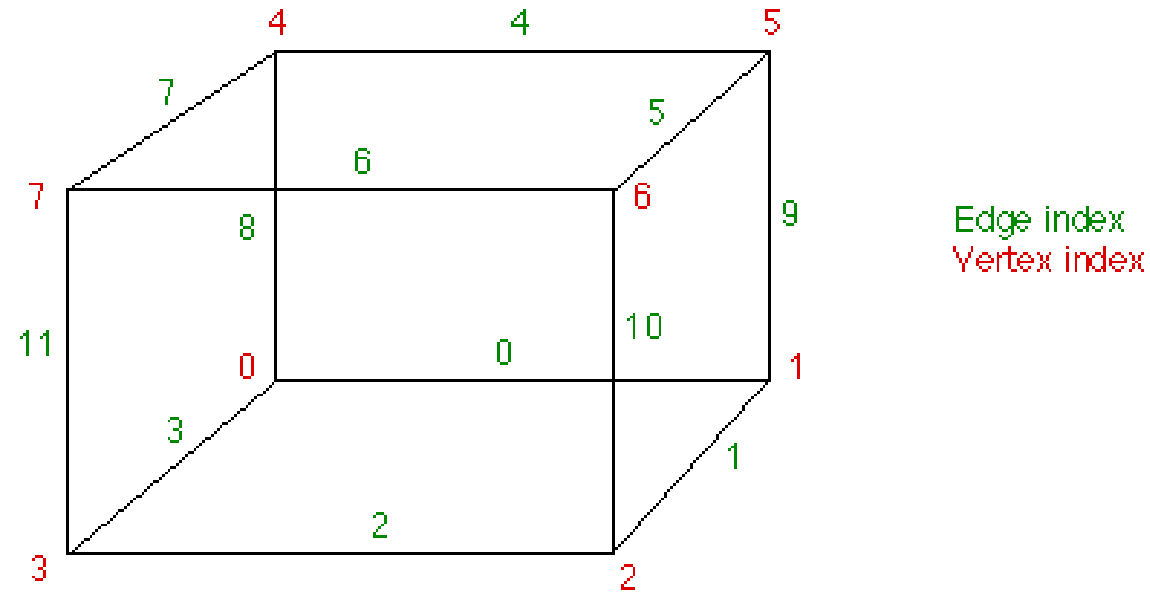


3D Meshes

Shu Liang

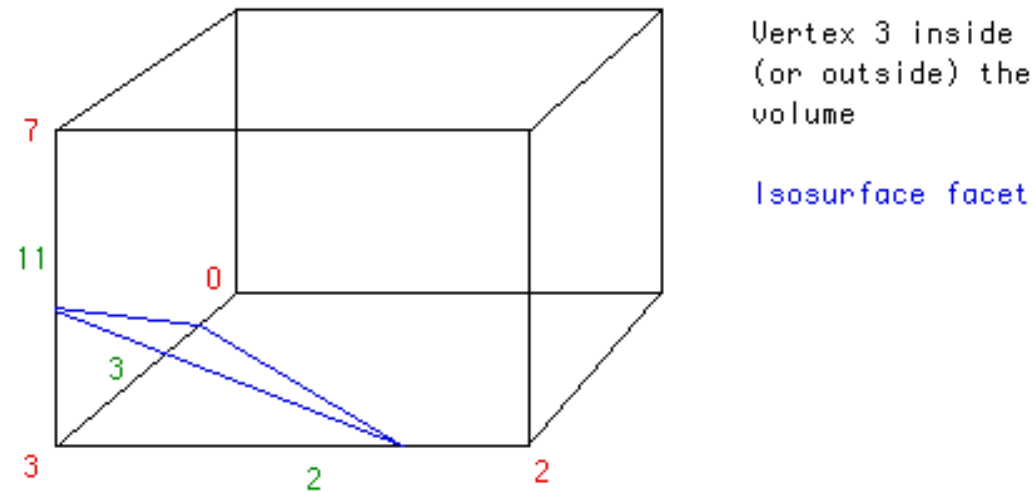
Marching Cubes

- Goal: Extracting a polygon mesh of an isosurface from discrete voxels.



Marching Cubes

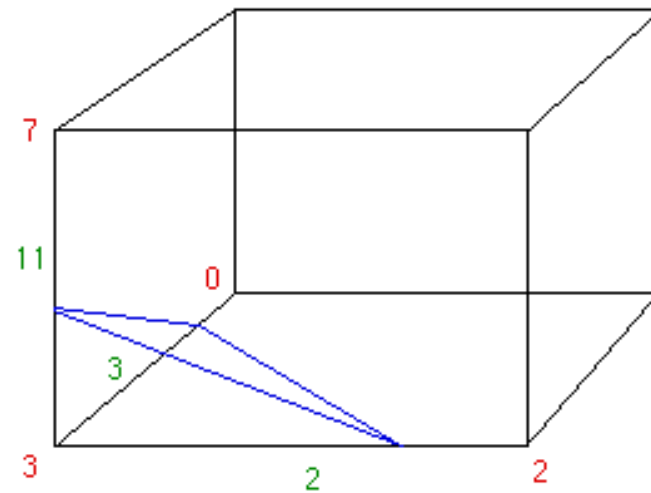
- For example: vertex 3 is below the isosurface value and all the other vertices are above the value.



- 256 possible intersection combinations.

Marching Cubes

- Edge Table



Vertex 3 inside
(or outside) the
volume

Isosurface facet

8bit cubeindex:

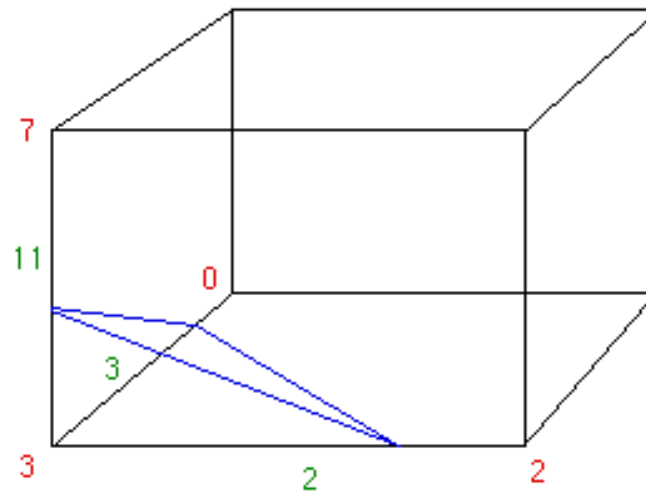
0 0 0 0 **1** 0 0 0

edgeTable[8] =

1 0 0 0 0 0 0 0 **1** **1** 0 0

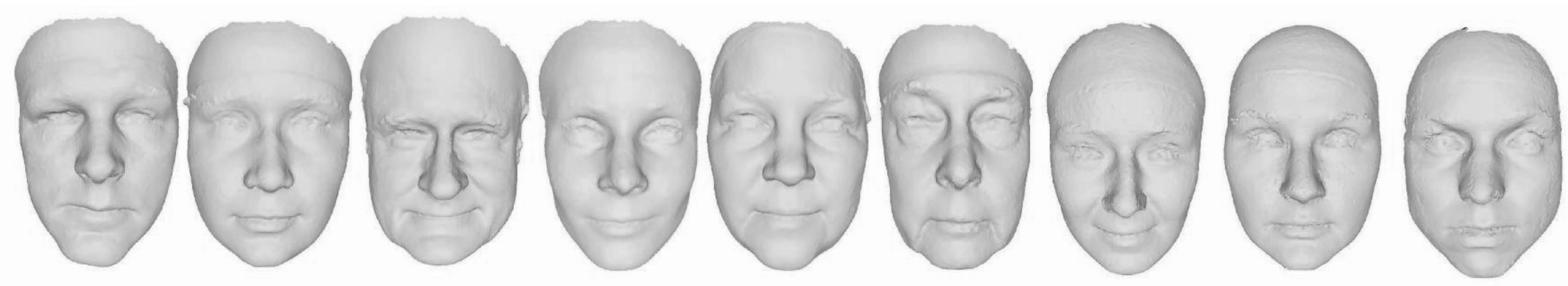
Marching Cubes

- Intersection Point:
- $P = P_1 + (\text{isovalue} - V_1)(P_2 - P_1) / (V_2 - V_1)$

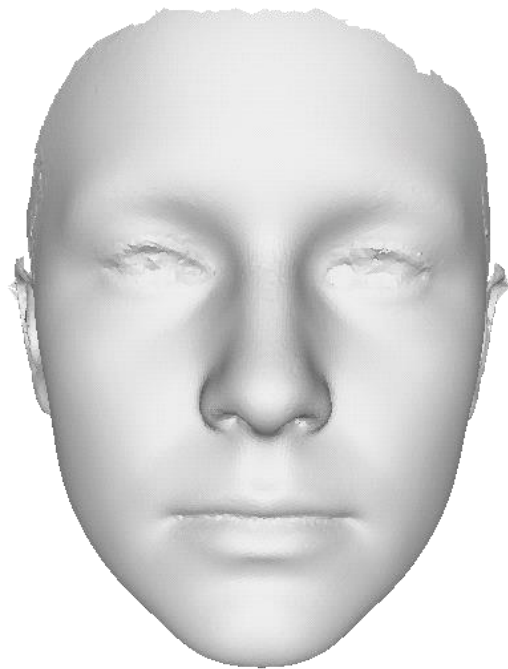


3dMD Face Dataset

- 3dMD face scans of our group

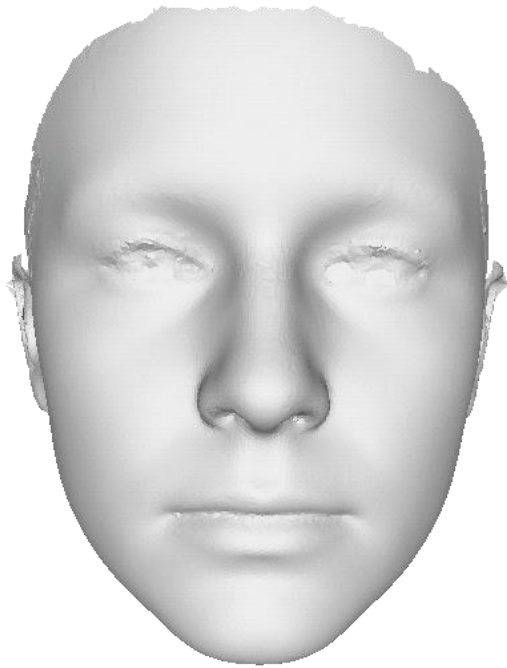


3dMD Face Dataset

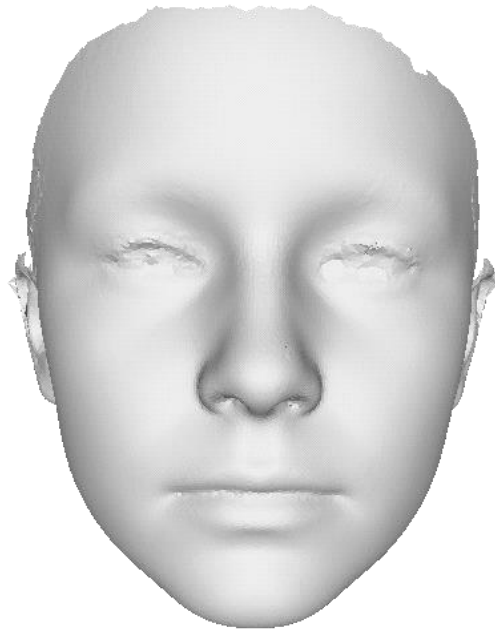


mean shape

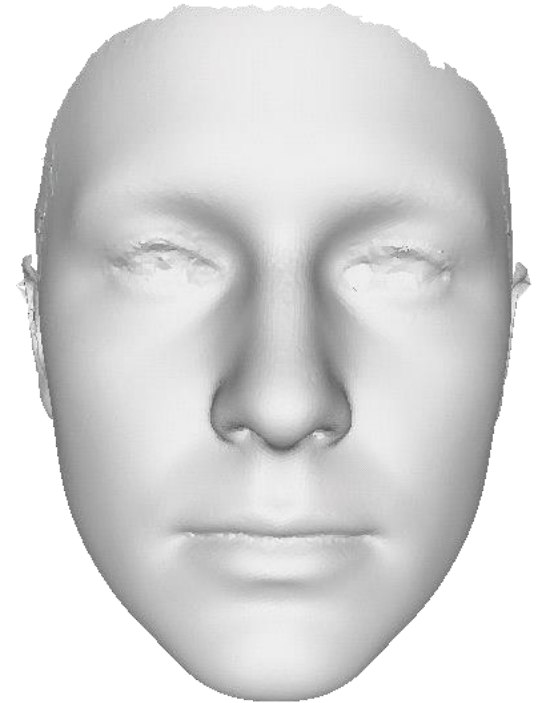
3dMD Face Dataset



mean shape

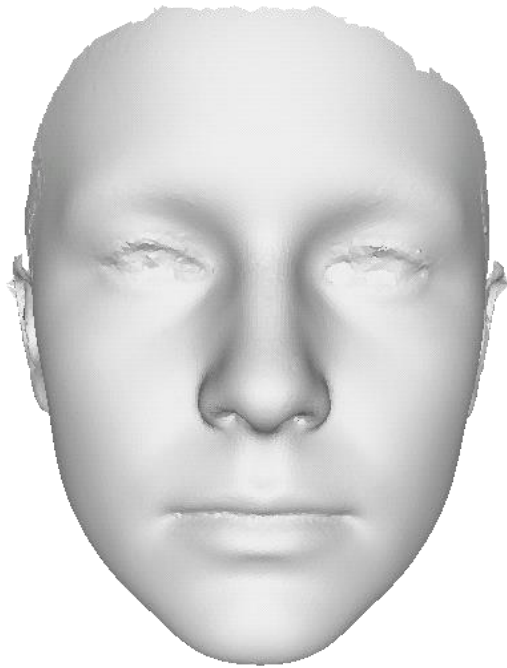


+ 1st PC

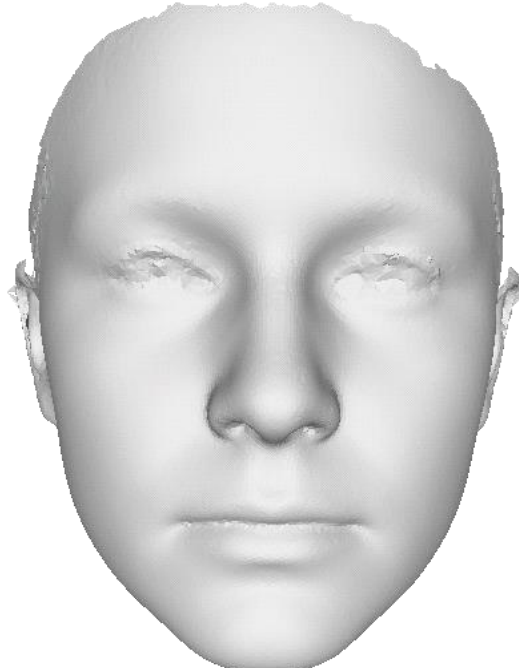


- 1st PC

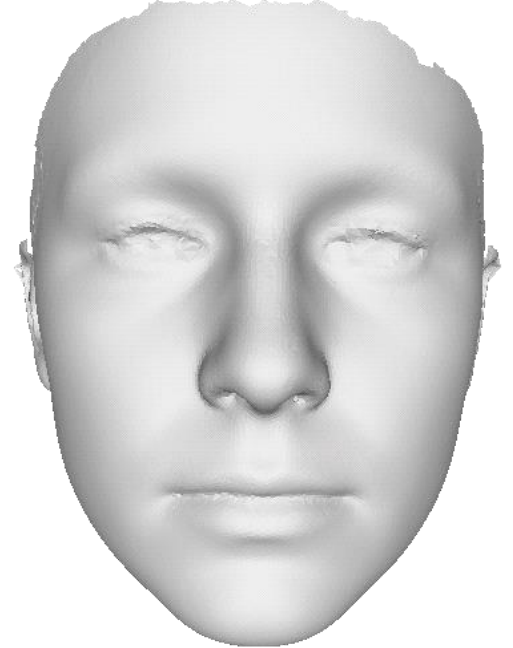
3dMD Face Dataset



mean shape

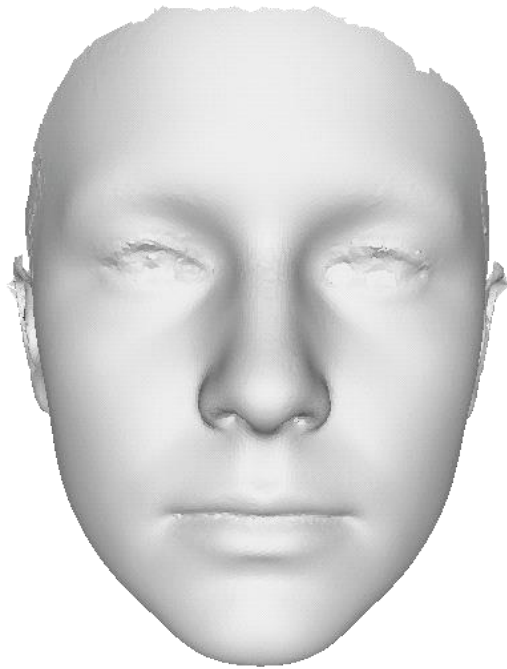


+ 2nd PC

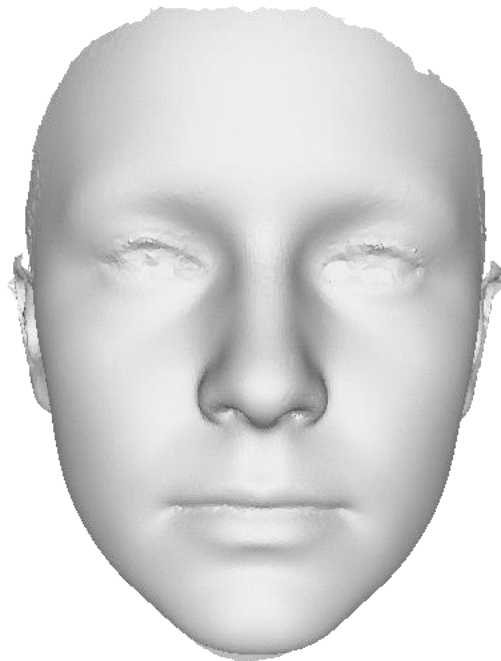


- 1st PC

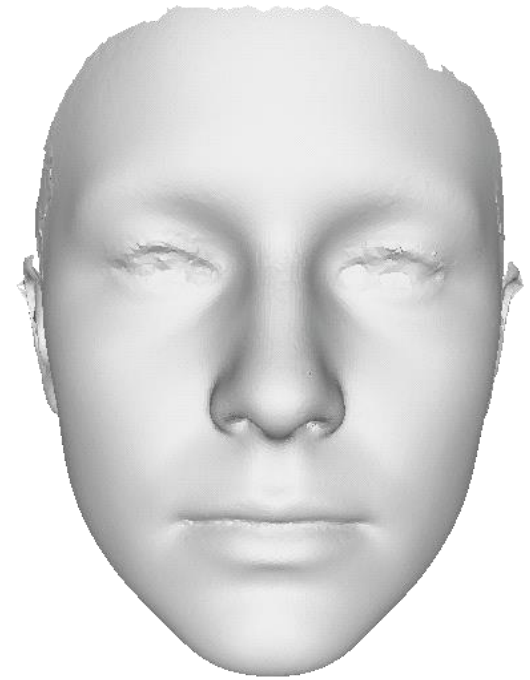
3dMD Face Dataset



mean shape

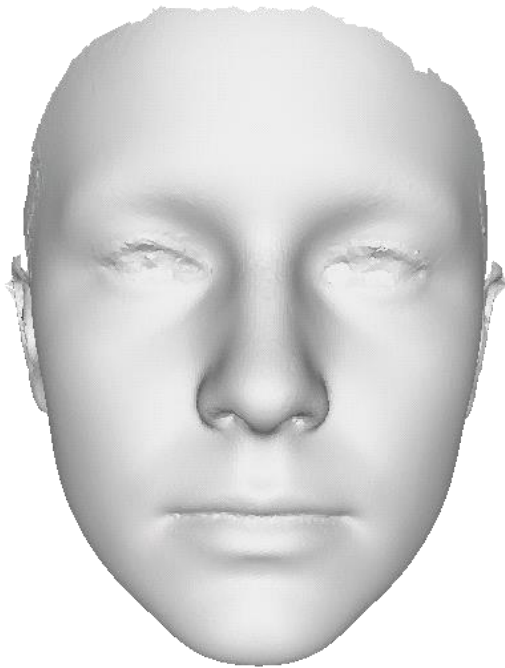


+ 3rd PC

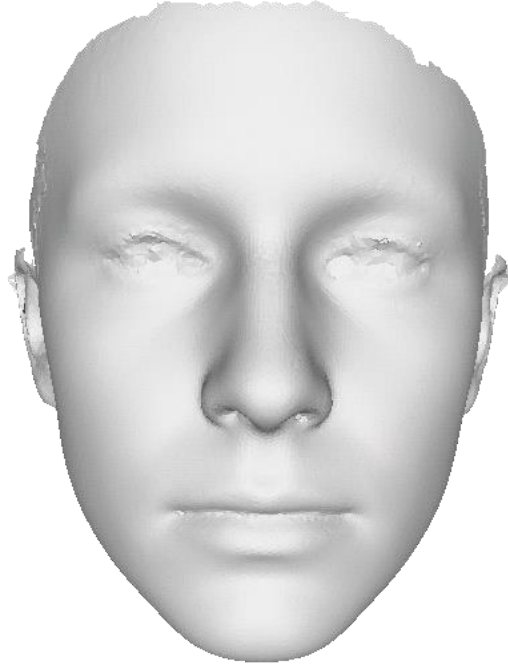


- 3rd PC

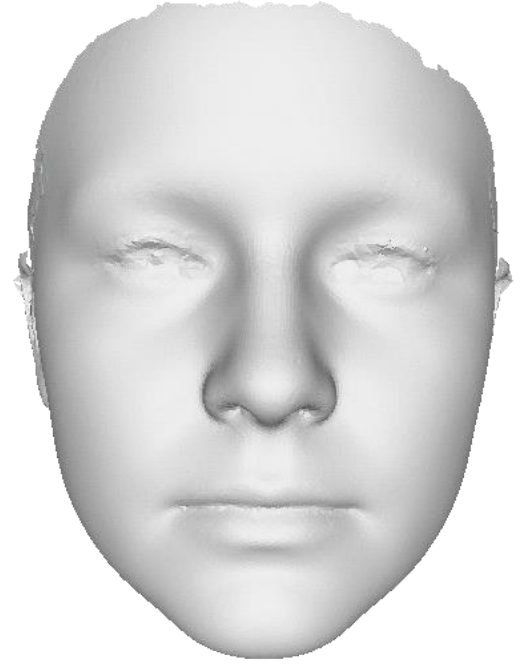
3dMD Face Dataset



mean shape

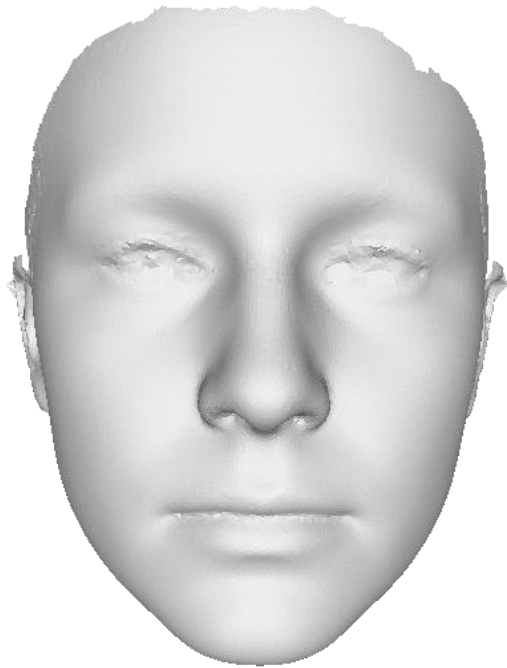


+ 4th PC

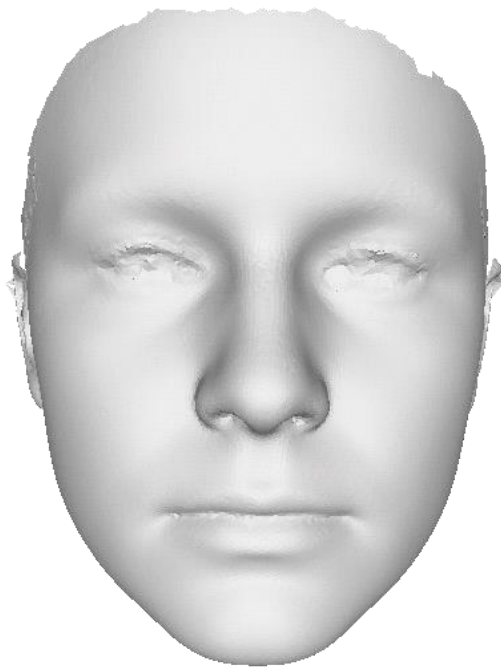


- 4th PC

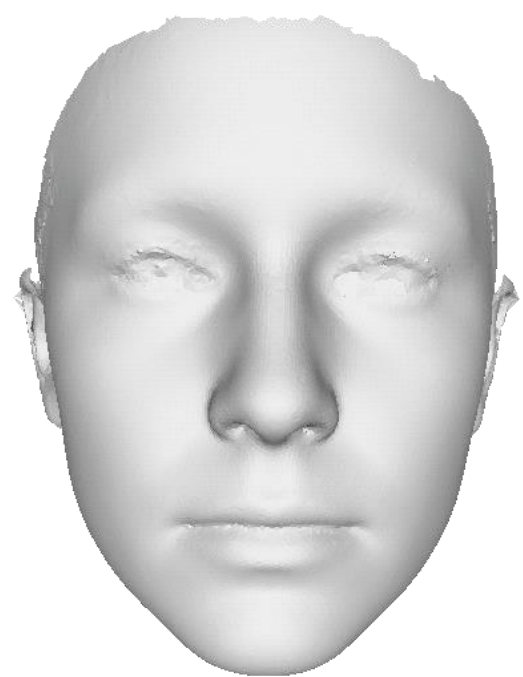
3dMD Face Dataset



mean shape




+ 5th PC



- 5th PC

3D Morphable Model

- Any person's face can be expressed as the linear combination of the PCs


$$= \text{Average Face} + \sum_{i=1}^{200} \alpha_i PC_i$$
