

Registration of one image to another is an almost universal problem used in medical imaging as well as remote sensing. The limitation of rigid registration is often that the images are not exactly the same; there is often a slight warp between the images. For example, a CT taken on a curved table will be slightly different from a CT taken on a flat table. Or images of the same geography taken from an different passes of an airplane are warped because the plane is in a different position.

One effective method of doing warped registration is to match small regions of the test image with the reference image with rigid registration methods. The continuous mapping that matches structures in the two images is then found by interpolation. We are studying methods of registering a region within an image with a reference image for application in elastic registration.

One of the primary difficulties is the effect of the window on the correlation. The window that selects a region in the image often dominates the correlation. We have used wavelet transform scaling functions to localize in the test image and then only correlate the detail coefficients. This completely eliminates the effects of the window from the correlation. The correlation peaks are much sharper and easier to find. The effect is very similar to the phase only correlation commonly used in radar.

We will demonstrate the basic method and the interesting side effects such as increased sensitivity to distortion.