Computer Vision
Assignment 1

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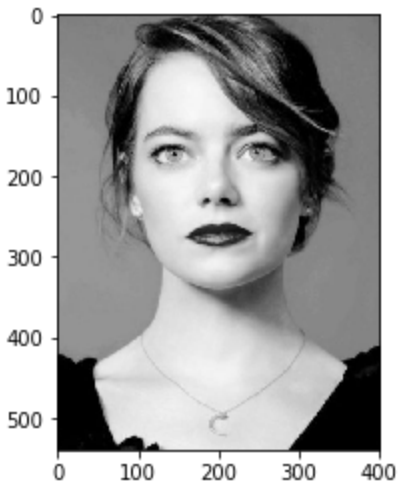
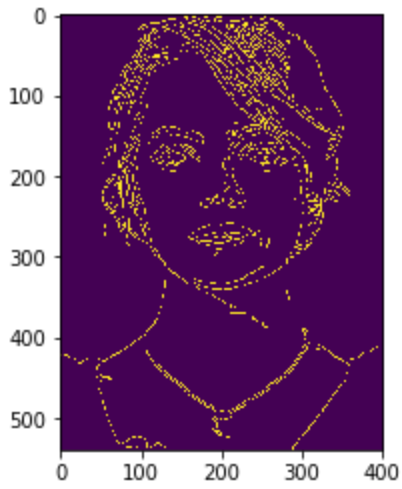
Canny Edge Detection

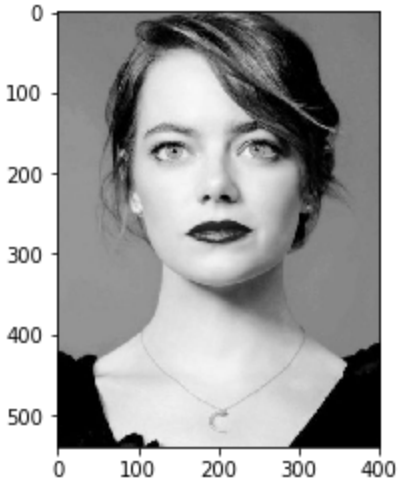
1. Grayscaling the image
2. Noise Reduction
    - Using 5x5 GaussianBlur kernel
3. Intensity Gradient of Image using Sobel filtering
   This step helps in finding the edge gradient and direction of each pixel.
   $G = \sqrt{G_x^2 + G_y^2}$
   $\theta = tan^{-1}\left(\frac{G_x}{G_y}\right)$
4. Non-maximum suppression
   This step involves removal of all the unwanted pixels which might have been classified as edges.
   Check for each pixel if there is a local maximum in its neighborhood in the direction of the gradient.
5. Hysteresis Thresholding
   Two threshold values are taken. The edges with intensity gradient above the higher threshold are considered as edges.
   The edges with intensity gradient below the lower threshold are taken as non-edges.
   The edges with intensity between higher and lower value are considered as edges or non-edges based on their connectivity to a pixel which belongs to an edge.
6. Edge Linking
   Finally, all the edges between the higher and lower threshold which are connected to a pixel from an edge are linked together.

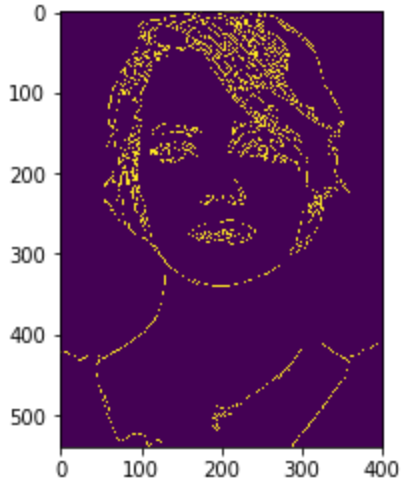
   Images from implementation of Canny Edge Detection algorithm





Images from the in-built function for Canny Edge Detection





Harris Corner Detection

1. Grayscaling the image
2. Spatial Derivative calculation using Sobel filtering
   The spatial derivative gives the values I_x and I_y. These values are useful to calculate the value of Harris response function.
3. Calculation of M

Matrix M contains the following values which are further used to calculate the Harris response.

4. Harris response calculation

   $R = det(M) - k(trace(M))^2$

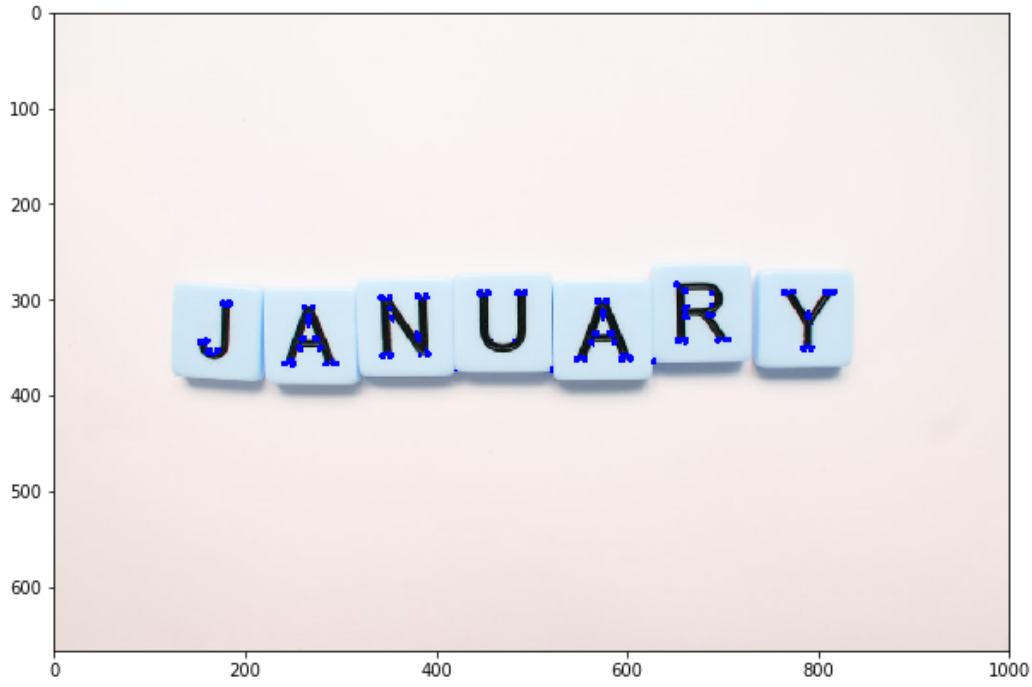
5. Corner Detection with R

   $R > 0$: Edge

   $R >> 0$: Corner

   $|R|\ is\ small$: Flat

Images from the implementation of Harris Corner Detection algorithm



Images from the in-built function for Harris Corner Detection


0
100
200
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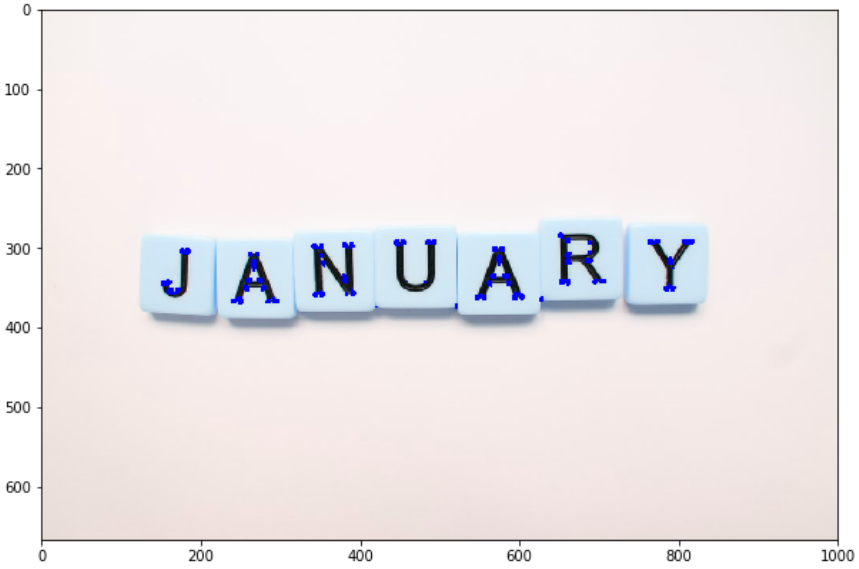
JANUARY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