Beckham

Michael Kemal Hill   vs.

Query Face   Jodie Foster

Hatice Özmen   vs.