

Extract\_Stego(Steg\_img):

A = matrix representation of Steg\_img

//Steg\_img converts to A which is a matrix of pixels by MATLAB command

//“imread(A, Steg\_img)”

[x, y, z] = the dimension of A:  $a \times b \times c$

// x = a, y = b, z = c

// z = c = 1 (Red), z = c = 2 (Green), z = c = 3 (Blue)

**Extracted\_img** = zero matrix with dimension [ x × y × 3 ]

for (a = 1 to x):

for (b = 1 to y):

for (i = 1 to 3):

Q = 8 bits pixel in (a, b, i) of matrix A

Q = Shift Q to the left by 4 bits in 8 bits

// remove the 4 MSB of Q by bitshift command in MATLAB

E = bitwise “And” operation on Q and [11111111]

// to get an 8 bits binary which contain Q in the 4 MSB of E and

// the remaining 4 LSB of E be 0

// by bitand command in MATLAB

Extracted\_img[a, b, i] = Extracted\_img[a, b, i] + E

endfor

endfor

endfor

Output **Extracted\_img**

Again, we implement the algorithm in MATLAB. Extracted\_img is a pixel matrix of the extracted image from the stego-image. To convert the matrix of pixels into an image, we can use MATLAB command “ **imwrite(Extracted\_img, filename)** ”. For example, “ **imwrite(Extracted\_img, 'extracted.png')**”; “ will write the matrix Extracted\_img into a PNG image “extracted.png”.