The FERET Facial Database

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For the most part, the performance of face recognition systems reported in the literature has been measured on small data bases (DB), with each research site carrying out its experiments on their own database thus making meaningful comparisons and drawing conclusions impossible. The majority of those databases were collected under very controlled situations and algorithms were developed to process mostly frontal or full profile images. To overcome such shortcomings, we have been developing over the last several years the FERET facial database so a standard tested for face recognition applications can become available. The FERET data base consists now of 1,109 sets comprising 8,525 images. Since large amounts of images were acquired during different photo sessions, the lighting conditions and the size of the facial images can vary. The diversity of the FERET data base is across gender, race, and age. Fig.1 is indicative of the range of facial images the FERET DB consists now of.

Figure 1. Examples of Facial Images

Specific software and hardware requirements have to be met in order to accomplish the goals of the FERET program in terms of data collection, communication and sharing of resources, data processing and benchmarking, and specific graphical user interfaces (GUIs). Computational requirements are extensive, even more so when one contemplates processing and/or making available hundreds of images at one time. The hardware lab configuration consists now of SPARC 20 (with 19" color monitor) and LX stations (operating under Solaris 2.3 OS), Apple Quadra 840 AV and several Apple Quadra 660 AV with 16" color monitors (operating under Apple System 7.5). Image acquisition is further facilitated by the availability of 8mm SONY videoHi8 Handycam camcorder and Video Cassette Recorder SONY SLV-R1000. Archiving, communication, and information exchange are facilitated by 12GB SCSI Disk, 1/4" tape drive, and external 644 MB CD-ROM for the SUNs, 1GB and 500 MB SCSI hard drives, 4mm 2GB DAT DDS tape, and CD 300i External CD-ROM for the Apple-Quadras, and ftp and internet communications. Utilities and development software include Adobe PhotoShop Deluxe, MATLAB 4.1 and corresponding image, signal and neural network processing toolboxes.

1,109 facial image sets - including 190 duplicate sets taken at different times and possibly wearing glasses - consisting of several poses and totaling 8,525 images have been collected so far. Acquisition of duplicate sets is very important if one wants to assess how robust is a given face recognition system when tested on images shot at different times, which are likely to be somehow different. Most of the sets consist of the following poses: two frontal shots ('fa' and 'fb'), 1/4 half (right and left) profiles ('qr' and 'ql'), 3/4 half (right and left) profiles ('hr' and 'hl'), and right and left (90 deg.) profiles ('pr' and 'pl'). In addition we recently collected several hundred sets that have several additional poses at the midpoints between: 'hr' and 'qr' ('ra'), 'qr' and frontal view ('rb'), frontal view and 'ql'('rc'), 'ql' and 'hl' ('rd'), and between 'hl' and 'pl' ('rd') (see Fig. 2). The additional poses were taken to assess the capability of modeling the human face using several positions and interpolating/extrapolating amongst them for identification purposes. The facial image sets were acquired without any restrictions imposed on expression and with two frontal images shot at different times during the photo session. Most of the facial image sets were acquired using Kodak Gold Ultra 400 film and developed on CD - ROM using five resolutions: High Scan 16 (2048 x 3072), High Scan 4 (1024 x 1536), High Scan 0 (512 x 768), High Scan -4 (256 x 384), and High Scan -16 (128 x 192). KODAK CD-ROM format is compatible with both SUN and Apple - QUADRA AV series. PhotoCD format images have been converted on SUN Sparc Station and saved as TIFF and RAW format with resolution 256x384 and 8 bits, 256 gray scale levels. KODAK CD-ROMs come with (hard copy) thumbnail prints of each set of images to facilitate manual browsing.

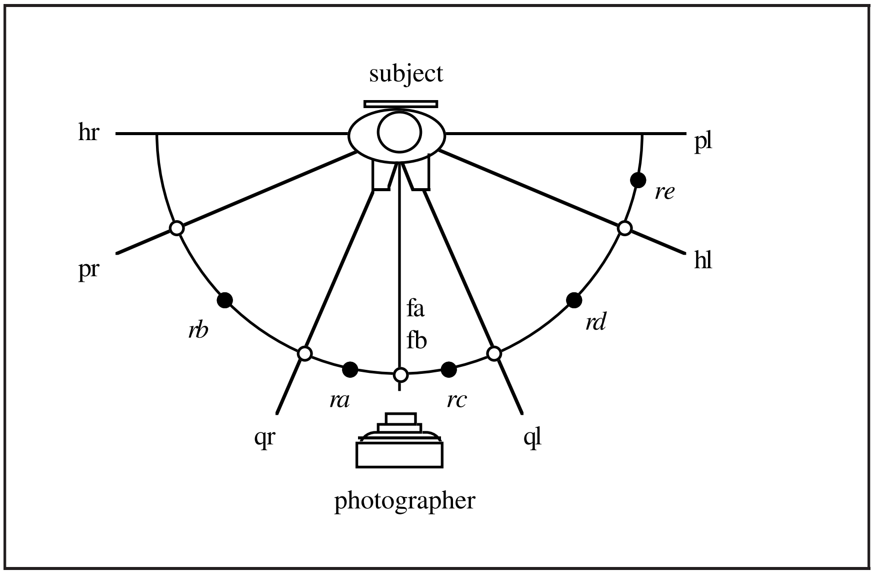

Figure 2. Top View Geometry for Facial Database Image Acquisition

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