

Homework #4

2017 Fall, GCT522, Computer Graphics Theory and Application

Sunjin Jung

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AUTODESK MAYA 2017

Homework #4

Blendshape

The Curious Case of Benjamin Button

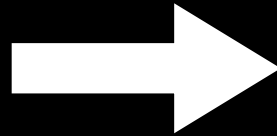


Goal

To make facial expression from the neutral input mesh

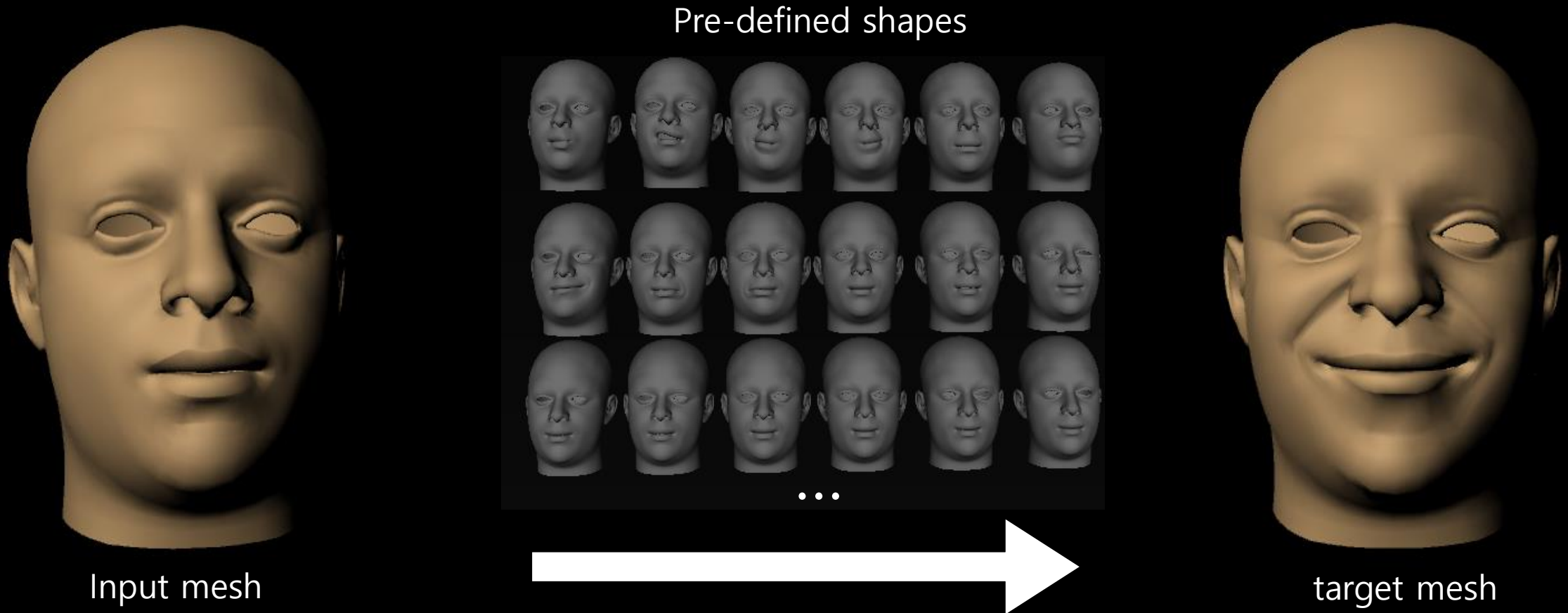


Input mesh



target mesh

Blendshape



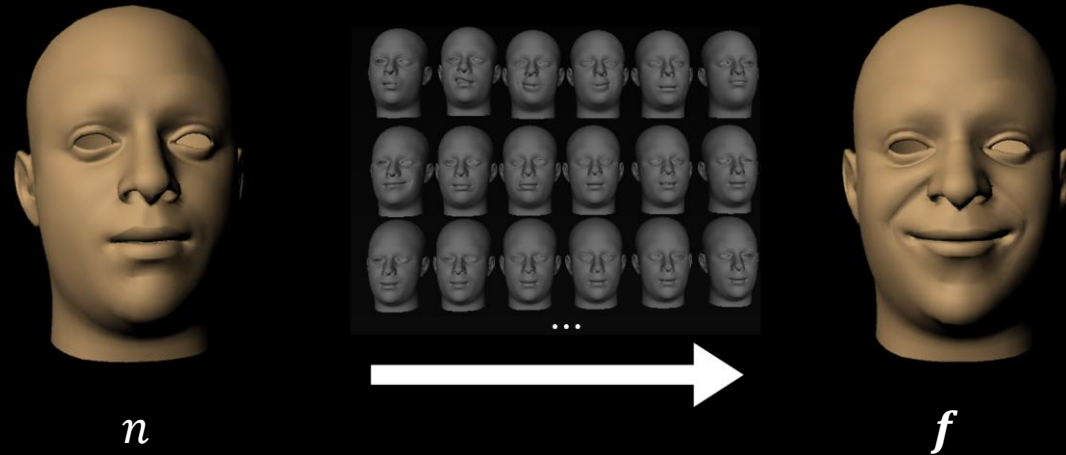
Blendshape



$$f = n + \sum_k w_k b_k$$



Blendshape



$$f = n + \sum_k w_k b_k$$

f : a facial expression vector containing all the model vertex coordinates

n : a neutral expression vector containing all the model vertex coordinates

b_k : a difference vector between k^{th} blendshape and neutral expression

w_k : a weight value for k^{th} blendshape

New face = neutral face + \sum (deformed face – neutral face) * weight

Homework #4

- **Blendshape**

- Get familiar with MAYA Node
- Make custom MEL Command and Maya Deformer Node
- 7 Points
- 3 Requirements

- **Due date**

- 5th, November, 14:30

Requirements

1. Make deformer node for a target mesh 4.0 pts

- Make deformer node on a target mesh with your own attributes (2.0 pts)
- Implement main algorithm(blendshape) in deform function (2.0pts)

2. Make command to connect your deformer node 2.0 pts

- Connect attributes using plugs

3. Explain your code & approach 1.0 pts

Demo Scenario

1. Click target mesh
2. Type MEL command “deformer -type yourDeformer”
(**don't** make yourDefomer name as “**blendShape**”,
it will generate default maya blendshape deformer)
3. Click created deformer node and source meshes
(or you can choose the node and source meshes by using other options
in your command)
4. Type MEL command “yourCommand”

Demo Video



Workflow(Deformer)

1. Create a project using the `MPxDeformerNode` framework
2. Make attributes using `MFnAttribute`
 - get `mesh` as input attribute using `MFnTypedAttribute` (given)
 - set `weight(0.0~1.0)` as input attribute using `MFnNumericAttribute`
 - set your attributes as array to get multiple sources
3. Access to your attributes using `MDataHandle`
4. Iterate over target mesh(to which deformer node is applied) vertices
 - get position of the vertex (`target point`)
 - iterate over the source meshes
 - `delta += (source point - target point) * weight`
 - `target point += delta`

Workflow(Command)

1. Create Command using the [MPxCommand](#) (same as the previous homework #2)
2. Connect the source meshes and weights to your deformer node using [MDGModifier](#)
 - use [MArrayDataBuilder](#) to pre-allocate the size of array attribute
 - use [MPlug](#) to access the attributes of the node
 - iterate the selected source meshes and connect the meshes to the attributes

Tips & Code Snippets

➔ Skeleton Code (KLMS)

References

- **Maya 2017 API reference**

- (\$MAYA_PATH)\devkit\plug-ins\example)

- **Complete Maya Programming Book**

- Chapter 4.5 Nodes
- Chapter 4.8 Deformers

(▲ Very important)

You should read these parts before starting your homework!

- **Blendshape**

- Lewis, John P., et al. "Practice and Theory of Blendshape Facial Models." *Eurographics (State of the Art Reports)* 1.8 (2014).

Submission files

- **Source code :**
 - .sln / .cpp / .h / .vcproj (Please don't send me *.sdf)
- **Compiled binary file :**
 - .mll file not dll
- **Readme.txt file :**
 - Target Machine & software(ex. Maya 2017, x64)
 - How to use your Command(in detail)
- **Screen capture file:**
 - **Image** : 3 different facial expressions (.png file)
 - **Video** : demo video in your environment (like a video on page 11)

Upload your files to KLMS
until 5th, November, 14:30

Q/A

Sunjin Jung

sunjin225@kaist.ac.kr

#2344, N5 Building / Visual Media Lab. in GSCT