

# Assignment 2

## FACE TRANSFORMATION

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### Face Morphing

In this part, we have to combine two photographs to form a merged photograph.

Steps Involved:

1. Establish the correspondences between two photographs i.e., Match eyes, nose and other facial features between both photographs.
2. Now form a new image with the points of correspondence by taking a weighted average.
3. Triangularize the set of points using Delaunay Triangulation.
4. To find the value at any pixel, we find the corresponding pixels in both the photographs which have the same barycentric coordinates with respect to corresponding triangles and then take a weighted average.
5. Output the obtained Image.



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## Face Swapping

Given two images source and target, swap the target's face with sources face.

Steps Involved:

1. Established correspondence between feature points of source and target limited only to the face part.
2. There will be a convex hull which encloses the feature points in both the images. We are essentially swapping one convex-hull in place of another.
3. Triangularize the feature points in the target image.
4. Now fill the target image pixels using the source image pixel corresponding to the same barycentric coordinates in the corresponding triangle in source image.



First one is the face cut and pasted without adjusting for color. The second is after adjusting the color. We used seamless cloning[\[1\]](#) to adjust the color. In seamless cloning we fill the colors in the swapped part by using the gradients of the face but having the edge conditions equal to the pixels where the face is being swapped to.

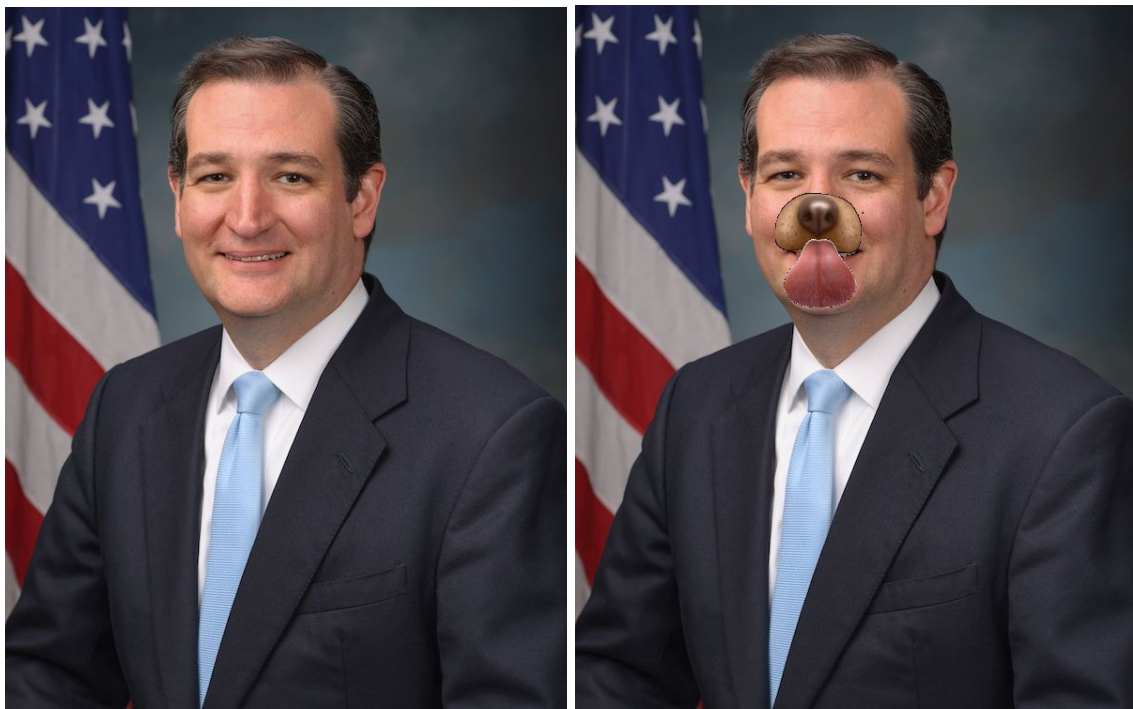
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## Filters for augmenting face

Given an images source and a filter, we have to apply the filter on the source image .

Steps Involved:

1. Get fixed representative points on the filters that are to be transformed to the target image's points.
2. Mark the points on the image on which you want the representative points to be transformed.
3. The filter image with it's alpha map will be affine transformed to the corresponding background image.
4. Overlay the weighted foreground(transformed filter) over the background image.



First one is the original image. The second is after applying the filters.

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**References:**

1. Patrick Perez, Michel Gangnet, and Andrew Blake. 2003. Poisson image editing. ACM Trans. Graph. 22, 3 (July 2003), 313-318. DOI: <https://doi.org/10.1145/882262.882269>

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