

A dark blue vertical bar runs down the left side of the page. A blue arrow-shaped banner points to the right from this bar, containing the date. Below the banner, several thin, curved lines in dark blue and light gray sweep upwards from the bottom left corner.

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PROJECT REPORT

PROJECT 1

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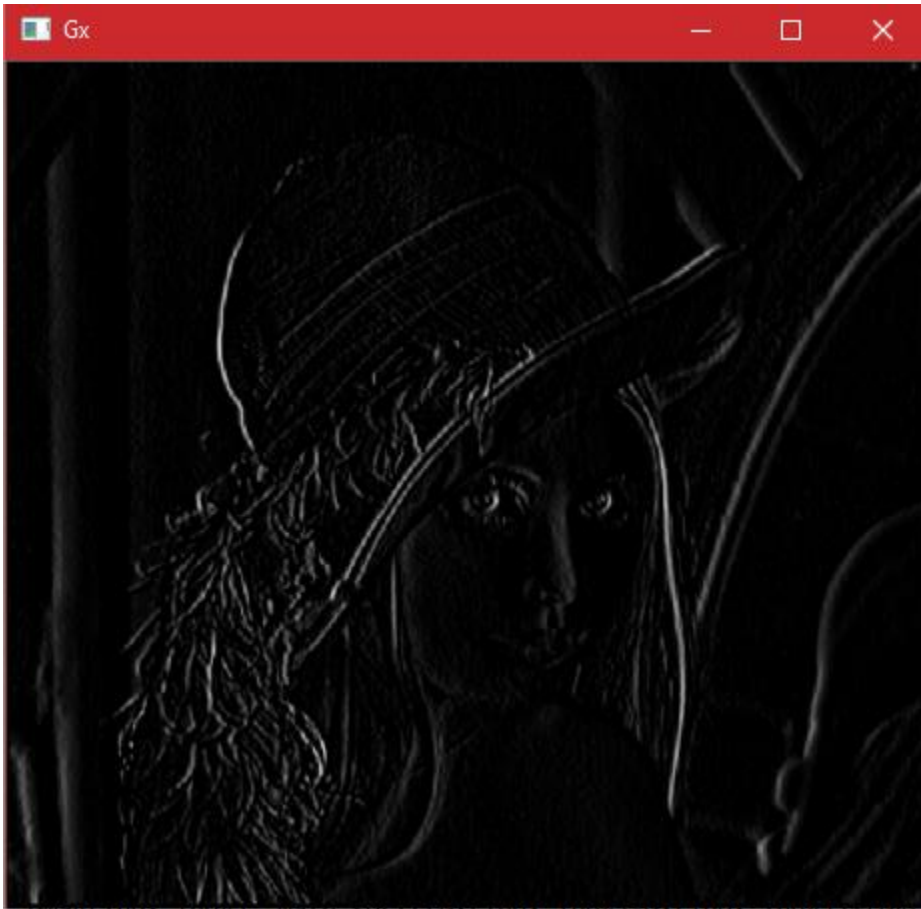
PROBLEM 1

Original Image

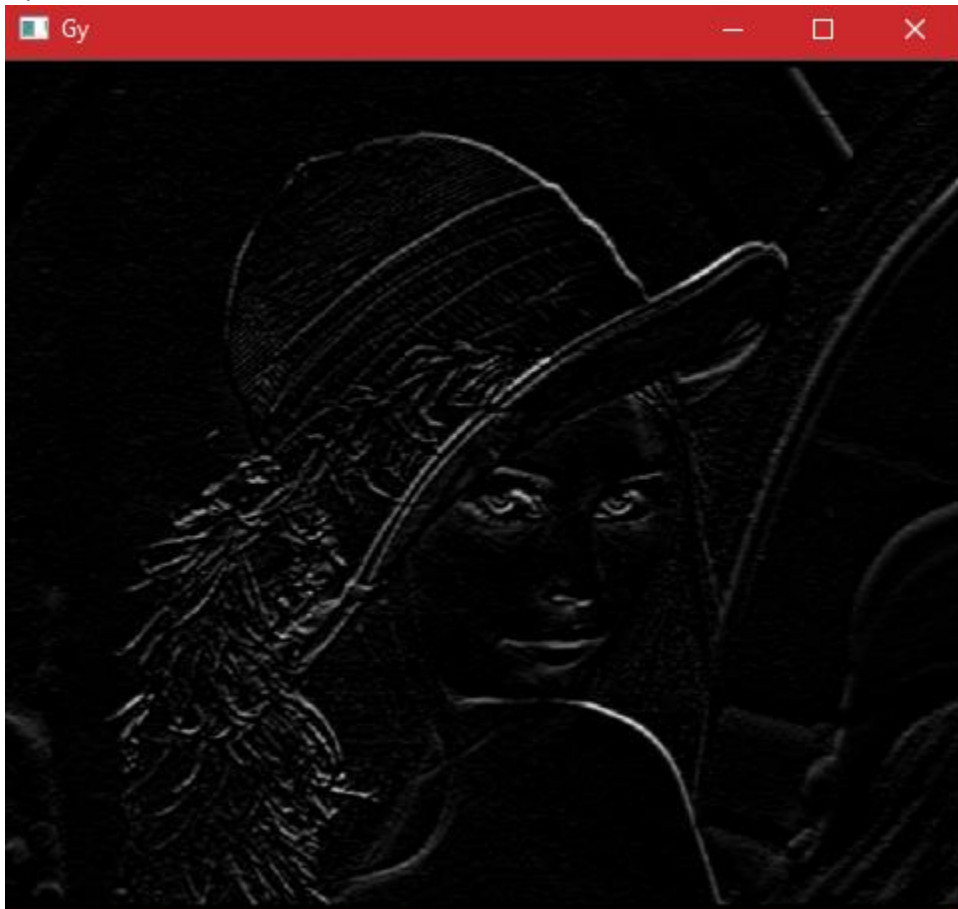


A. 2D Convolution : Images after 2D Convolution

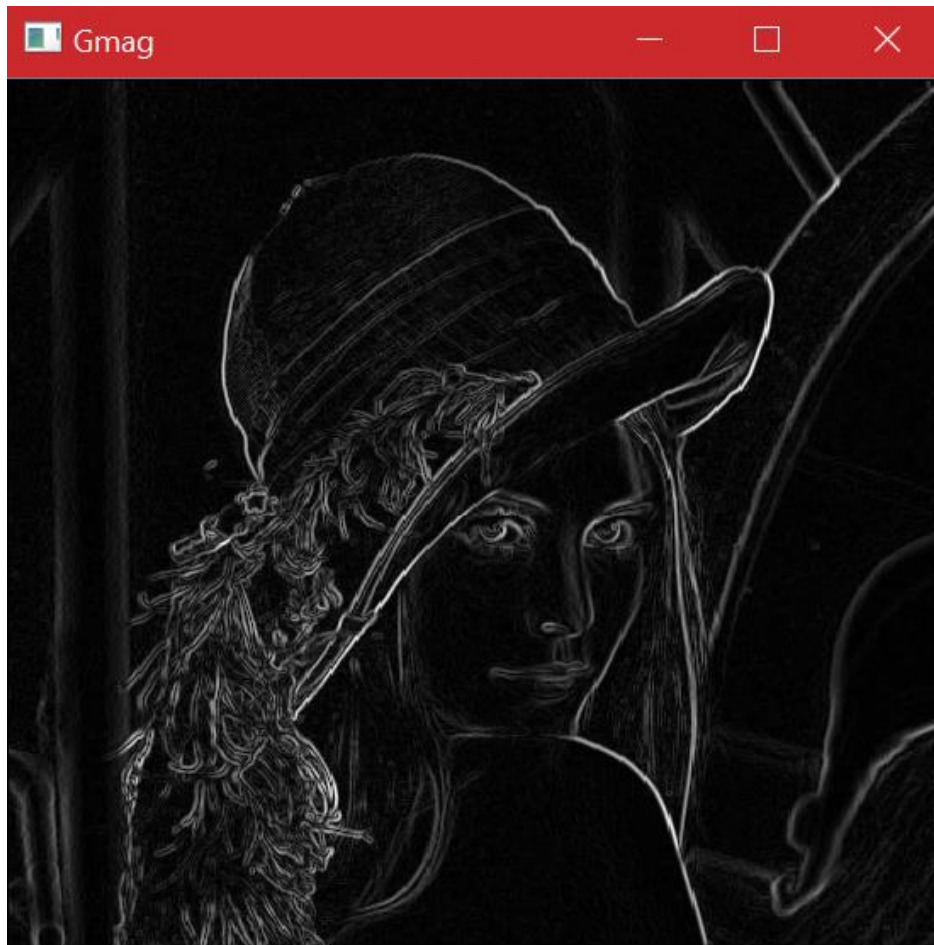
Gx

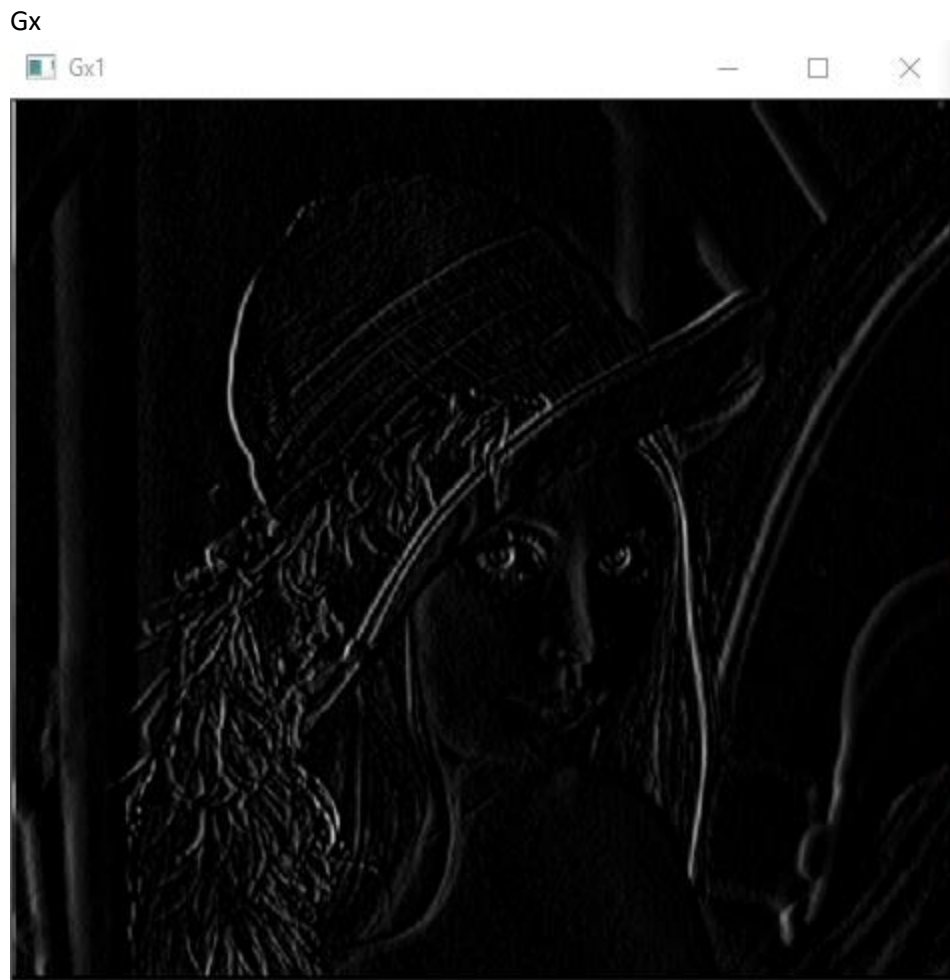


Gy

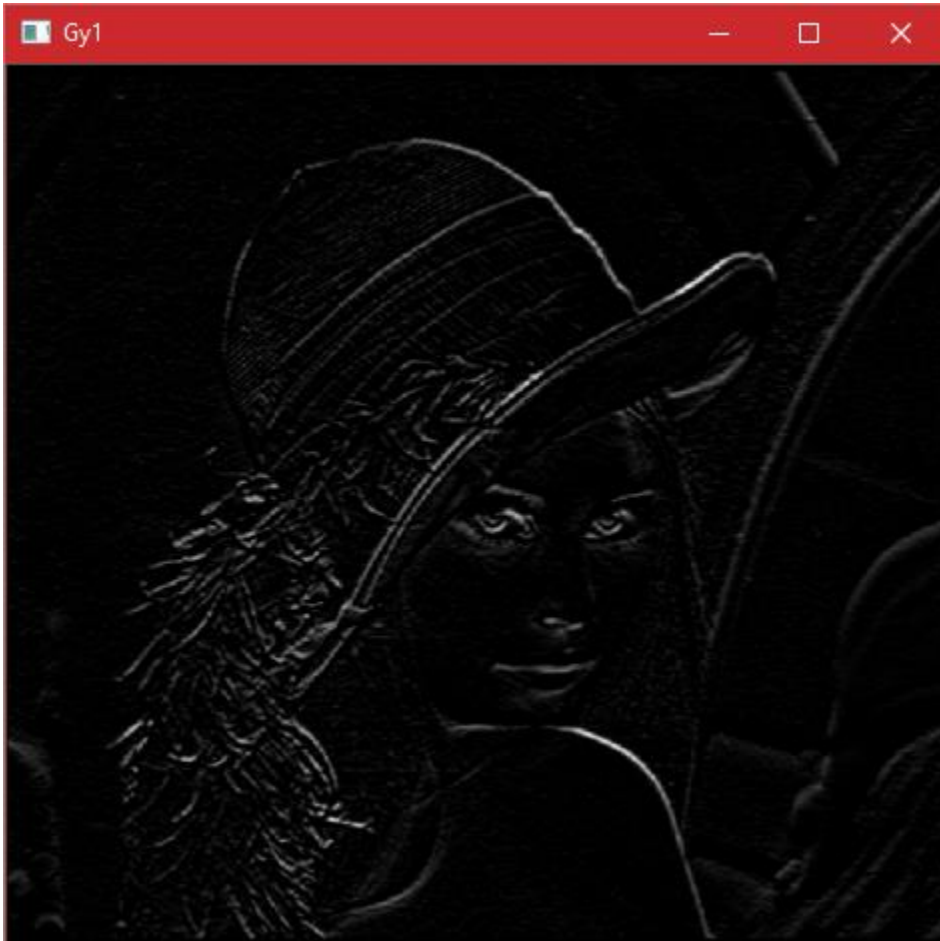


Gmag

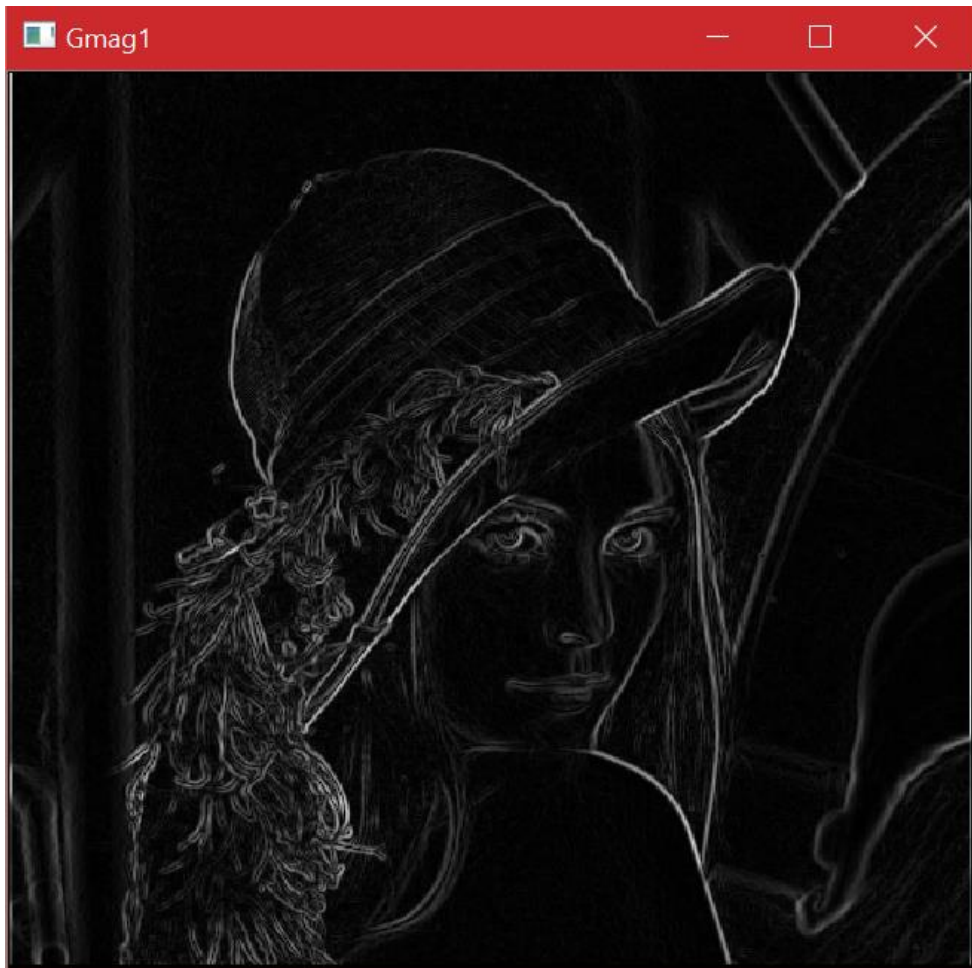


B. 1D Convolution : Images after 2D Convolution

Gy



Gmag



Gx, Gy and Gmag of 1D and 2D convolution is similar.

C. Computational Complexity

For $M \times N$ Image and $P \times Q$ Filter, Computational complexity of performing 2D Convolution would be $O(M \times N \times P \times Q)$ because each pixel would be computed in $P \times Q$ computation.

For $M \times N$ Image and $P \times Q$ Filter, Computational complexity of performing separable 1D Convolution would be $O(M \times N \times (P+Q))$ because each pixel would be computed in $P+Q$ computation.

For Example, an image with 256×256 size and filter of 3×3 would take following number of operations:

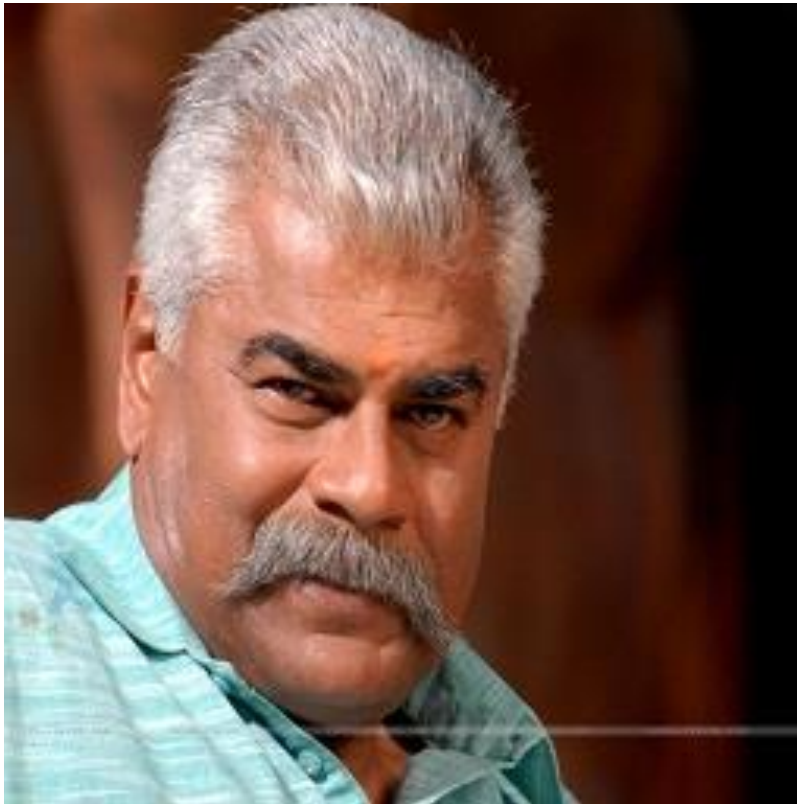
2D Convolution: $256 \times 256 \times 3 \times 3 = 589284$

1D Convolution: $256 \times 256 \times (3+3) = 393216$

So computational complexity of performing 2D convolution is greater than 1D convolution.

PROBLEM 2

Original Image



Comparison of Original Greyscale and Enhanced Image

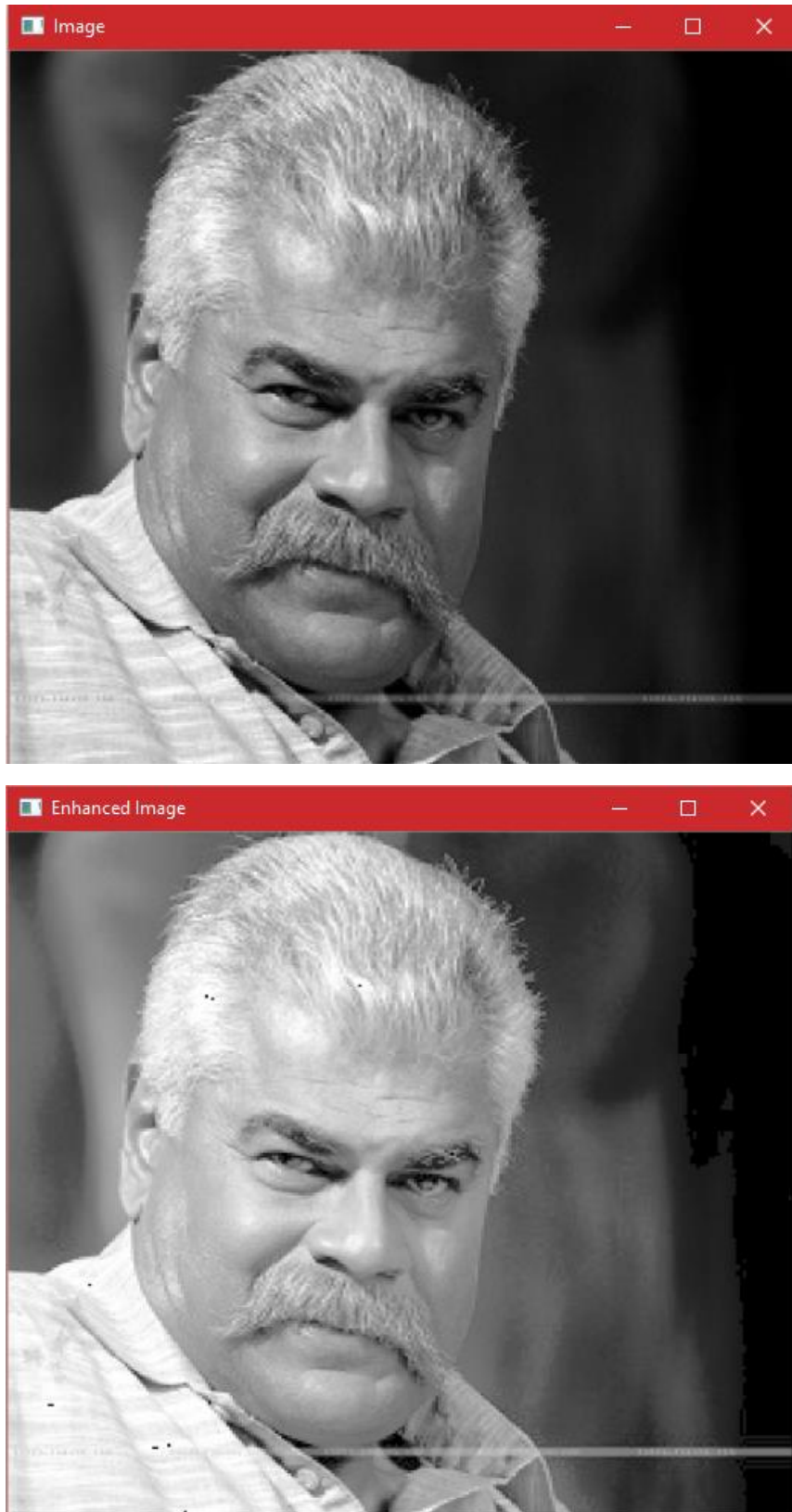
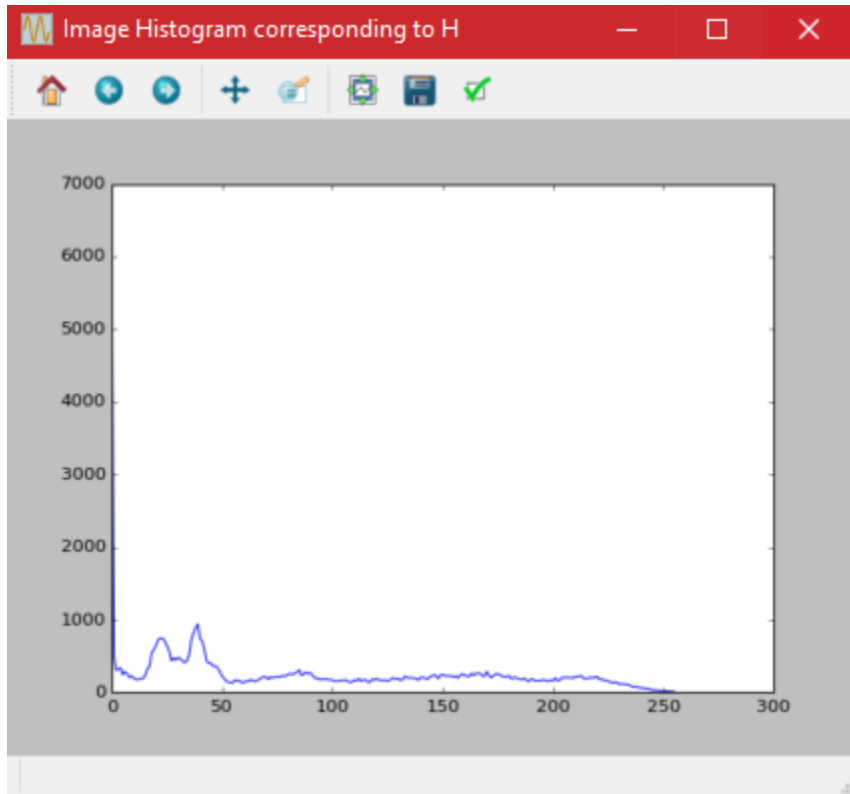
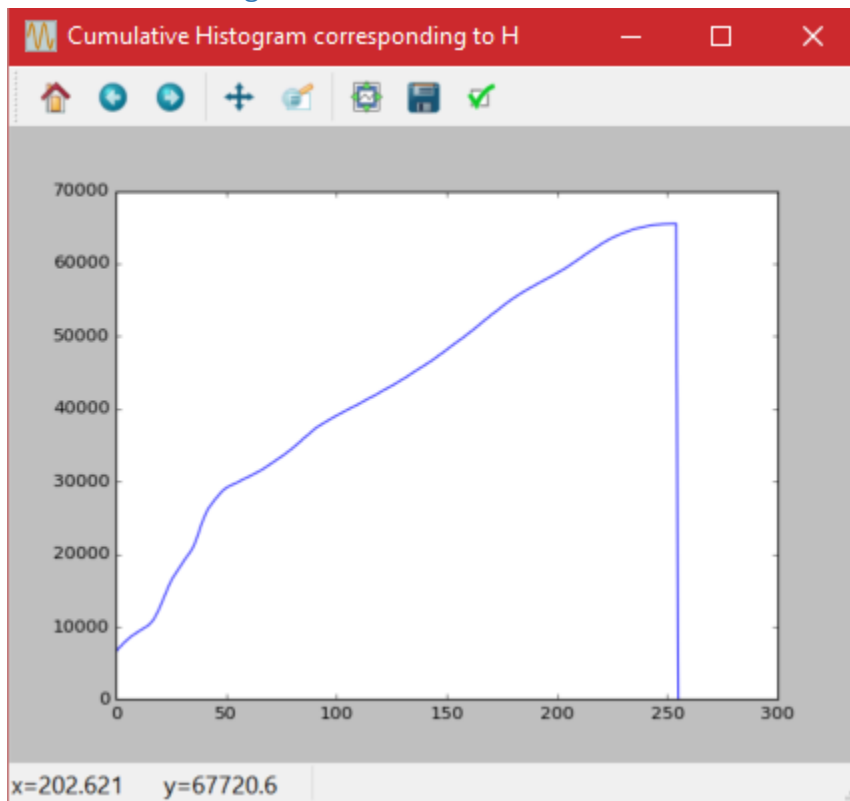


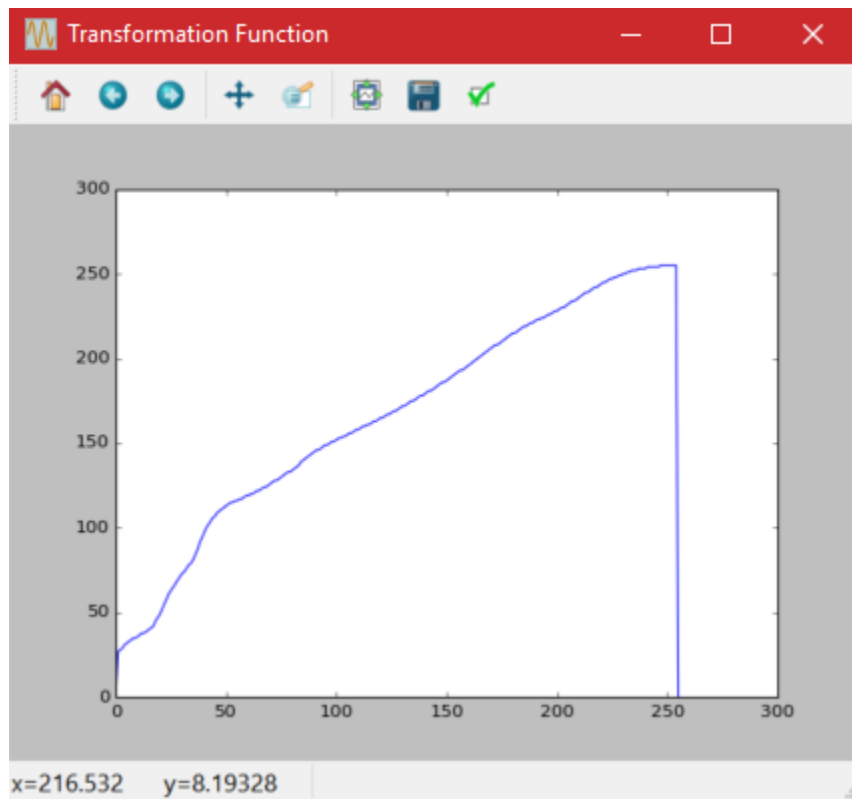
Image Histogram



Cumulative Histogram



Transformation Function



Final Histogram

