```matlab
clear all;
clc;
close all;

    clc;
    imgOrg = imresize(imread('vegan.jpg'),0.5);
    template = imresize(imread('soy-dessert.jpg'), 0.5);
    imgOrg = imgOrg - mean(imgOrg(:));
    template = template - mean(template(:));
    windowSize = size(template);

    fftImg = fftshift(fft2(double(imgOrg)));

    template = padarray(template, ceil((size(fftImg)-size(template))/2));
    template = imresize(template, size(fftImg));
    fftTemp = fftshift(fft2(rot90(double(template),2)));

    C = ifft2(fftImg .* fftTemp);
    %res = conv2(fftImg, fftTemp);
    %find(max(res))

    figure;
    imshow(log(1+fftTemp),[]);

    figure;
    imshow(log(1+fftImg),[]);

    imshow(abs(log(C + 1)),[]);
    maxVal = max(C(:))
    loc = find(C == maxVal)
    [x,y] = ind2sub([size(imgOrg,1) size(imgOrg,2)], loc)
    x = x - ceil((size(fftImg)-size(template))/2);
    y = y - ceil((size(fftImg)-size(template))/2);
    drawnow;
    hold on;
    figure;
    imshow(imgOrg);
    rectangle('Position', [y - windowSize(2)/2, x - windowSize(1)/2, windowSize(2),

        Warning: Displaying real part of complex input.
        Warning: Displaying real part of complex input.

        maxVal =

           4.0692e+07


        loc =

              130624
```

```
x =

    428


y =

    270


Error using rectangle
Value must be a 4 element vector

Error in templateConvolution (line 38)
    rectangle('Position', [y - windowSize(2)/2, x - windowSize(1)/2, window
```

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The convolution of 2 functions g and f is given by

$f * g = f(t) * g(t - \mathcal{T})$

The cross correlation of 2 functions g and f is

$\int f(-t)' * g(t)$ where f(t)' is the complex conjugate of f(-t).

Cross-correlation is equivalent to convolution if the filter f(t) is rotated by 180 and then the conjugate of the filter is multiplied element by element with the function.