

# Tracking with Normalized Correlation

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In this assignment you will build a simple tracking algorithm using correlation. You will use a grayscale image sequence found on the web. It has 462 images, but you can just use the first 10 to get your tracker working. It's up to you if you want to try to get your tracker working on the rest of the images.

Do the following steps.

1. Download the images from here [http://vision.ucsd.edu/~bbabenko/project\\_miltrack.shtml](http://vision.ucsd.edu/~bbabenko/project_miltrack.shtml). Use the “David Indoor” sequence.
2. Use matlab to load in the first image and plot it on the screen. Use the command `impixelinfo` to allow you to figure out the coordinates of a box around the face that you want to track.
3. You can hand code the coordinates of the box around the part of the image you want to track. Use this rectangular patch of the image as a filter in the `filter2` command to build a tracker which will attempt to find the best match to the box in the next frame.
4. Once you have found the face in the next frame, reset the “tracked object” to be the patch from the position you found in the second frame, and then repeat this process. This will be called your basic tracker.
5. Show the results of your basic tracker by showing an image of each frame with a rectangle around the current position from your tracker. Obviously, if your tracker is working, the rectangle should stay on the face in each frame. *It is not essential for your tracker to work throughout the entire video, but it should work for a least a few frames.* Make a .pdf document showing the results of your tracker.
6. Once you have finished your basic tracker, try modifying your tracker in the following way. Instead of replacing the tracked object in each frame with a patch from the current image, take a weighted average of the old tracked object and the new tracked object. That is:

$$t_{new} = \alpha \times t_{old} + (1 - \alpha) \times t_{currentFrame}.$$

Experiment with different values of  $\alpha$ .

7. Show results for at least 2 different values of  $\alpha$ . Of course, if you set  $\alpha$  to 0, you will recover your basic tracker, so don't show results for  $\alpha=0$  in this portion of the assignment.

Turn in your code, and your results for the basic tracker and the modified tracker in a single .pdf file.