NISTIR 8280

Ongoing Face Recognition Vendor Test (FRVT)
Part 3: Demographic Effects

Annex 4 : Description and examples of images and metadata: Border crossing photos

2019/12/19

NIST

National Institute of
Standards and Technology
U.S. Department of Commerce

The remaining were collected in primary immigration lanes in United States airports using an inexpensive webcam attached to a flexible operator-directed mount.

▷ **Demographic composition**: The photos are accompanied by text metadata labels for sex and race. The

▷ **Example images**: Example images are shown in Figures 1. These are drawn from NIST Special Database 32.

▷ **Capture standards**: The images exhibit considerable violation of most quality-related clauses of all face recognition standards. As is evident in the Fig 2, the common defects are non-frontal pose (associated with the rotational degrees of freedom of the camera mount), low contrast (due to varying and intense background lights), and poor spatial resolution due to compression - see examples in

▷ **Encoding**: The images are encoded as ISO/IEC 10918 i.e. JPEG.

▷ **Compression**: The images are generally of size 240 x 320 pixels, many are 240 x 240. The compressed file sizes range from 5.1KB to 20.97KB, i.e. first to 99-th percentile, with median 14120 bytes. This implies bits-per-pixel values ranging from 0.7 to 2.0 with a median of 1.5.
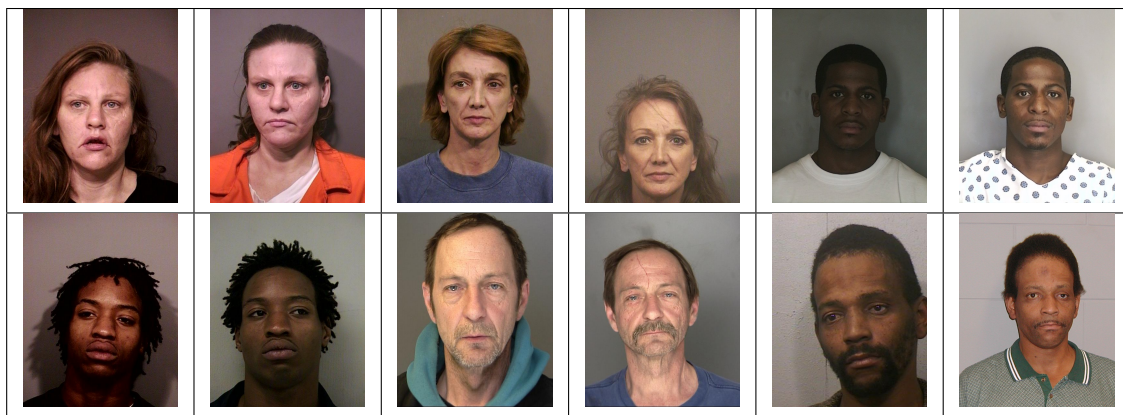

Figure 1: Six mated mugshot pairs representative of the FRVT-2014 (LEO) and FRVT-2018 datasets. The images are collected live, i.e. not scanned from paper. Image source: NIST Special Database 32

Figure 2: Twelve webcam images representative of probes against the FRVT-2018 mugshot gallery. The first eight images are four mated pairs. Such images present challenges to recognition including pose, non-uniform illumination, low contrast, compression, cropping, and low spatial sampling rate. Image source: NIST Special Database 32

Links:				
EXEC. SUMMARY	False positive: Incorrect association of two subjects	1:1 FMR	1:N FPIR	$T \gg 0$	$\rightarrow$ FMR, FPIR $\rightarrow$ 0
TECH. SUMMARY	False negative: Failed association of one subject	1:1 FNMR	1:N FNIR		$\rightarrow$ FNMR, FNIR $\rightarrow$ 1