

Introduction to Visual Recognition

- ➔ General visual recognition
 - importance for intelligence? challenges?
- Face recognition
 - importance for intelligence? challenges?
- Rapid object categorization
- How good are we at recognizing faces?
- How good are the best machines?
 - taste of machine learning
 - applications of face recognition

What can we recognize from vision?



"Understanding vision and building visual systems is really understanding intelligence"
 - Fei-Fei Li

Why is visual recognition difficult?



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Rapid object categorization

How good are we at recognizing faces?

How good are the best machines?

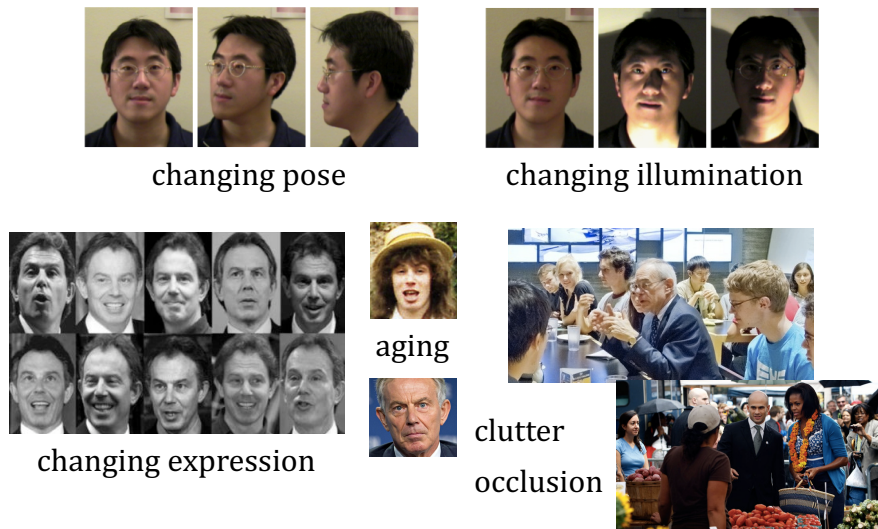
taste of machine learning

applications of face recognition

Why are faces important for intelligence?



Why is face recognition hard?



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➔ Rapid object categorization

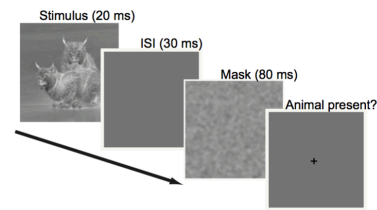
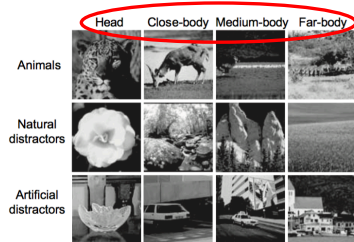
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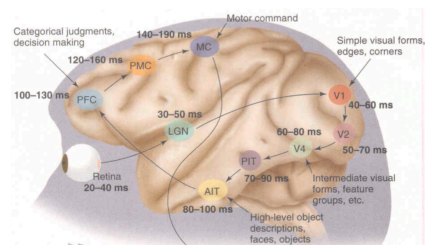


Serre et al. (2007)

- 1,200 images, half contain animals and half are “distractors”
- respond as quickly as possible: does the image contain an animal or not?
- human subjects were ~80% correct

It takes about 100 ms for visual signals from the eye to reach the first cortical areas engaged in object/face recognition

Thorpe & Fabre-Thorpe (2001)



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How good are we at face recognition?



Jenkins, White, Van Montfort & Burton, *Cognition*, 2011

Cambridge face memory test

Psychology Experiments: Cam x
 www.bb.k.ac.uk/psychology/psychologyexperiments/experiments/facememorytest/startup.php

Cambridge Face Memory Test

Welcome to Cambridge Face Memory Test

In the following task you will be required to memorize the faces of different individuals. You will then be asked to identify a face you memorized out of a line-up of three faces. The test will begin with a very easy practice round and then will become progressively more challenging. Instructions will be given throughout the task, please follow them carefully. The test will take approximately 20 minutes to complete.


If you have any questions about this on-line test, please contact Sue Nicholas (s.nicholas@bbk.ac.uk) for further information. If you wish to lodge a complaint or concern, please contact the Head of the Brain and Behaviour Lab, Professor Martin Eimer (m.eimer@bbk.ac.uk).


If you are 18 years of age or older, understand the statements above, and freely consent to participate in the study, click on the 'I Agree' button to begin the experiment.


[I Agree](#)

Test phase

Block:

1 

2 

3 

~ 20 minutes

Famous faces memory test testmybrain.org

TESTMYBRAIN ABOUT FAQ PUBLICATIONS

Why test? **Brain tests** **Your profile**

TESTMYBRAIN
 TestMyBrain aims to engage and collaborate with citizen scientists like you, by providing tools to help you learn about yourself.
 When you test yourself and build your brain profile, you contribute to brain research.

TestMyBrain Blog

Test of Multiple Memory Types
 How good are you at memorizing new information? How does this relate to your long-term memory?
 2393 brains
 Estimated time to complete: 15 minutes

Concentration and Life Experiences
 Here, we look at your life experiences and how you pay attention to spatial and emotion information.
 4732 brains
 Estimated time to complete: 10 minutes

Cognitive Speed
 How fast are you? Here, we test your ability to respond quickly and flexibly.
 5710 brains
 Estimated time to complete: 5 minutes

Famous Faces
 Face recognition can be surprisingly difficult. Can you identify famous people from their faces?
 96234 brains
 Estimated time to complete: 5 minutes

Brain Profile
 Sort by: BEST | WORST
 100
 75
 50
 25
 0
 What will your Brain look like?

Click "Go!" next to any of the tests to the left to get started!

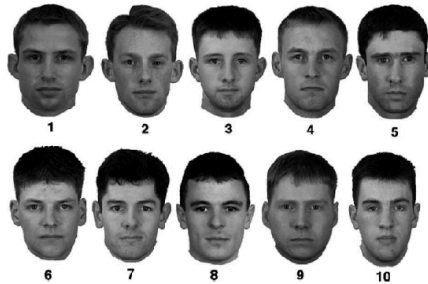
Face recognition performance in humans



Which of the 10 photos on the bottom depicts the target face?

Viewers are ~ 70% correct

Performance degrades with changes in pose & expression



Importance of familiar vs. unfamiliar face recognition!

Bruce et al., 1999

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How good are the best machines?

Public databases of face images to test performance:

Labeled Faces in the Wild (LFW)
 > 13,000 celebrity images, 5,749 identities

YouTube Faces Database (YTF)
 3,425 videos, 1,595 identities



same person?

Private face image datasets used to "train" face recognition systems:

(Facebook) Social Face Classification dataset
 4.4 million face photos, 4,030 identities

(Google) 100-200 million face images, ~ 8 million identities

	LFW	YTF
Facebook DeepFace	97.4%	91.4%
Google FaceNet	99.6%	95.1%
Human performance	97.5%	89.7%

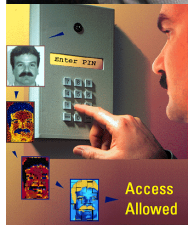


Machine vision applications of face recognition

security, forensics



access control



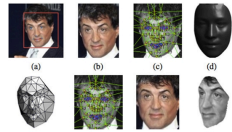
surveillance



More applications of face recognition

Facebook's New Face-Recognition Software Is Scary Good

By WSJ Online



content-based image retrieval

Facial recognition app matches strangers to online profiles

How accurate on-line apps you'd like to date? Facebook, an upcoming app for Android, iOS, and Google Glass use facial recognition technology to match passersby to their social media and dating info.

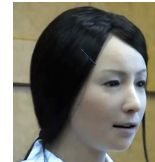
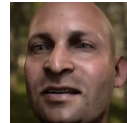


social media

Google Glass Face Recognition App Coming This Month, Whether Google Likes It Or Not

SECURITY 12/18/2013 @ 9:17AM 20,202 views

Since Google Glass first appeared, its potential for facial recognition has been seen either as a privacy nightmare or as one of the headset's first truly intriguing uses. Google has declared itself in the first camp. Stephen Balaban is in the second, and he's about to share his vision with Glassheads everywhere, whether Google likes it or not.



graphics, HCI
humanoid robots

Faces are everywhere...

