



Home Office

# Adding value to CCTV: issues in testing of facial recognition systems

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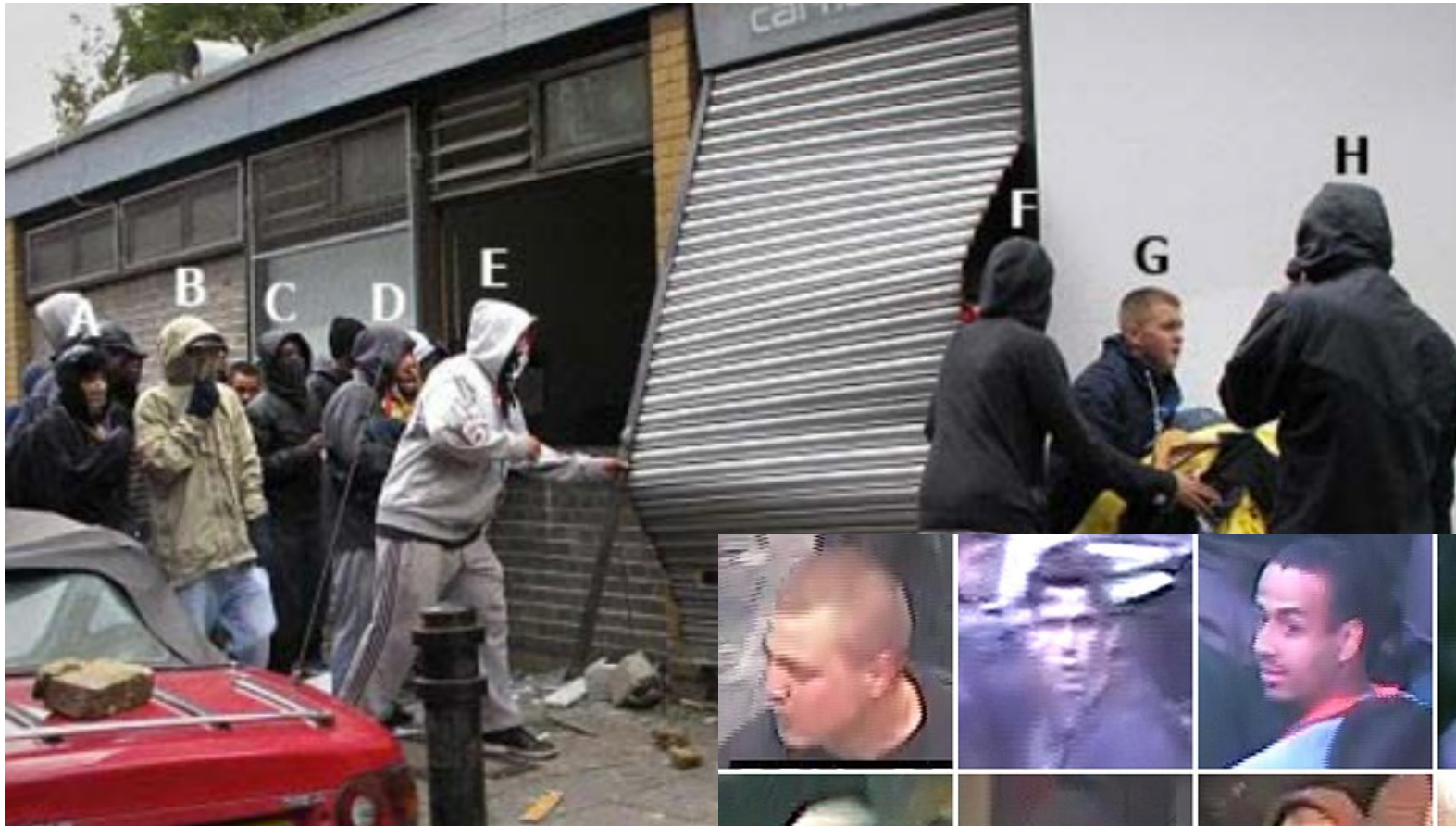
# We know AFR works






... but would it work here?


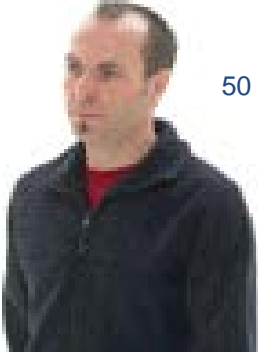


... or here?



# CCTV scales of operation - manual

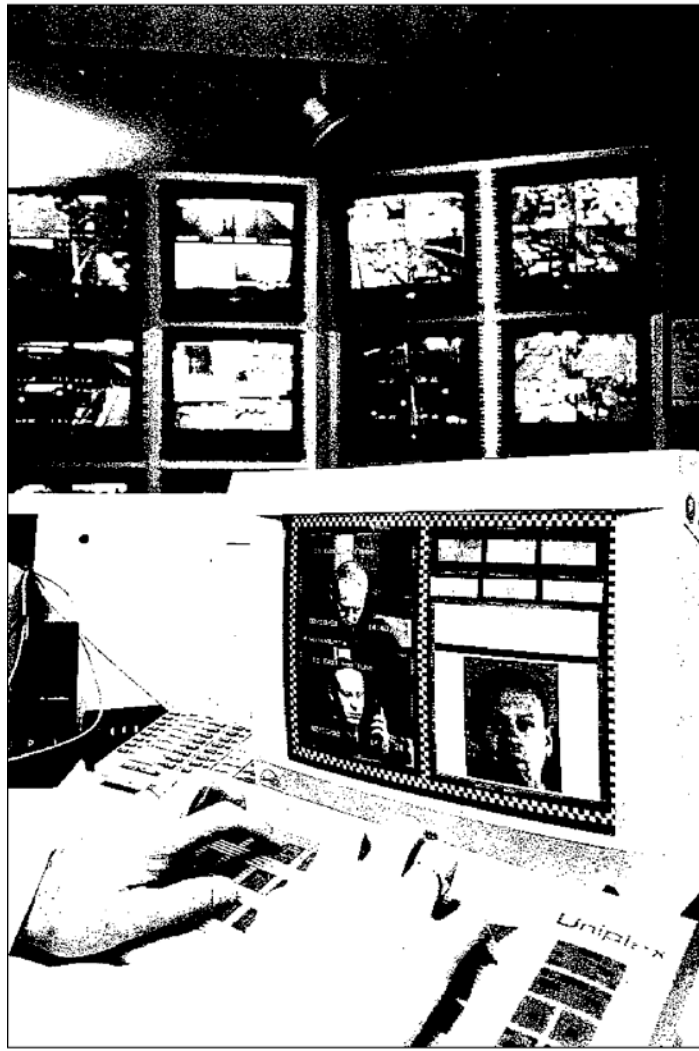
		
Monitor 5%	Detect 10%	Recognise 50%

 25 pixels	 50 pixels
Identify 120%	Inspect 250%



# Back in the late 1990s

**Plate 1** Mandrake face recognition system in use by the London Borough of Newham

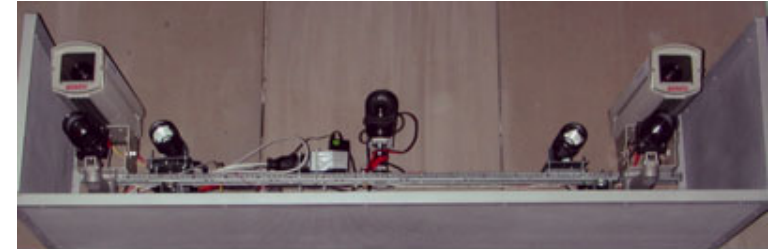


# BKA tests



Der Erfassungsbereich der Kameras

(Foto: BKA)



Die Kameras im Mainzer HBF

(Foto: BKA)



# Quality issues in AFR/CCTV footage and watchlist imagery



# ... sometimes video helps



1



3



6



12



15



36

Frame number



# Not just the technology ...

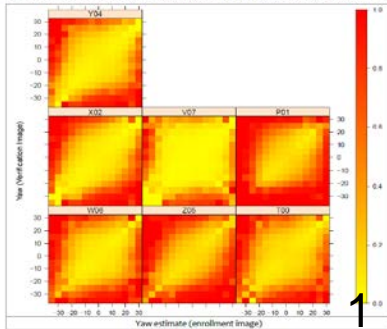
## Technology

## Systems & Processes

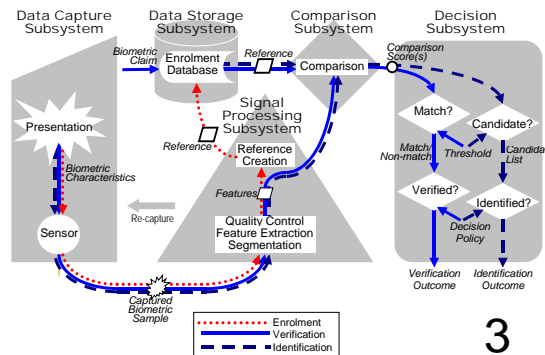
## Subjects

## Society

Figure 21 – Dependence of LEO accuracy on yaw angle of enrollment and verification images



2



3



4

Possible matches found !



5



6

# CAST contribution

- Datasets representing ‘typical’ situations in a crowded environment – public transport hub
- Aims:
  - how well could ‘standard’ AFR algorithms work in unconstrained environments?
  - understand the role of other system components
    - e.g. the operator working with unfamiliar people
  - provide technology developers and researchers with resources to innovate
- FRL2011 dataset available on license
  - 3 technology suppliers have been assessed/reported



# Facial Recognition Library 2011

## Cameras

HD #	SD	HD Camera	HD fps		
1	Y	2 Mp mono	5	Entrance to station	Highly backlit
2	Y	2 Mp colour	5	Up escalator	250% view
3	Y	4 Mp mono	7	Walkway past shops	Walking at angle
4	Y	2 Mp mono	6	At ticket barriers	Highly backlit
5		2 Mp mono	13	Walking past shops, camera at an angle	
6	Y	2 Mp mono	18	Ramp up from platform	
7		2 Mp colour	20	Ramp down	200% view
8	Y	2 Mp colour	10	Train platform	50% view
9		11 Mp colour	1.5	Station concourse	20% view
10	Y	2 Mp mono	6	Taxi drop-off	At 7.5-40 m distance

# FRL2011 specification

- 100 watchlist subjects
  - of whom 50 walk through field of view of SD/HD CCTV cameras
  - M:F ratio: 49:51
  - Ethnicity:
    - approximate balance of light and dark Caucasian, Afro-Caribbean, Asian, Oriental, Arab and mixed race
  - Age: 15-64
    - with some preponderance of 20-29 (34%) and 30-39 (23%)
- Additional imagery (number of subjects)
  - 81 multi-pose images (96, 78 in IR)
  - User provided photos (97)
  - Informal photos (94)
  - Autocue speech (25)
- 10 x 1hr HD footage, with 7 x 1hr SD footage



# Multi-pose images



# Learnings so far

- Manageable watchlist
  - Hundreds
  - Quality – we've used FIND compliant (1 MP)
- Need for clear definitions
  - What constitutes a missed recognition?
    - Detection Opportunity
  - Recognition and false alert rates
    - On a frame by frame basis, traverse through FOV, per hour?
- False Alert Rate
  - For one supplier, many of the false alerts from one individual on watchlist

Thank you for your attention

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