

Assignment 2, Q9: CS 663, Autumn 2023

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Question

In this section, we implement local histogram equalization of various sizes (e.g., 7×7 , 31×31 , 51×51 , 71×71) on the images 'LC1.jpg' and 'LC2.jpg' from the homework folder. We will compare these local histogram equalization results to global histogram equalization using MATLAB's image processing toolbox. We will also identify regions where the local method produces better local contrast than the global histogram equalization.

Image Preprocessing

We begin by presenting the original images for reference:



Original LC1 image



Original LC2 image

Local Histogram Equalization

We apply local histogram equalization to both images with different window sizes. Here are the results:

LC1 Local Histogram Equalization



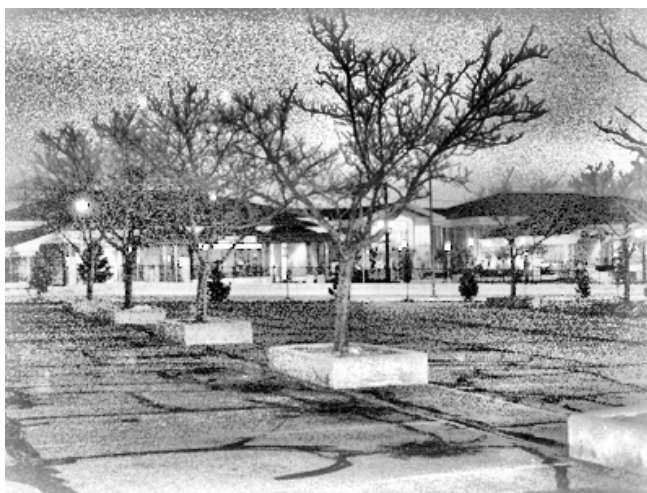
Local histogram equalization with 7×7 window



Local histogram equalization with 31×31 window



Local histogram equalization with 51×51 window



Local histogram equalization with 71×71 window

LC2 Local Histogram Equalization



Local histogram equalization with 7×7 window



Local histogram equalization with 31×31 window



Local histogram equalization with 51×51 window



Local histogram equalization with 71×71 window

Comparison with Global Histogram Equalization

For comparison, we also provide the results of global histogram equalization on both images:



Global histogram equalization for LC1



Global histogram equalization for LC2

Discussion

In the case of LC1, the local histogram equalization with various window sizes does not provide a significant improvement over global histogram equalization in terms of overall image enhancement. However, the local method does reveal some additional edge and corner details in specific regions.

For LC2, similar to LC1, the local histogram equalization with small window sizes does not yield better overall enhancement compared to the global method. Nevertheless, in certain regions with low contrast in the global image, the local method manages to bring out finer details and improve local contrast.

In summary, while global histogram equalization generally produces better overall image enhancement, local histogram equalization can be valuable when specific regions of interest require improved local contrast or when fine details need to be emphasized.