CSE 494/570 Advanced Computer Graphics I

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Project 4: 3D Face Recognition

Due: 9:00 am, Dec. 3, 2015

- Design and implement a 3D face recognition algorithm and test it in the provided 3D face database.
- Suggested 3D face recognition algorithms include:
    1. Canonical multidimensional scaling algorithm ([1] and Chpts. 7 & 13 in [2]);
    2. Generalized multidimensional scaling algorithm ([3] and Chpts. 9-10, 13 in [2]) .
    3. Spectrum approach [4].
    4. Constrained harmonic map based algorithm [5].

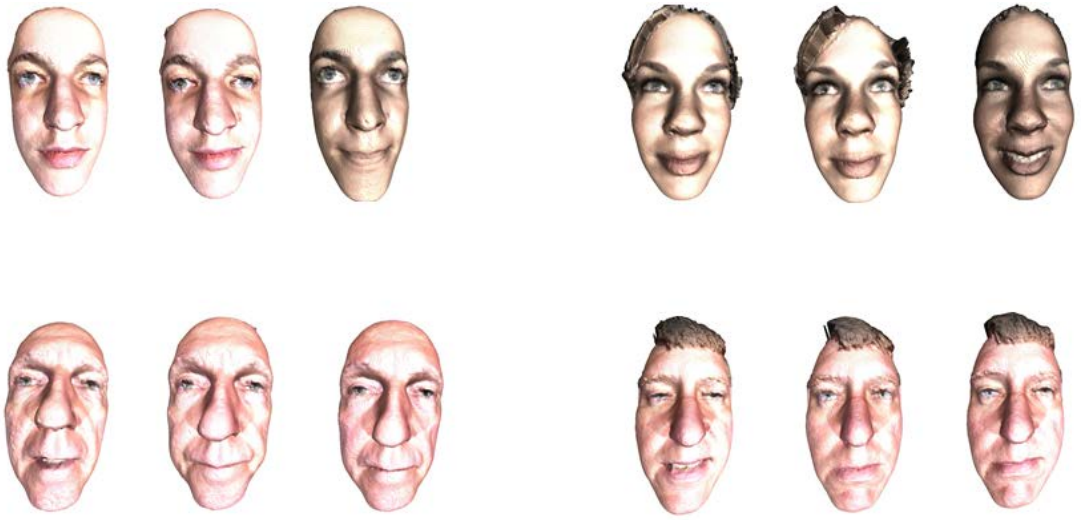

Figure 1. Testing data set [6,7].

Testing data:

1) 12 3D facial surface meshes (2 females, 2 males; 3 surfaces each subject) with feature point information from Texas 3D Face Recognition Database [6,7].

Software library:

Implementation of canonical multidimensional scaling and generalized multidimensional scaling algorithms in Matlab is provided in the package (Matlab source code package is only runnable in 32-bit Matlab systems).

Mesh data is in Matlab format. A routine to load and display each surface in the Matlab is provided in the package. Dataset in the obj format is provided upon request. A free obj file viewer can be downloaded from http://meshlab.sourceforge.net/.

Group Project

1) It is a group project. Each group consists of 1-2 members. Please email me before Nov. 23 about the group information and the algorithm that each group selects.

Hand in:

1) Whole source code package.
2) Project report (one for each group). A tentative structure of the report consists of the following sections: *"Abstract", "Face Recognition Method", "Performance Evaluation Method", "Experimental Results", "Conclusion and Contributions from Each Group Member".*
3) The final scores will be determined by experimental results and project report quality.

Bells and Whistles (20 points):

1. Try to implement or research fast marching algorithm, turn in source code and avoid using the provided Matlab library. (10 points)
2. Process more complicated face surface data (data available upon request). (10 points)

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4. Bronstein, M.M. and A.M. Bronstein, *Shape recognition with spectral distances.* IEEE Trans Pattern Anal Mach Intell, 2011. **33**(5): p. 1065-71. [Pubmed: 21135442].
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6. Gupta, S., M.K. Markey, and A.C. Bovik, *Anthropometric 3D Face Recognition.* Int. J. Comput. Vision, 2010. **90**(3): p. 331-349.
7. Gupta, S., K.R. Castleman, M.K. Markey, and A.C. Bovik. *Texas 3D Face Recognition Database*. 2010; Available from: http://live.ece.utexas.edu/researc/texas3dfr/index.htm.