UNIVERSIDAD
PANAMERICANA

Image Processing

Moravec algorithm

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A corner is detected when the minimum change produced by any of the shifts is larger than a certain threshold.

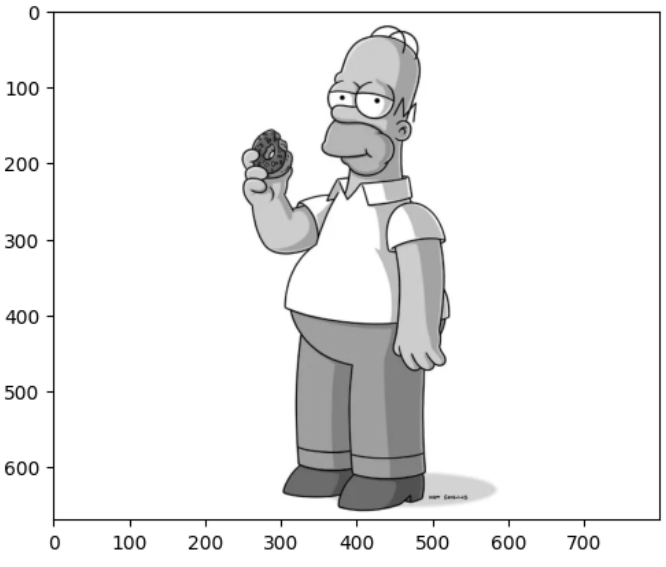
- Here the shifts comprise {(1, 0), (1, 1), (0, 1), (-1, 1)}

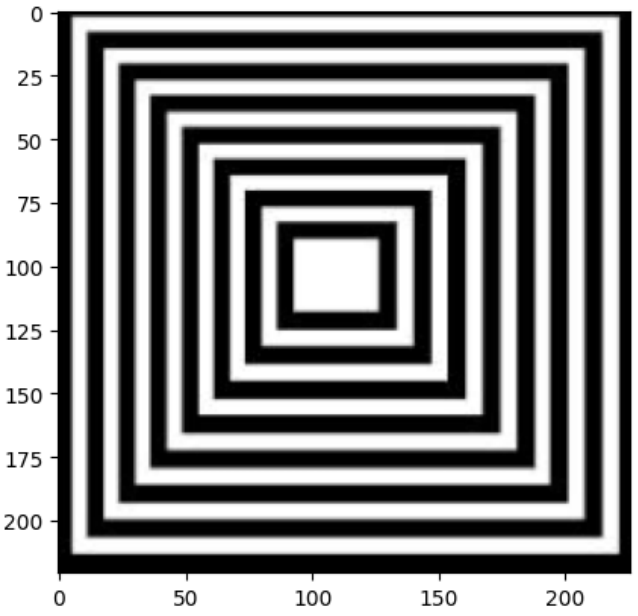
For every pixel location

$$V_1 = \frac{1}{p(q-1)} \sum_{i=-k}^{k} \sum_{j=-l}^{l-1} (g(i,j) - g(i,j+1))^2$$
$$V_2 = \frac{1}{(p-1)q} \sum_{i=-k}^{k-1} \sum_{j=-l}^{l} (g(i,j) - g(i+1,j))^2$$
$$V_3 = \frac{1}{(p-1)(q-1)} \sum_{i=-k}^{k-1} \sum_{j=-l}^{l-1} (g(i,j) - g(i+1,j+1))^2$$
$$V_4 = \frac{1}{(p-1)(q-1)} \sum_{i=-k}^{k-1} \sum_{j=-l}^{l-1} (g(i,j+1) - g(i+1,j))^2$$
$$V = min(V_1, V_2, V_3, V_4)$$

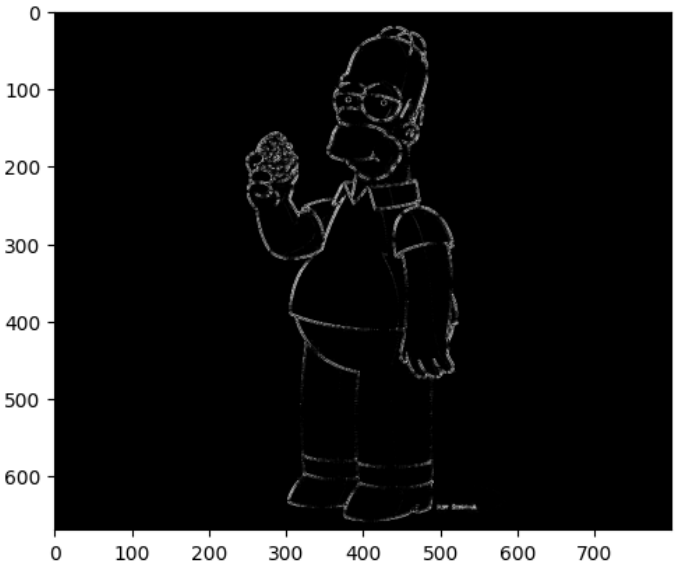
In the above equation, p = 2k + 1 and q = 2l + 1If the V is above a certain threshold, the corner is detected in that pixel location.

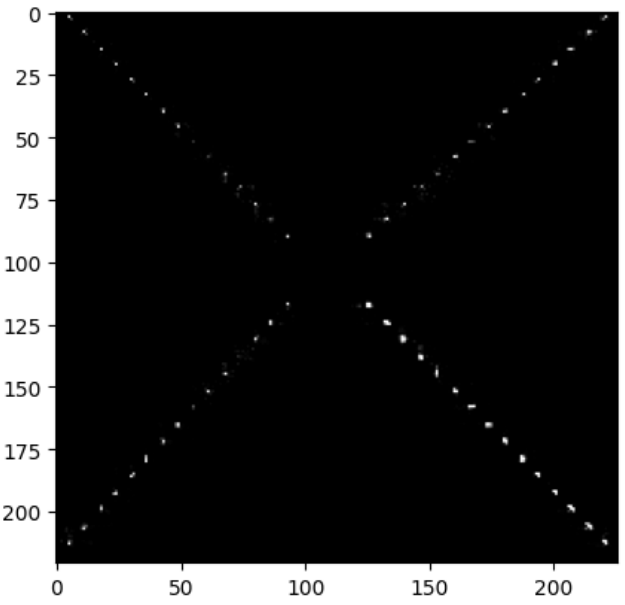
The images we worked with





The results





Among the main strengths of this algorithm is that its edge detection is very precise, which is very useful in figures with many squares or rectangles. It also proved to be useful as a shape detector, as in more complex images a clear outline is shown over patterns or components within the image.

However, the main limitation of this algorithm is in the threshold it uses to detect, as well as in the kernel, since we have to adjust these hyperparameters so that they fit our model. By doing tests with other values we can get better or worse results, and therefore these are values that we must know how to adjust if we want to obtain good behavior from our algorithm.