

COL783: Assignment 2



Base Image



Example Image

1. Face Alignment

We used python stasm library.

Stasm is python wrapper for finding features in faces.

It provides 77 feature points for each image.

Feature points with corresponding indices:

```
L_LTemple,      // 00
L_LJaw01,       // 01
L_LJawNoseline, // 02 nose line on left jaw
L_LJawMouthline, // 03 mouth line on left jaw
L_LJaw04,       // 04
L_LJaw05,       // 05
L_CTipOfChin,   // 06
L_RJaw07,       // 07
L_RJaw08,       // 08
L_RJawMouthline, // 09
L_RJawNoseline, // 10
L_RJaw11,       // 11
L_RTemple,      // 12
```

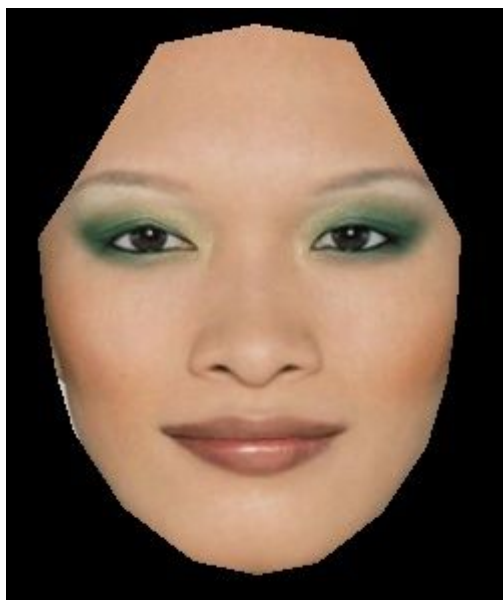
L_RForehead, // 13
L_CForehead, // 14
L_LForehead, // 15
L_LEyebrowTopInner, // 16
L_LEyebrowTopOuter, // 17
L_LEyebrowOuter, // 18
L_LEyebrowBotOuter, // 19
L_LEyebrowBotInner, // 20
L_LEyebrowInner, // 21
L_REyebrowInner, // 22
L_REyebrowTopInner, // 23
L_REyebrowTopOuter, // 24
L_REyebrowOuter, // 25
L_REyebrowBotOuter, // 26
L_REyebrowBotInner, // 27
L_REyelid, // 28
L_LEyelid, // 29
L_LEyeInner, // 30
L_LEye31, // 31
L_LEyeTop, // 32
L_LEye33, // 33
L_LEyeOuter, // 34
L_LEye35, // 35
L_LEyeBot, // 36
L_LEye37, // 37
L_LPupil, // 38
L_RPupil, // 39
L_REyeInner, // 40
L_REye41, // 41
L_REyeTop, // 42
L_REye43, // 43
L_REyeOuter, // 44
L_REye45, // 45
L_REyeBot, // 46
L_REye47, // 47
L_RNoseMid, // 48
L_CNoseMid, // 49
L_LNoseMid, // 50
L_LNostrilTop, // 51
L_CNoseTip, // 52
L_RNostrilTop, // 53
L_RNoseSide, // 54
L_RNostrilBot, // 55
L_CNoseBase, // 56
L_LNostrilBot, // 57
L_LNoseSide, // 58
L_LMouthCorner, // 59
L_LMouth60, // 60
L_LMouthCupid, // 61
L_CTopOfTopLip, // 62
L_RMouthCupid, // 63

L_RMouth64,	// 64
L_RMouthCorner,	// 65
L_RMouth66,	// 66
L_CBotOfTopLip,	// 67
L_LMouth68,	// 68
L_LMouth69,	// 69
L_CTopOfBotLip,	// 70
L_RMouth71,	// 71
L_RMouth72,	// 72
L_RMouth73,	// 73
L_CBotOfBotLip,	// 74
L_LMouth75,	// 75
L_LMouth76	// 76

Feature points of base and example image:



Morphed Image:



2. Layer Decomposition

We used WLS filter for base and detail layer decomposition using a mask of skin area. We used gaussian blurring for smoothing the mask over whole image.

Layer decomposition of the morphed image:



Base Layer



Detail Layer

Layer decomposition of the base image:



Base Layer



Detail Layer

3. Skin Detail Transfer

$$\mathcal{R}_d = \delta_I \mathcal{I}_d + \delta_E \mathcal{E}_d.$$

We have taken δ_I as 0 and δ_E as 1. This will entirely conceal the skin detail of original image and put the new skin detail of example image.



4. Color Transfer

$$\mathcal{R}_c(p) = \begin{cases} (1 - \gamma) \mathcal{I}_c(p) + \gamma \mathcal{E}_c(p) & p \in \mathcal{C}_3 \\ \mathcal{I}_c(p) & \text{otherwise} \end{cases}$$

We have take $\gamma = 0.8$. This controls the blending effect of two color layers.



5. Highlight and Shading transfer

$$\nabla \mathcal{R}_s(p) = \begin{cases} \nabla \mathcal{E}_s(p) & \text{if } \beta(p) \|\nabla \mathcal{E}_s(p)\| > \|\nabla \mathcal{I}_s(p)\| \\ \nabla \mathcal{I}_s(p) & \text{otherwise} \end{cases}$$



6. Lip Makeup

$$\mathcal{M}(p) = \mathcal{E}(\tilde{q})$$

$$\tilde{q} = \arg \max_{q \in \mathcal{C}_2} \{G(|q - p|)G(|\mathcal{E}(q) - \mathcal{I}(p)|)\}$$



Experimentation:

1. Bilateral Filter instead of WLS Filter:

1.1 Layer Decomposition

