Image Registration

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Image Morphing

Morphing is a special effect in motion pictures and animations that changes (or morphs) one image or shape into another through a seamless transition. Traditionally such a depiction would be achieved through cross-fading techniques; we are using image registration while also performing a cross-dissolve to gradually transform one image into another and create more realistic transition.

We select corresponding control points in both images using Matlab's *cpselect* tool:

```
cpselect (A, B);
```

And click on 4 corresponding pairs of points: the left eye, right eye, tip of the nose, and bottom of the chin (*Figure 1*):

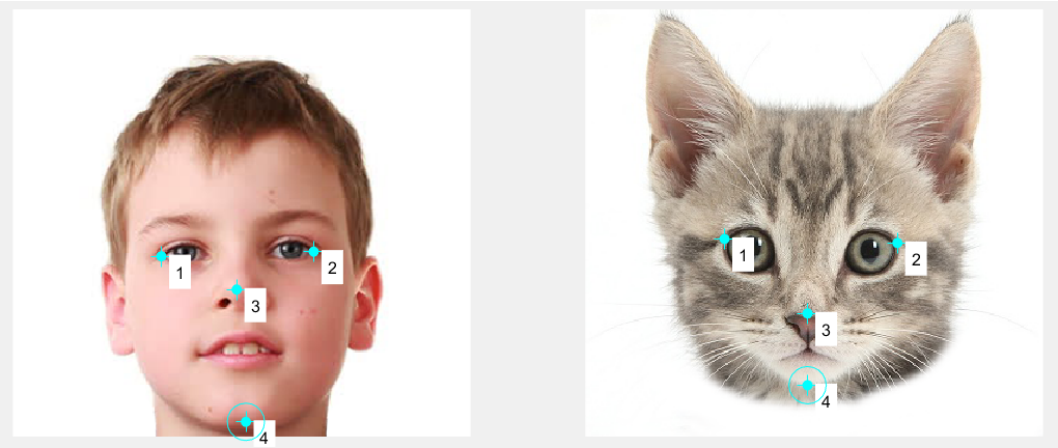

Figure 1: Selecting control points in both images using Matlab's cpselect tool.

Now we can gradually warp the image A to B by performing a weighted average of these control points. *Figure 2* shows the result image morphing on every 20th frame of the transformation:

Figure 2: Image morphing on every 20th frame of the transformation.

Coding Image Morphing

Listing 1 shows the Feature-Based Image Registration technique used to transform one image into another. Note that control points in the images are chosen by the user:

```
A = imread('1.png');
B = imread('2.png');

[m,n,k] = size(B);       % get reference image size
A = imresize(A,[m,n]);   % make the two images the same size
cpselect (A, B);         % select control points in both images

for t=0:0.01:1
    % gradually warp the image A to B by
    % performing weighted average of the control points
    P_mid = (1-t)*PA + t*PB;

    % affine transformation that maps the points PA to P_mid
    T_mid = cp2tform(PA, P_mid, 'affine');

    % put both images on the same coordinate system
    [A_T, B_T] = align (A, B, T_mid);

    % cross-fade between two aligned images
    I = (1-t)*A_T + t*B_T;

    if mod(t,0.2) == 0
        subplot(2,3,1+5*t);
        imagesc(I); axis image off; drawnow;
    end;
end;
```

Listing 1: Image registration technique used to transform image A into image B