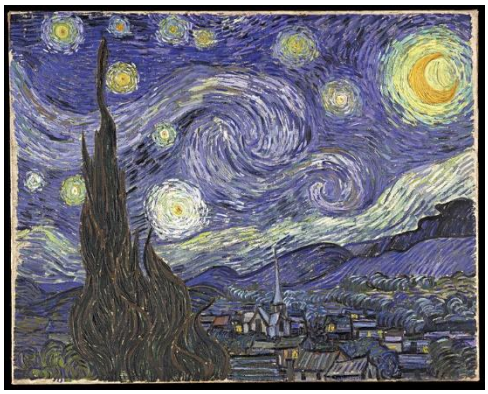
2 Problem # 2: Image Subtraction for Tamper Detection [30 Points]

Images of paintings are sometimes tampered to introduce subtle and plausible alterations. You are provided images of the original and tampered versions of Van Gogh's "Irises" and "Starry Night" (Fig. 2). Detect the tampered regions for each painting by subtracting the tampered image from the reference image. For each painting, submit a binary image where the tampered regions are marked by white pixels and the non-tampered regions are marked by black pixels.

You will need to align the tampered image with the reference image before subtraction. This may be done by minimizing the mean squared difference (MSD) over a set of horizontal and vertical shifts. Essentially, shift the tampered image in both directions by various amounts (number of pixels). The shift amount that yields the minimum MSD should be used to align the two images. You are not allowed to use built-in functions such as MATLAB's imtranslate() or OpenCV's warpAffine(), etc., to achieve this objective, but must write your own code.

Provided Images:

Irises



Starry Night

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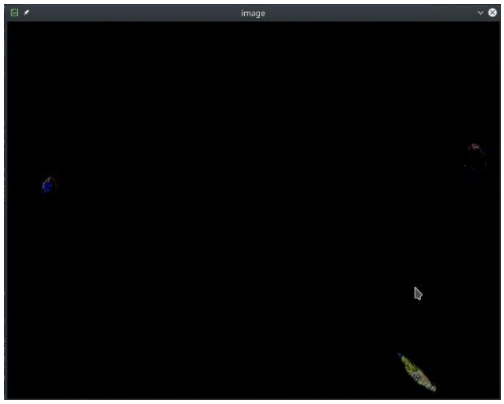
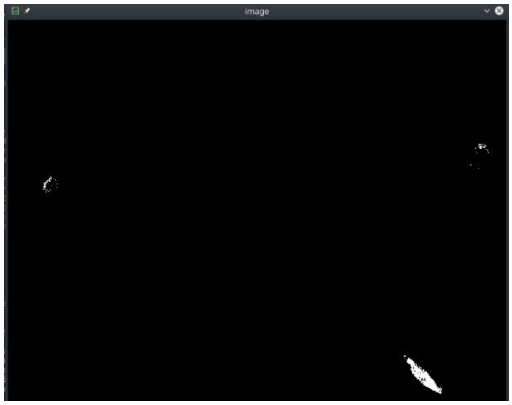
Img#1 Irises

Colored Image	Binary image
	

```
Mean Square Error = 76.01799883534017
 displacement in x = -2
displacement in y = 2
```

Img#2 Starry Night

Color image	Binary image