

Virtual Studio

Aman Agrawal, Suyash Agrawal, Madhur Singhal

COL780

Problem

The aim of our project was to place the object/person in front of a green screen in a known 3-D environment in realtime.



Demo 1



Method

Method

- ① Segment the person using Chroma-Keying

Method

- ① Segment the person using Chroma-Keying
- ② Apply a Light mask to prevent the color bleeding

Method

- ① Segment the person using Chroma-Keying
- ② Apply a Light mask to prevent the color bleeding
- ③ Find a homography, to place the person in a known 3-D environment.

Method

- ① Segment the person using Chroma-Keying
- ② Apply a Light mask to prevent the color bleeding
- ③ Find a homography, to place the person in a known 3-D environment.
- ④ Apply this homography, to generate the final result.

Chroma Keying

Chroma keying, is a visual effects technique for compositing (layering) two images or video streams together based on color hues (chroma range).[1]

Algorithm 1 Pseudocode for Segmentation

Input: Green-Screen frame, high and low thresholds

Output: Mask

```
1: Apply Bilateral filter to remove noise, while keeping the edges.  
2: Convert the image to YCrCb color scheme  
3: for each pixel  $p$  do  
4:    $\alpha \leftarrow \sqrt{(Cr_p - Cr_{key})^2 + (Cb_p - Cb_{key})^2}$   
5:   if  $\alpha < low$  then  
6:      $mask(p) \leftarrow 0.0$  (background)  
7:   else if  $\alpha > high$  then  
8:      $mask(p) \leftarrow 1.0$  (foreground)  
9:   else  
10:     $mask(p) \leftarrow \frac{\alpha - low}{high - low}$   
11:   end if  
12: end for  
13: Erode away the boundaries of foreground object
```

Light Mask

Light Mask

- At the edges of the body in front of the green screen the keying will not work well.

Light Mask

- At the edges of the body in front of the green screen the keying will not work well.
- To solve this we obtain a edge light mask from the matte obtained by Chroma Keying.

Light Mask

- At the edges of the body in front of the green screen the keying will not work well.
- To solve this we obtain a edge light mask from the matte obtained by Chroma Keying.
- This mask is multiplied element-wise with the environment video.

Light Mask

- At the edges of the body in front of the green screen the keying will not work well.
- To solve this we obtain a edge light mask from the matte obtained by Chroma Keying.
- This mask is multiplied element-wise with the environment video.
- Finally we blend this with the keyed video and the environment to get the final result.

Homography and Projection

Homography and Projection

- We calculate a homography between the segmented image and a plane on which we need to project.

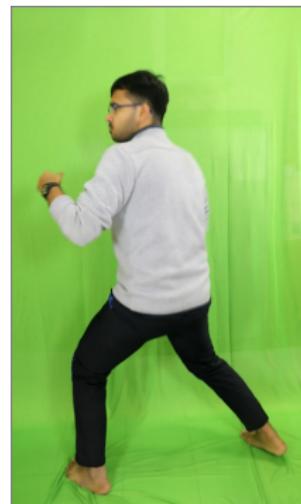
Homography and Projection

- We calculate a homography between the segmented image and a plane on which we need to project.
- Apply the Homography to get the final result.

Demo 2



Demo 2



References

- [1] Wikipedia. Chroma key — wikipedia, the free encyclopedia, 2017.
[Online; accessed 10-November-2017].