3D Meshes

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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

8bit cubeindex:
00001000
edgeTable[8] = 100000001100
Marching Cubes

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

Reference: http://paulbourke.net/geometry/polygonise/
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

+ 2\textsuperscript{nd} PC

- 1\textsuperscript{nd} 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

\[ \text{Any person’s face} = \sum_{i=1}^{200} \alpha_i PC_i \]