Assignment 2: Face Biometrics

Submit your slides before the midnight of Sept. 19th.
Select one paper on face recognition and present it on Sept. 19th. We have five groups in total and each group will have 15 minutes. Please email me your group member names as well as title of the paper. To avoid conflict of selection, I will post your selection as soon as I get an email from your group.

General Papers

Here are some excellent papers that every researcher in this area should read. They present a logical introductory material into the field and describe latest achievements as well as currently unsolved issues of face recognition.


T. De Bie, N. Cristianini, R. Rosipal, Eigenproblems in Pattern Recognition, Handbook of Computational Geometry for Pattern Recognition, Computer Vision, Neurocomputing and Robotics, E. Bayro-Corrochano (editor), Springer-Verlag, Heidelberg, April 2004


X. Lu, Image Analysis for Face Recognition, personal notes, May 2003, 36 pages


Standards

**Face Recognition Format for Data Interchange**

This standard specifies definitions of photographic (environment, subject pose, focus, etc.) properties, digital image attributes and a face interchange format for relevant applications, including human examination and computer automated face recognition.

**Biometric data interchange formats - Part 5: Face image data**
ISO/IEC 19794-5:2005 specifies scene, photographic, digitization and format requirements for images of faces to be used in the context of both human verification and computer automated recognition. The approach to specifying scene and photographic requirements in this format is to carefully describe constraints on how a photograph should appear rather than to dictate how the photograph should be taken. The format is designed to allow for the specification of visible information discernable by an observer pertaining to the face, such as gender, pose and eye colour. The digital image format can be either ISO standard JPEG or JPEG2000. Finally, the 'best practice' appendices provide guidance on photo capture for travel documents and face recognition performance versus digital compression.


Cognitive Vision / Psychology / Neuroscience

It is the general opinion that advances in computer vision research will provide useful insights to neuroscientists and psychologists into how human brain works, and vice versa. Psychology and neuroscience issues potentially interesting to face recognition system designers (according to Zhao et al. Survey, 2003) are:

- is face recognition a dedicated process?
- is face perception the result of holistic or feature analysis?
- ranking of significance of facial features;
- caricatures;
- distinctiveness;
- the role of spatial frequency analysis;
- view-point invariant recognition?
- effect of lighting change;
- movement and face recognition;
- facial expression.

We would like to encourage this kind of interdisciplinary approach. Here are some recent papers linking two areas and some psychology- and neuroscience-based face recognition papers.

A.M. Burton, V. Bruce, P.J.B. Hancock, From Pixels to People: A Model of Familiar Face Recognition, Cognitive Science, Vol. 23, No. 1, 1999, pp. 1-31


G.W. Cottrell, What can computational models tell us about face processing?, Lecture, "Introduction to Cognitive Science" course, Cognitive Science Department, UC San Diego, USA

G. Lovell, Face Recognition, Tutorial Handouts, "Cognitive Psychology" Course, University of Stirling, UK


A. Schwaninger, C.-C. Carbon, H. Leder, Expert Face Processing: Specialization and Constraints, In G. Schwarzer & H. Leder, Development of face processing,
Goettingen: Hogrefe, pp. 81-97


Highly Cited Papers

Here you can find papers on face recognition that have more than 500 citations based on the SCOPUS or WoS databases. The below documents are sorted based on the number of citations according to SCOPUS database. Number of citations according to Google Scholar database are presented for completeness only. More information about the search conditions that were used to generate the results are presented below.

<table>
<thead>
<tr>
<th>HIGHLY CITED PAPERS</th>
<th>Cited By (SCOPUS)</th>
<th>Times Cited (WoS)</th>
<th>Cited By (Google Scholar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. Chellappa, C.L. Wilson, S. Sirohey, Human and Machine</td>
<td>891</td>
<td>704</td>
<td>1653</td>
</tr>
<tr>
<td>Title</td>
<td>Authors</td>
<td>Journal</td>
<td>Volume</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>The FERET Evaluation Methodology for Face-Recognition Algorithms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face Recognition: A Literature Survey</td>
<td>W. Zhao, R. Chellappa, P.J. Phillips, A. Rosenfeld</td>
<td>ACM Computing Surveys</td>
<td>35</td>
</tr>
<tr>
<td>Face Recognition by Elastic Bunch Graph Matching</td>
<td>L. Wiskott, J.-M., Fellous, N. Kruger, C.D. Von Malsburg</td>
<td>IEEE Transactions on Pattern Analysis and Machine Intelligence</td>
<td>19</td>
</tr>
<tr>
<td>Understanding Face Recognition</td>
<td>V. Bruce, A. Young</td>
<td>The British Journal of Psychology</td>
<td>77</td>
</tr>
<tr>
<td>Robust Real-Time Face Detection</td>
<td>P. Viola, M.J. Jones</td>
<td>International Journal of Computer Vision</td>
<td>57</td>
</tr>
<tr>
<td>Features versus Templates</td>
<td>R. Brunelli, T. Poggio</td>
<td>IEEE Transactions on Pattern Analysis and Machine Intelligence</td>
<td>15</td>
</tr>
<tr>
<td>Application of the Karhunen-Loeve Procedure for the Characterization of Human Faces</td>
<td>M. Kirby, L. Sirovich</td>
<td>IEEE Transactions on Pattern Analysis and Machine Intelligence</td>
<td>12</td>
</tr>
<tr>
<td>Functional Neuroanatomy of Face and Object Processing</td>
<td>J. Sergent, S. Ohta, B. MacDonald</td>
<td>Brain</td>
<td>115</td>
</tr>
<tr>
<td>Probabilistic Visual Learning for Object Representation</td>
<td>B. Moghaddam, A. Pentland</td>
<td>IEEE Transactions on Pattern Analysis and Machine Intelligence</td>
<td>19</td>
</tr>
<tr>
<td>Why Faces Are and Are Not Special. An Effect of Expertise</td>
<td>R. Diamond, S. Carey</td>
<td>Journal of Experimental Psychology: General</td>
<td>115</td>
</tr>
</tbody>
</table>

**Total References:** 12

**Page Count:** 2
<table>
<thead>
<tr>
<th>Authors</th>
<th>Title</th>
<th>Journal</th>
<th>Volume, Issue, Year, Pages</th>
</tr>
</thead>
</table>