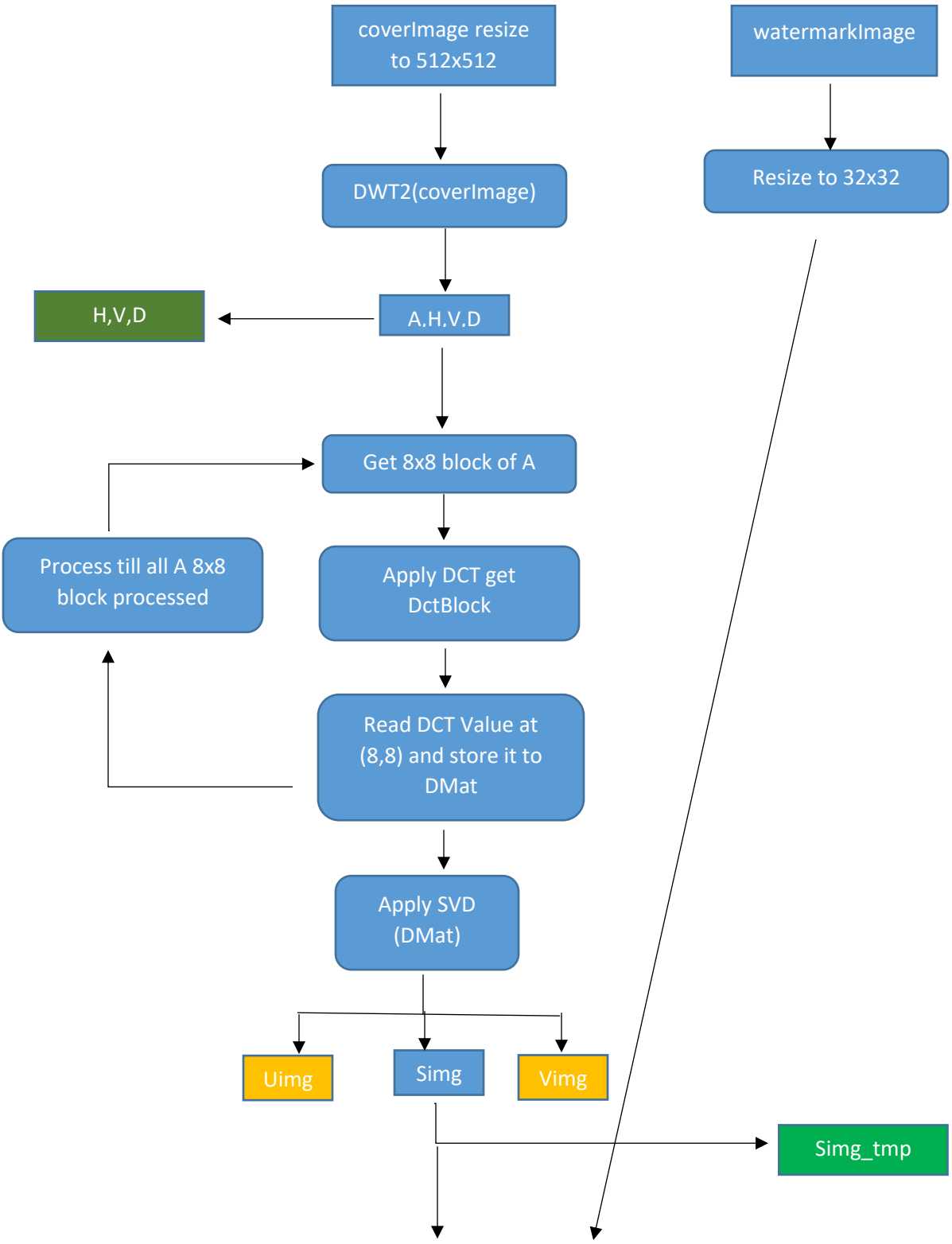
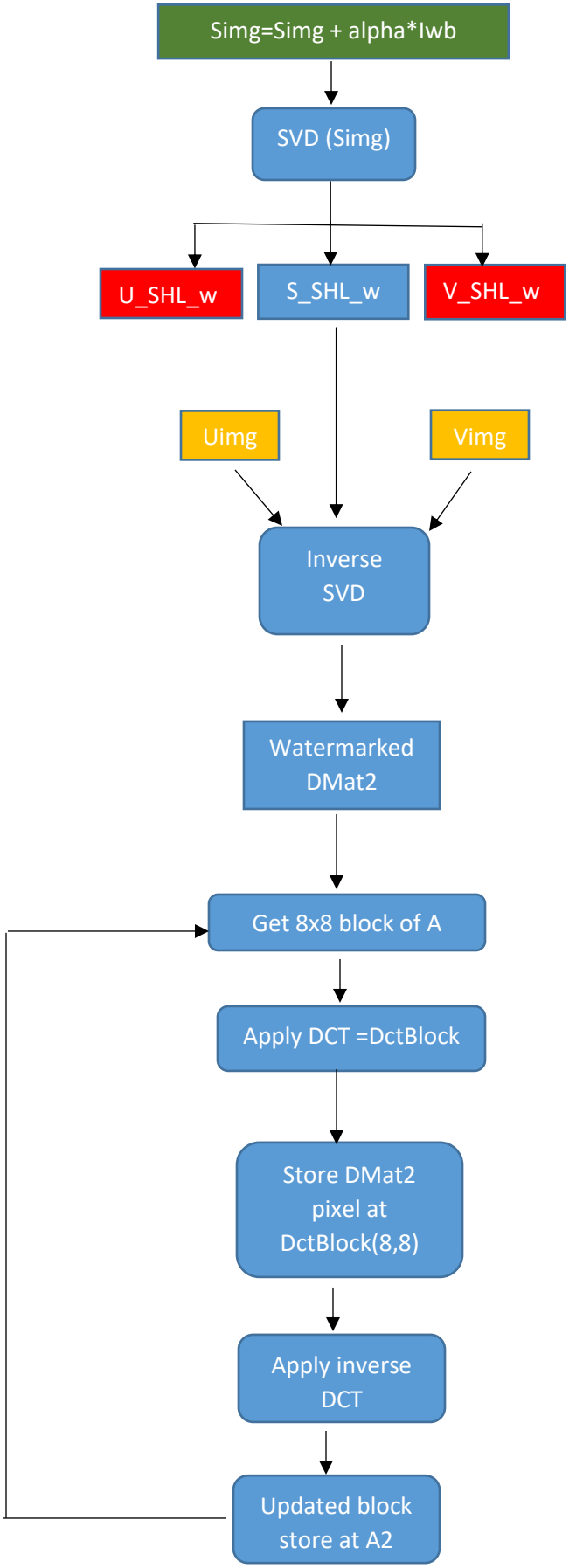
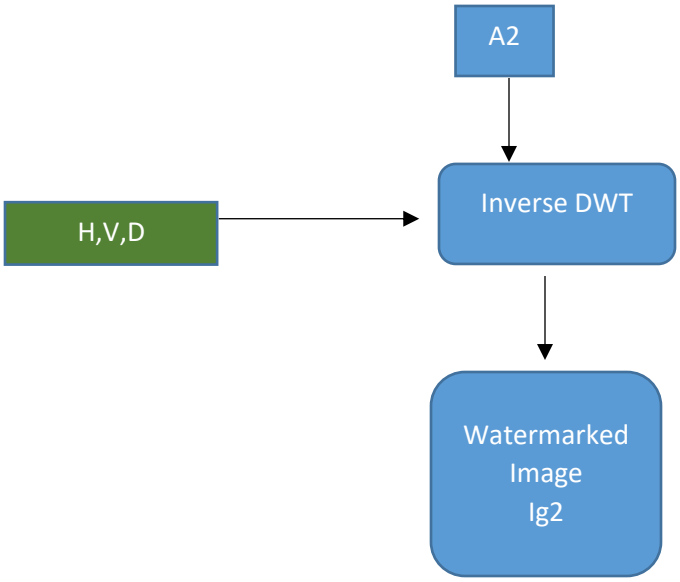
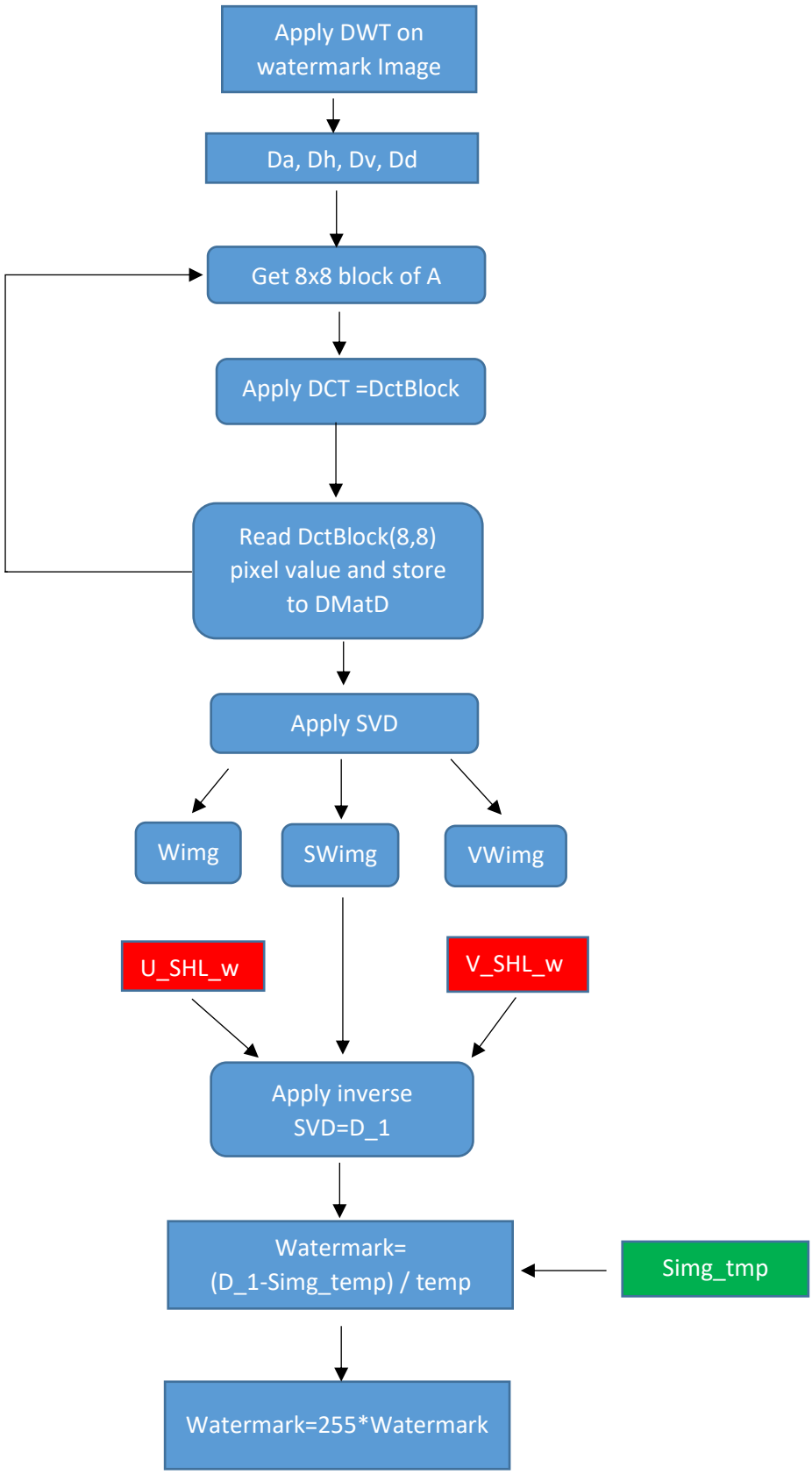
DWT-DCT-SVD Watermarking Algorithm




Simg=Simg + alpha*Iwb
SVD (Simg)
U_SHL_w
S_SHL_w
V_SHL_w
Uimg
Vimg
Inverse SVD
Watermarked DMat2
Get 8x8 block of A
Apply DCT =DctBlock
Store DMat2 pixel at DctBlock(8,8)
Apply inverse DCT
Updated block store at A2

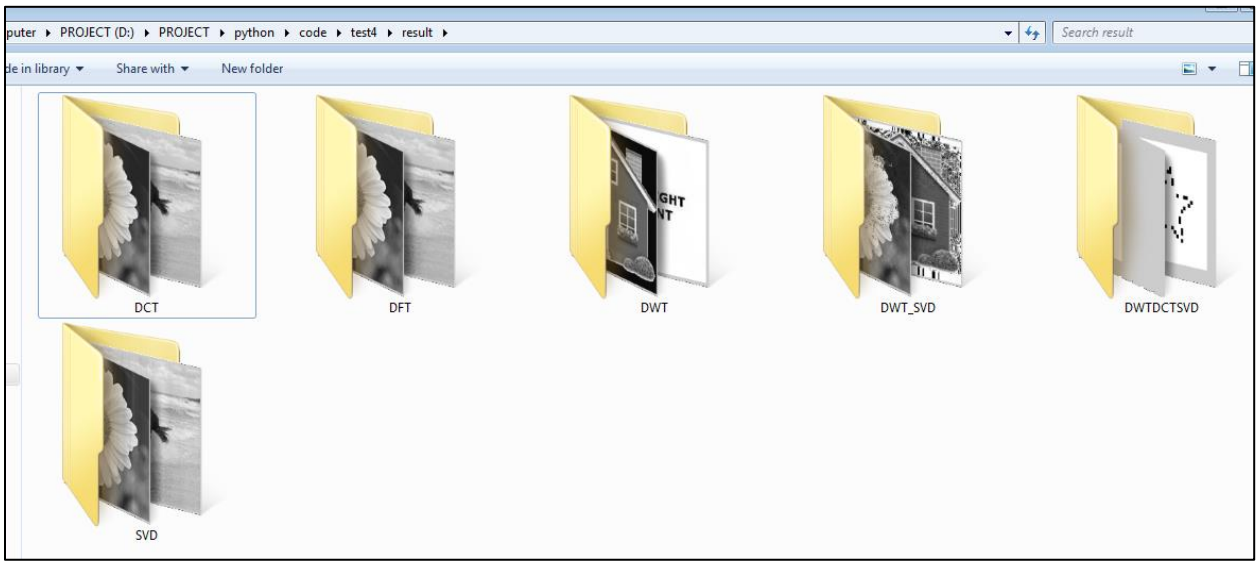

A2
H,V,D
Inverse DWT
Watermarked
Image
Ig2

Extraction Process:

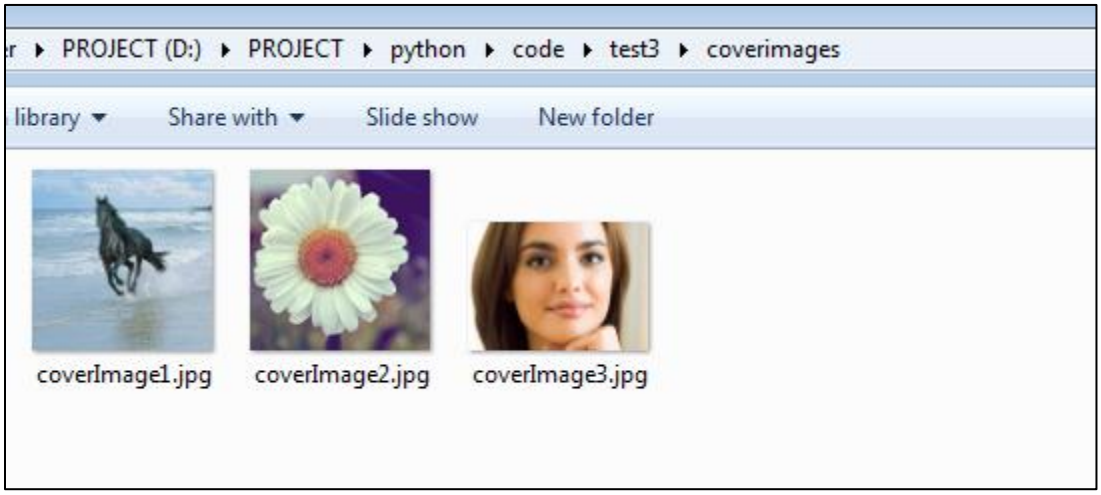


Algorithm Detail:

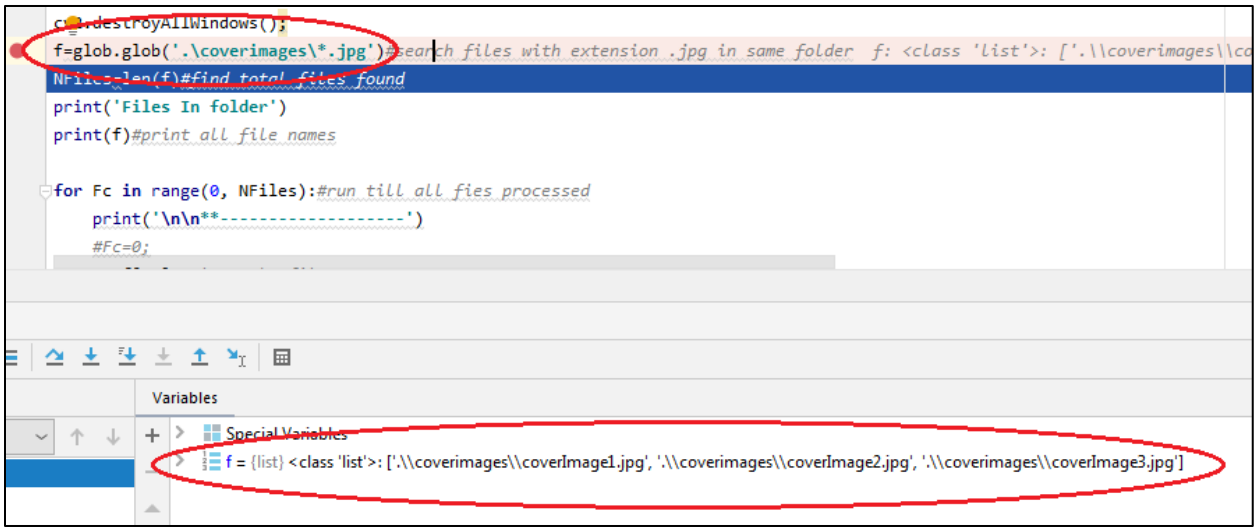
Initially individual folder created to store the output and results of each simulation methods



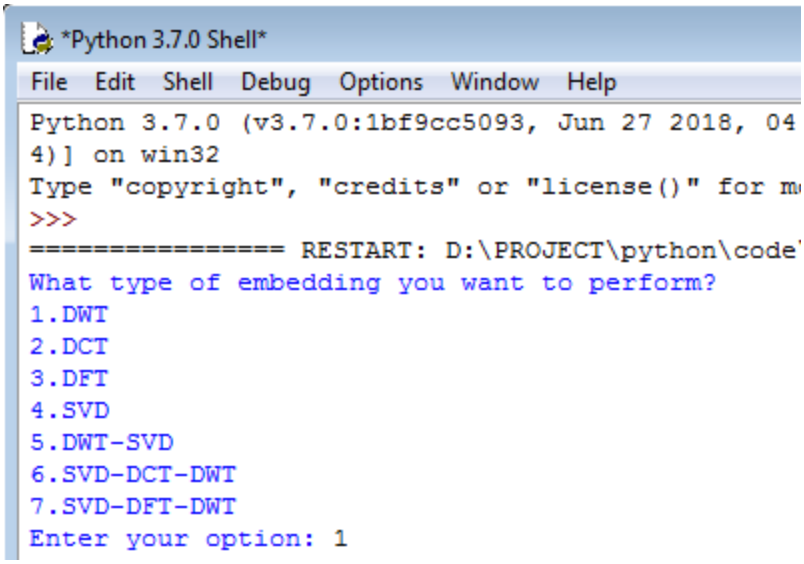
1. All images to be processed are stored at folder '/coverimages/' folder



2. The python script first finds all .jpg extension images of '/coverimage/' folder.



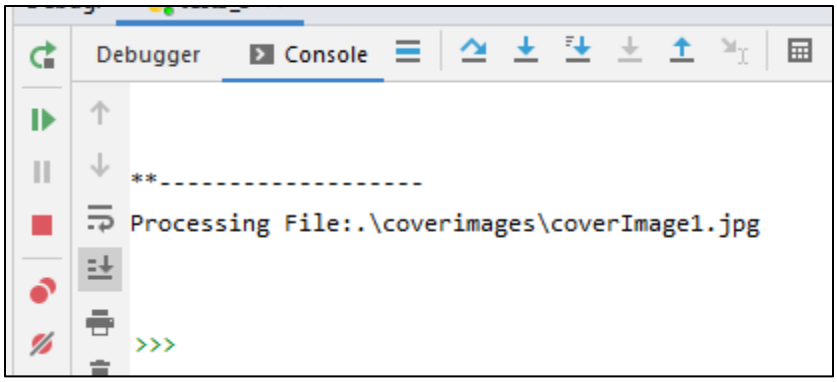
3. Algorithm ask for the option to be performed



4. According to the option selected the algorithm will be applied on cover image and watermark image

5.Initally first image file coverImage1.jps is read, files name to be read are stored at st variable

6. File name is displayed on Console Output



7. the algorithm used is followed as per paper

'DWT, DCT and SVD based Digital Image, Watermarking,

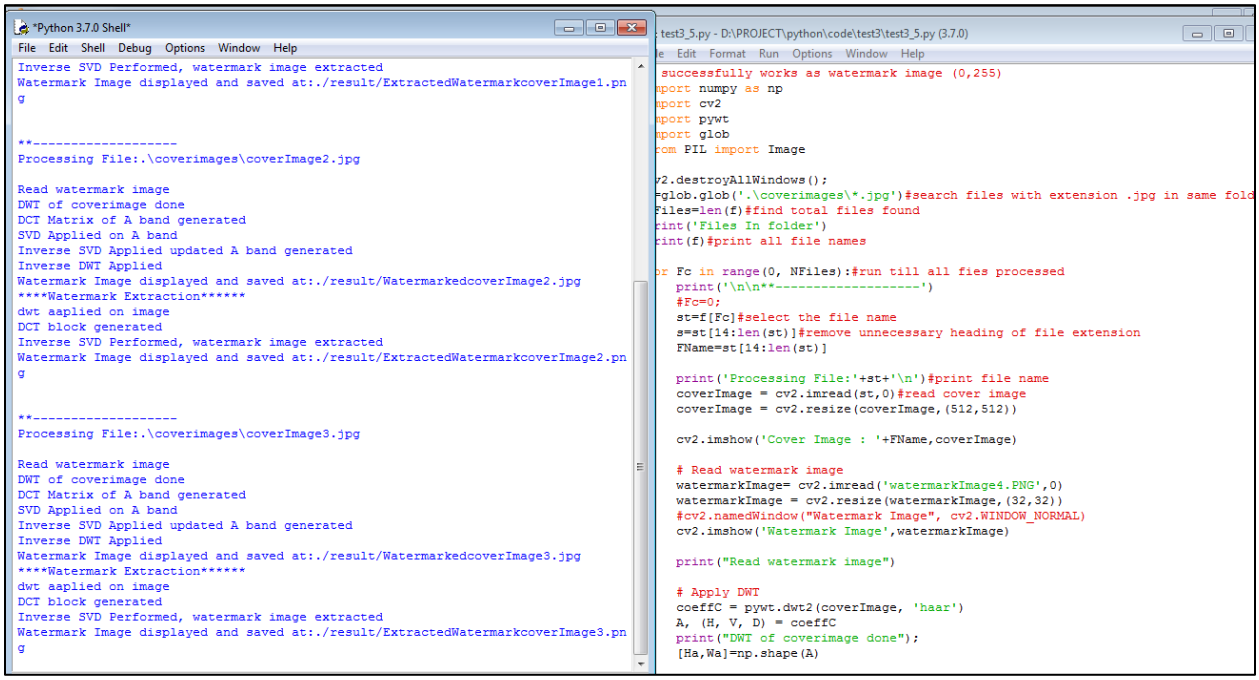
Manie Kansal, Gursharanjeet Singh, B V Kranthi

, International Conference on Computing Sciences, 2012'

As per reference research paper image is resized to 512x512 and watermark image resized to 32x32

1. DWT Watermarking

Console output option 1 : DWT



Python 3.7.0 Shell

File Edit Shell Debug Options Window Help

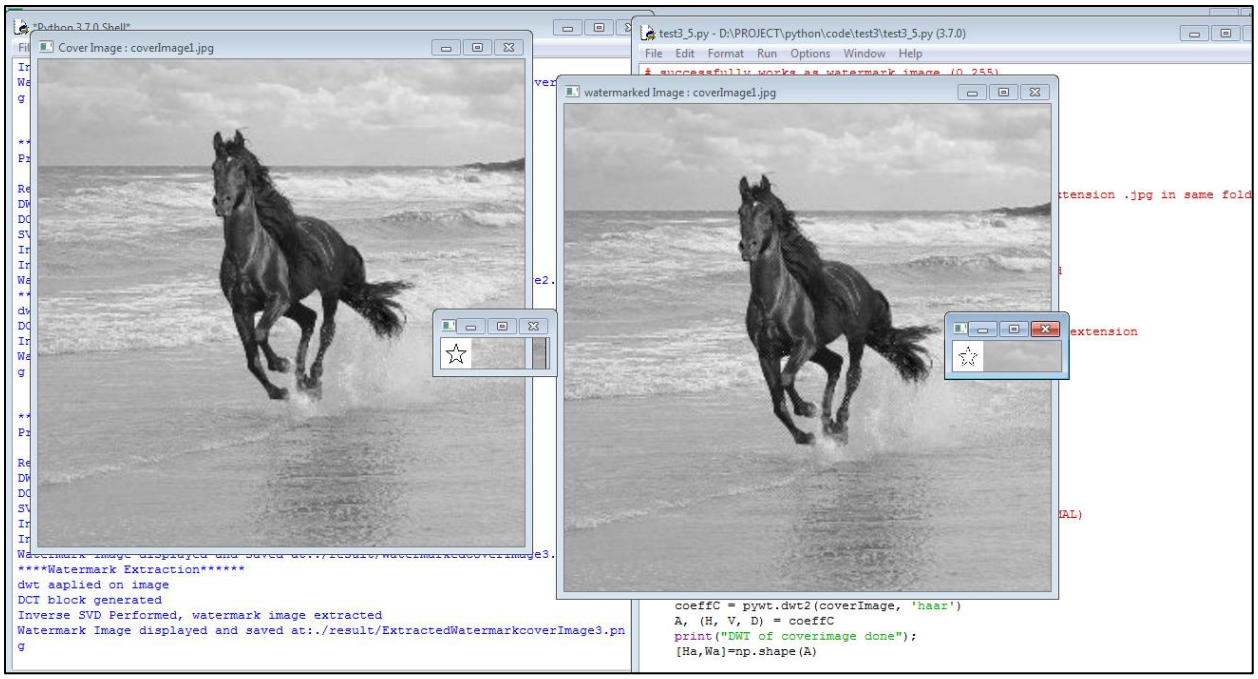
```
Inverse SVD Performed, watermark image extracted
Watermark Image displayed and saved at:./result/ExtractedWatermarkcoverImage1.pn
g


**--------------------
Processing File:.\coverimages\coverImage2.jpg

Read watermark image
DWT of coverimage done
DCT Matrix of A band generated
SVD Applied on A band
Inverse SVD Applied updated A band generated
Inverse DWT Applied
Watermark Image displayed and saved at:./result/WatermarkedcoverImage2.jpg
****Watermark Extraction******
dwt aaplied on image
DCT block generated
Inverse SVD Performed, watermark image extracted
Watermark Image displayed and saved at:./result/ExtractedWatermarkcoverImage2.pn
g


**--------------------
Processing File:.\coverimages\coverImage3.jpg

Read watermark image
DWT of coverimage done
DCT Matrix of A band generated
SVD Applied on A band
Inverse SVD Applied updated A band generated
Inverse DWT Applied
Watermark Image displayed and saved at:./result/WatermarkedcoverImage3.jpg
****Watermark Extraction******
dwt aaplied on image
DCT block generated
Inverse SVD Performed, watermark image extracted
Watermark Image displayed and saved at:./result/ExtractedWatermarkcoverImage3.pn
g
```

test3_5.py - D:\PROJECT\python\code\test3\test3_5.py (3.7.0)

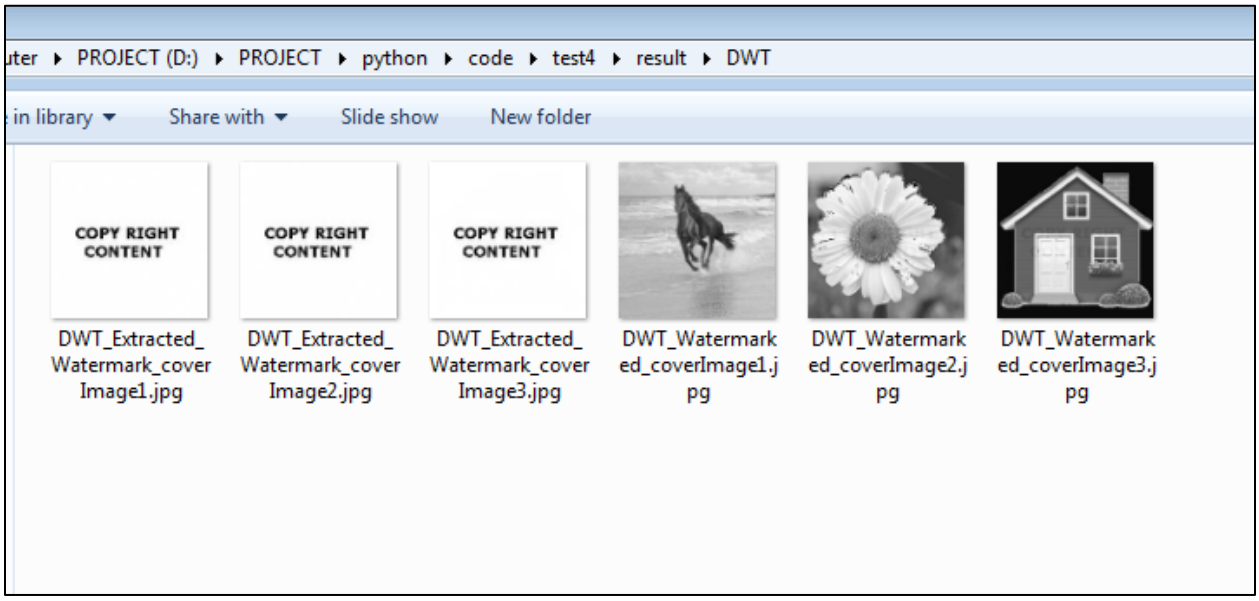
Edit Format Run Options Window Help

```
successfully works as watermark image (0,255)
mport numpy as np
mport cv2
mport pywt
mport glob
rom PIL import Image

v2.destroyAllWindows();
fglob.glob('.\coverimages\*.jpg')#search files with extension .jpg in same fold
files=len(f)#find total files found
rint('Files In folder')
rint(f)#print all file names

or Fc in range(0, NFiles):#run till all fies processed
  print('\n\n**--------------------')
  #Fc=0;
  st=f[Fc]#select the file name
  s=st[14:len(st)]#remove unnecessary heading of file extension
  FName=st[14:len(st)]

  print('Processing File:'+st+'\n')#print file name
  coverImage = cv2.imread(st,0)#read cover image
  coverImage = cv2.resize(coverImage,(512,512))

  cv2.imshow('Cover Image : '+FName,coverImage)

  # Read watermark image
  watermarkImage= cv2.imread('watermarkImage4.PNG',0)
  watermarkImage = cv2.resize(watermarkImage,(32,32))
  #cv2.namedWindow("Watermark Image", cv2.WINDOW_NORMAL)
  cv2.imshow('Watermark Image',watermarkImage)

  print("Read watermark image")

  # Apply DWT
  coeffC = pywt.dwt2(coverImage, 'haar')
  A, (H, V, D) = coeffC
  print("DWT of coverimage done");
  [Ha,Wa]=np.shape(A)
```

Simulation screenshot cover image 1

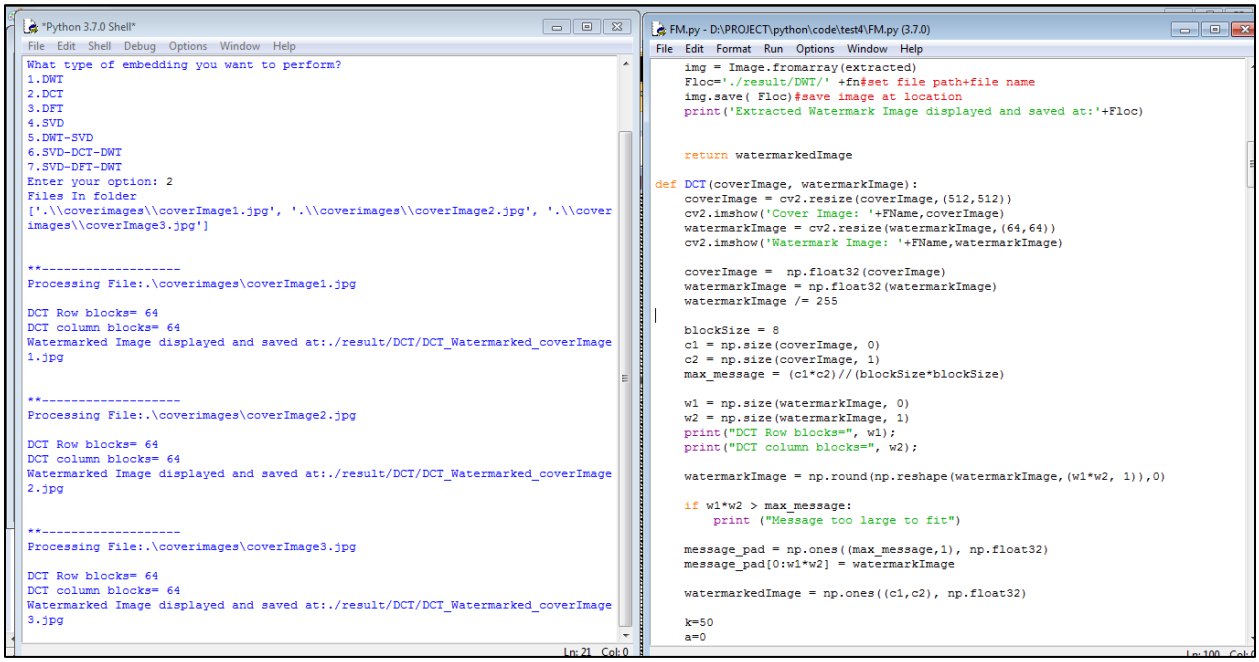


like wise above process all cover image will be processed and will be stored at ‘result/DWT/’ folder location

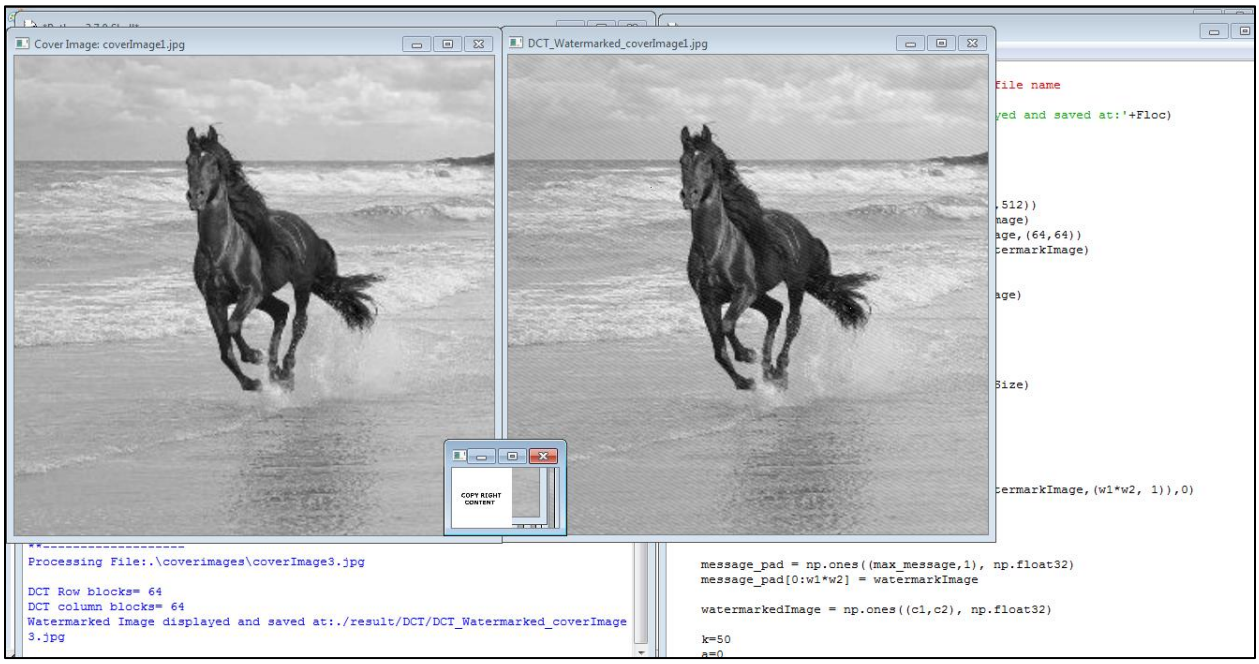


2. DCT Watermarking

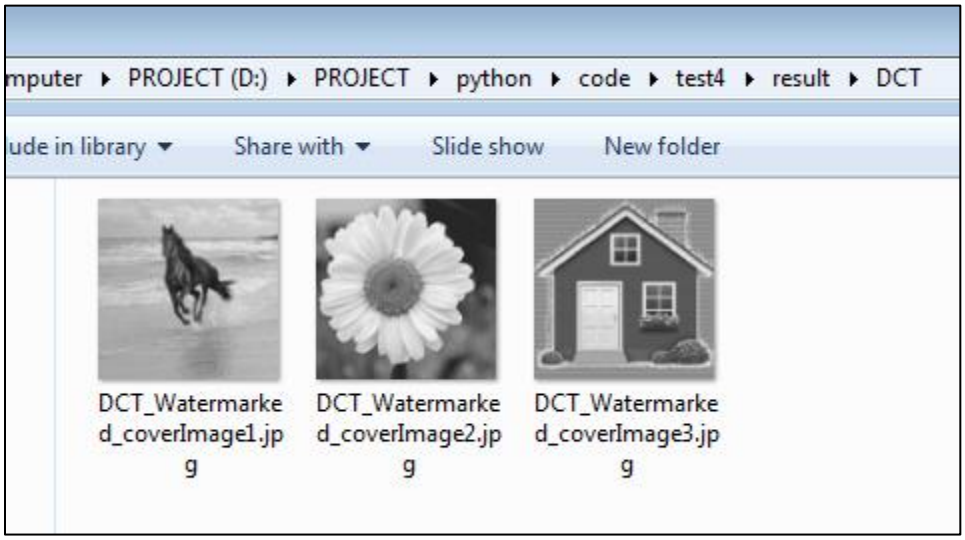
Console output option 2 : DCT



Simulation screenshot cover image 1

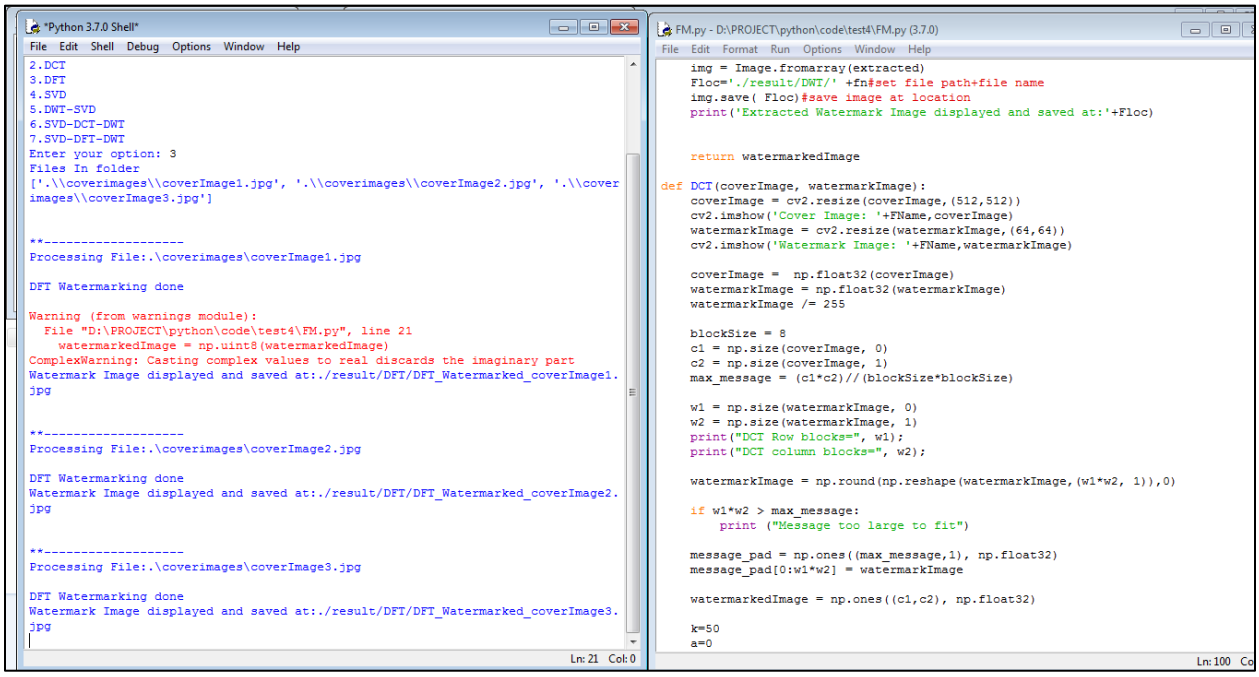


like wise above process all cover image will be processed and will be stored at ‘result/DCT/’ folder location

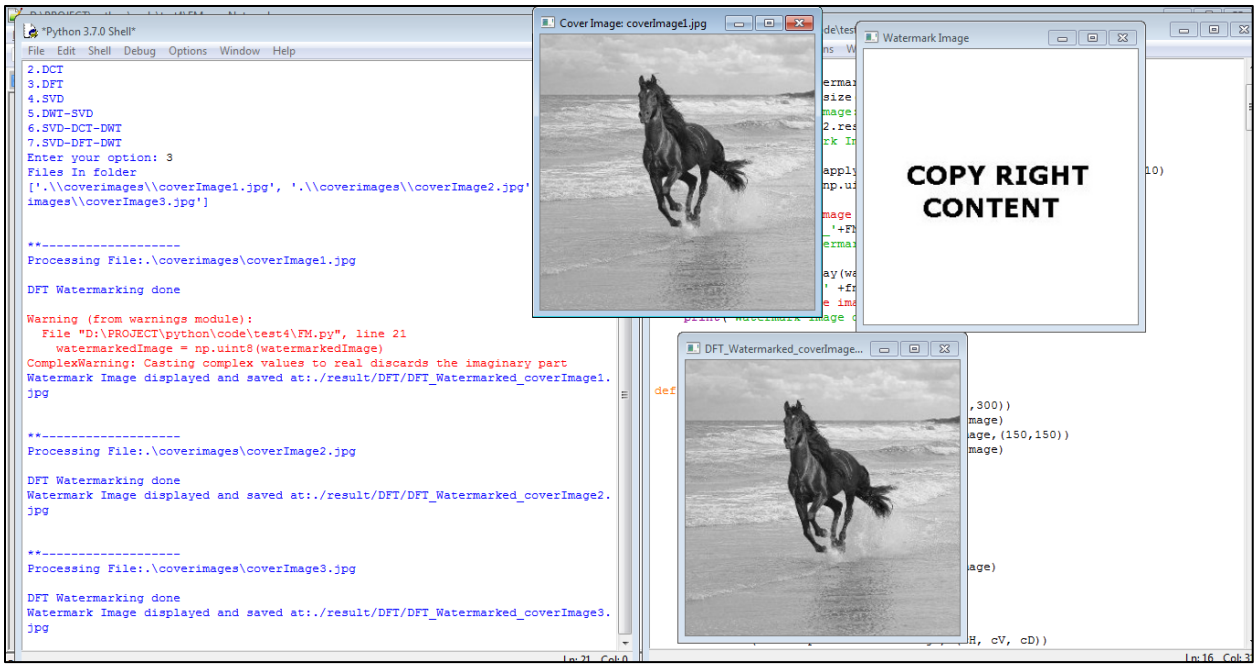


3. DFT Watermarking

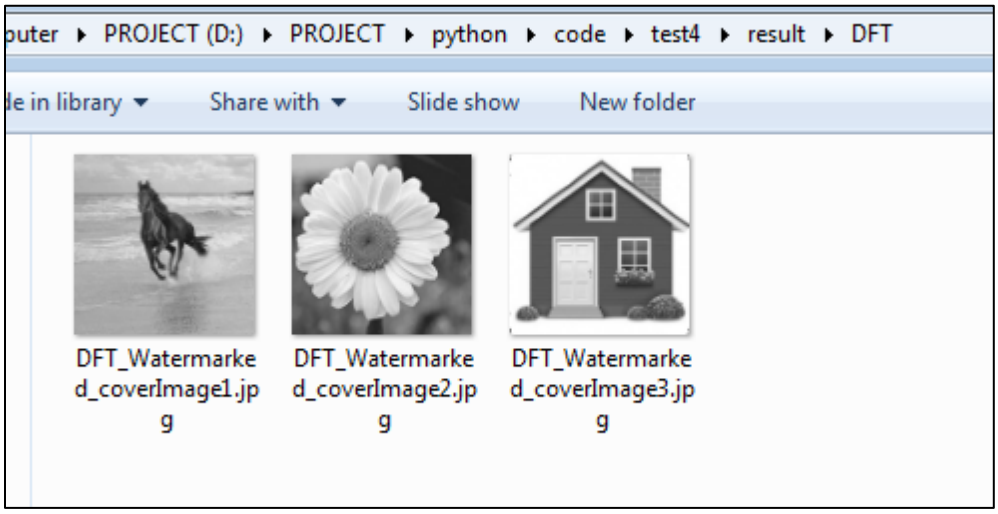
Console output option 3 : DWT



Simulation screenshot cover image 1

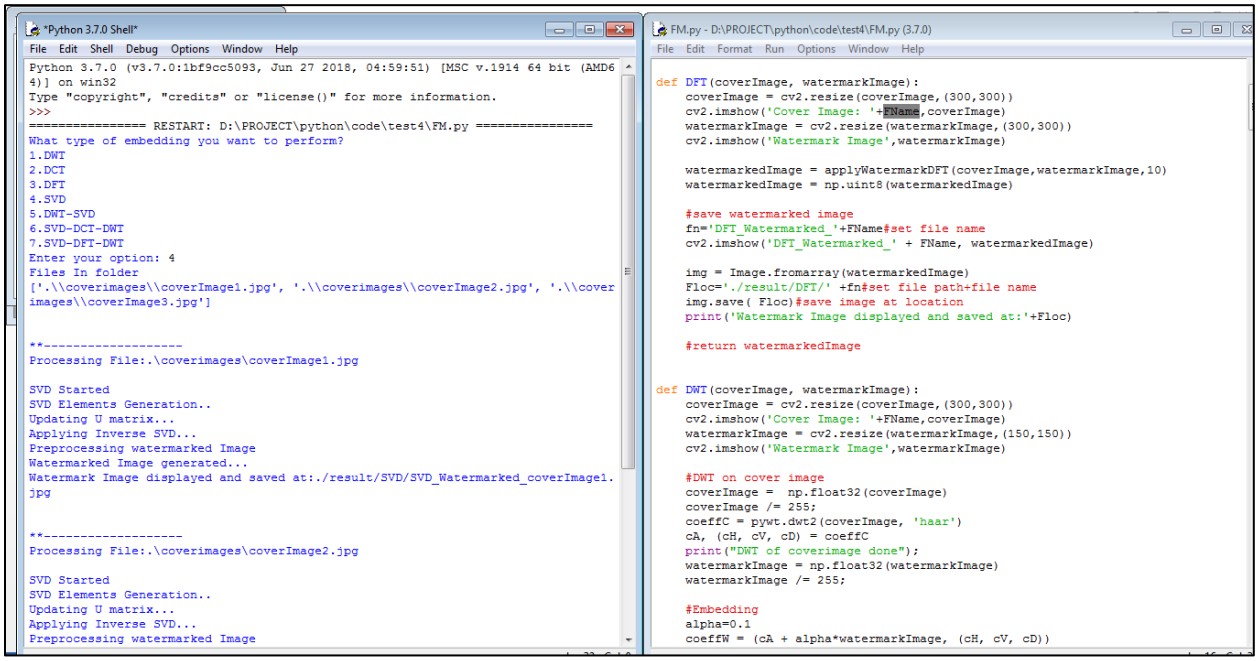


like wise above process all cover image will be processed and will be stored at ‘result/DFT/’ folder location

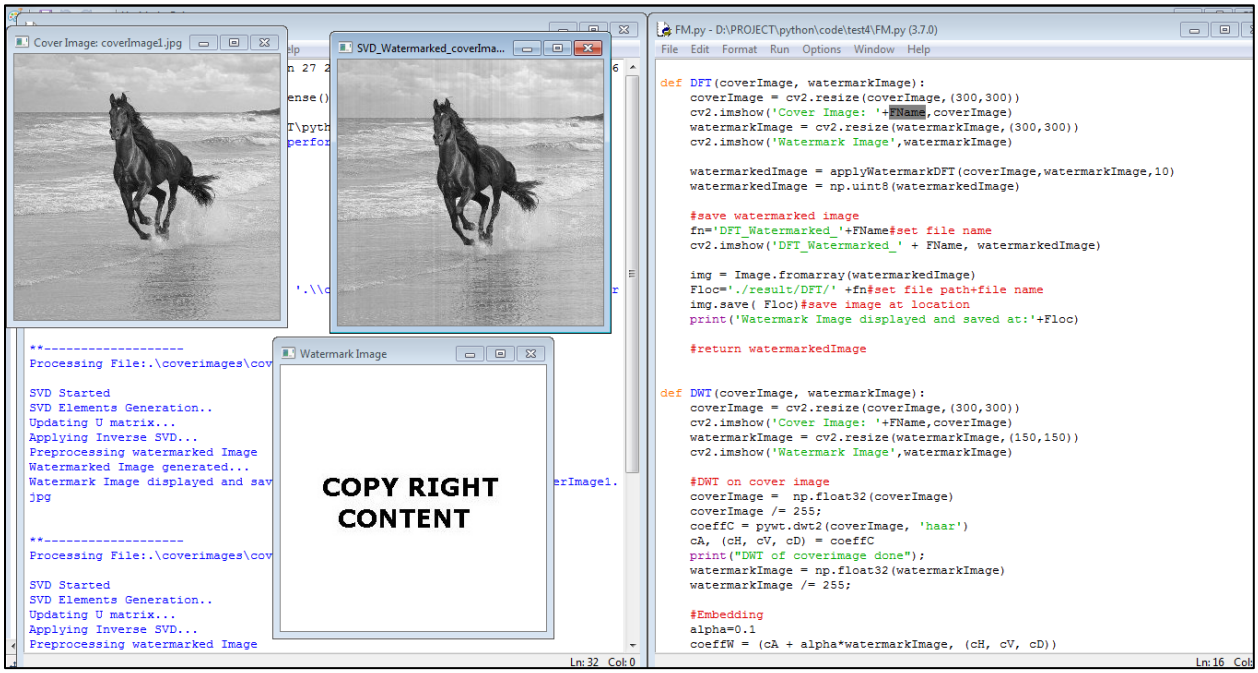


4. SVD Watermarking

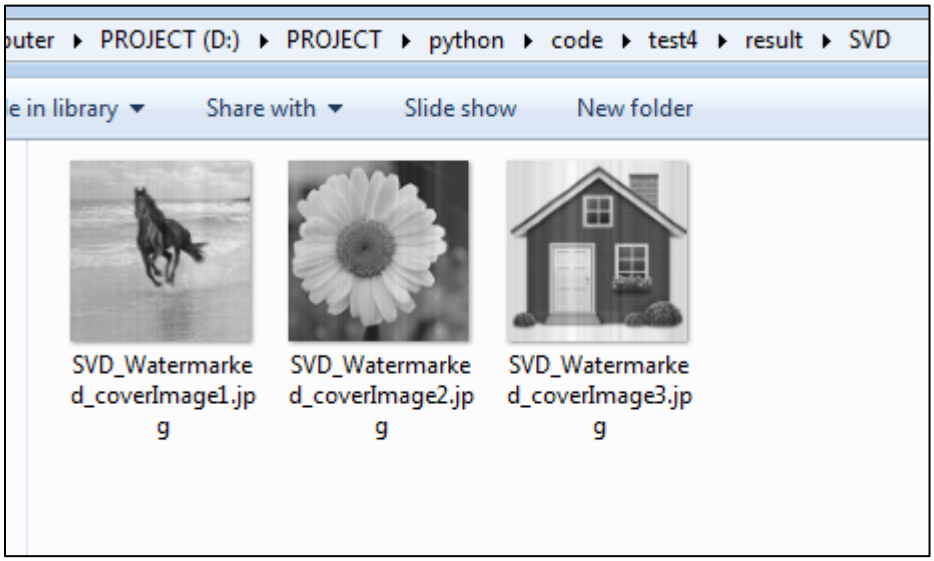
Console output option 4 : SVD



Simulation screenshot cover image 1

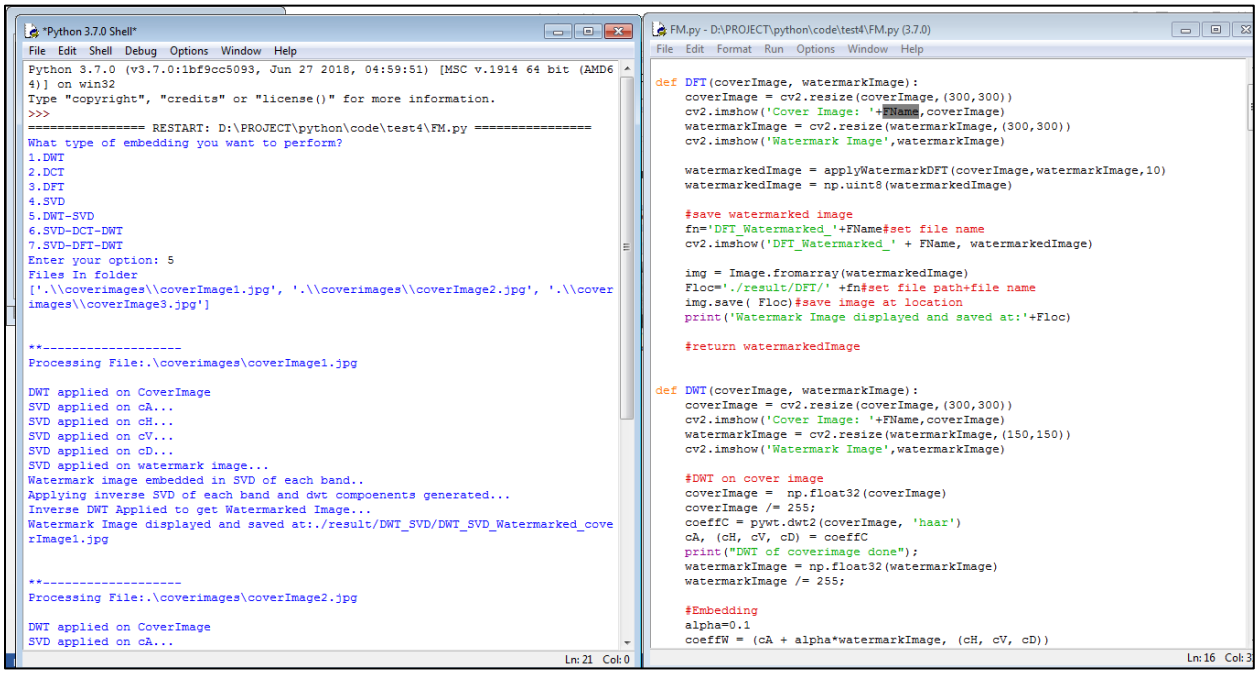


like wise above process all cover image will be processed and will be stored at ‘result/SVD/’ folder location

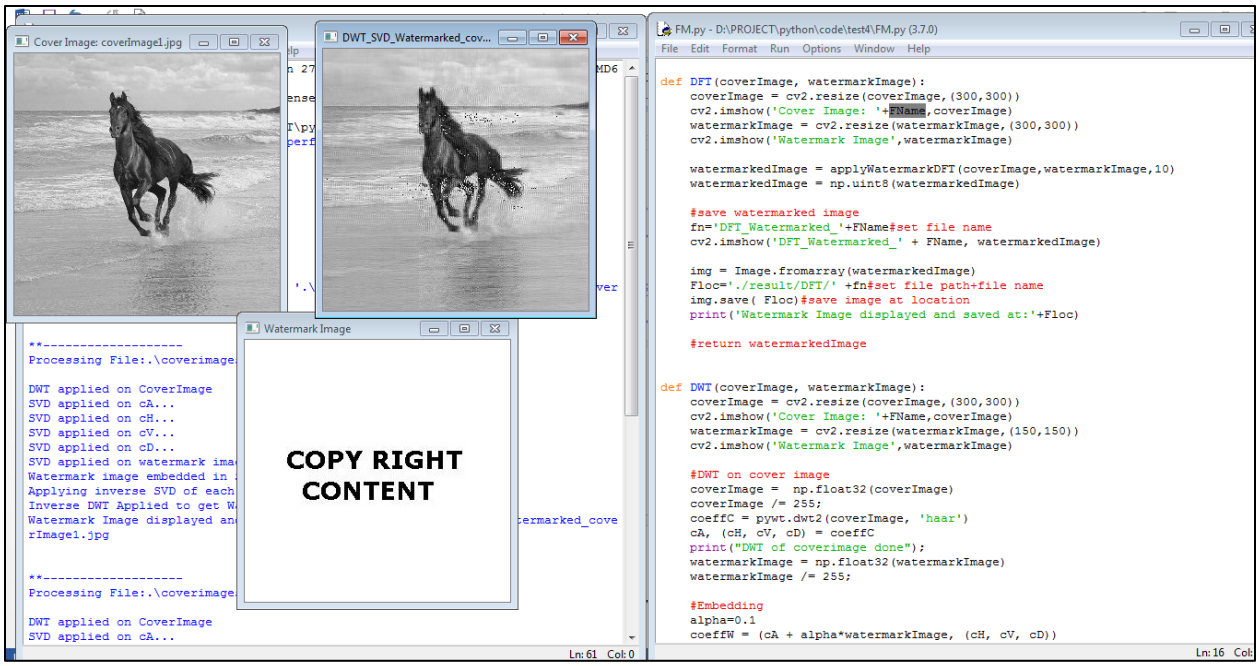


5. DWT-SVD Watermarking

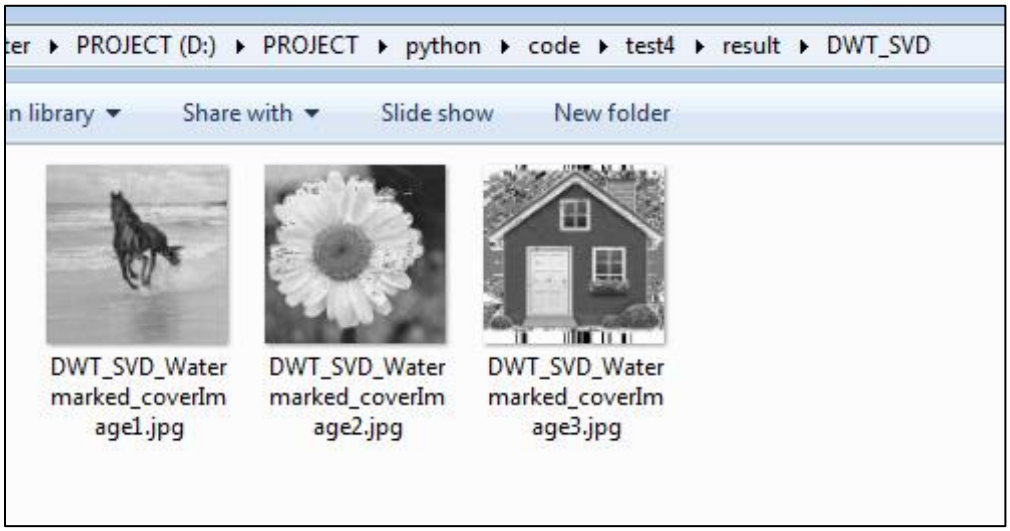
Console output option 5 : DWT-SVD



Simulation screenshot cover image 1

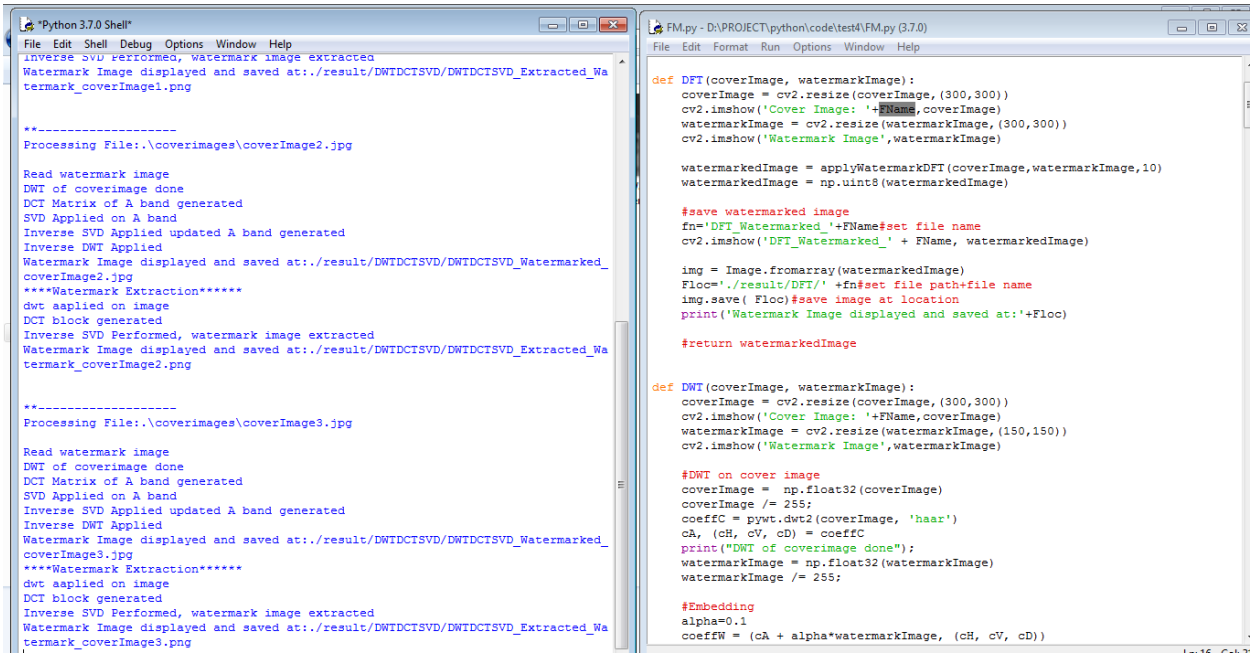


like wise above process all cover image will be processed and will be stored at ‘result/DWT_SVD/’ folder location

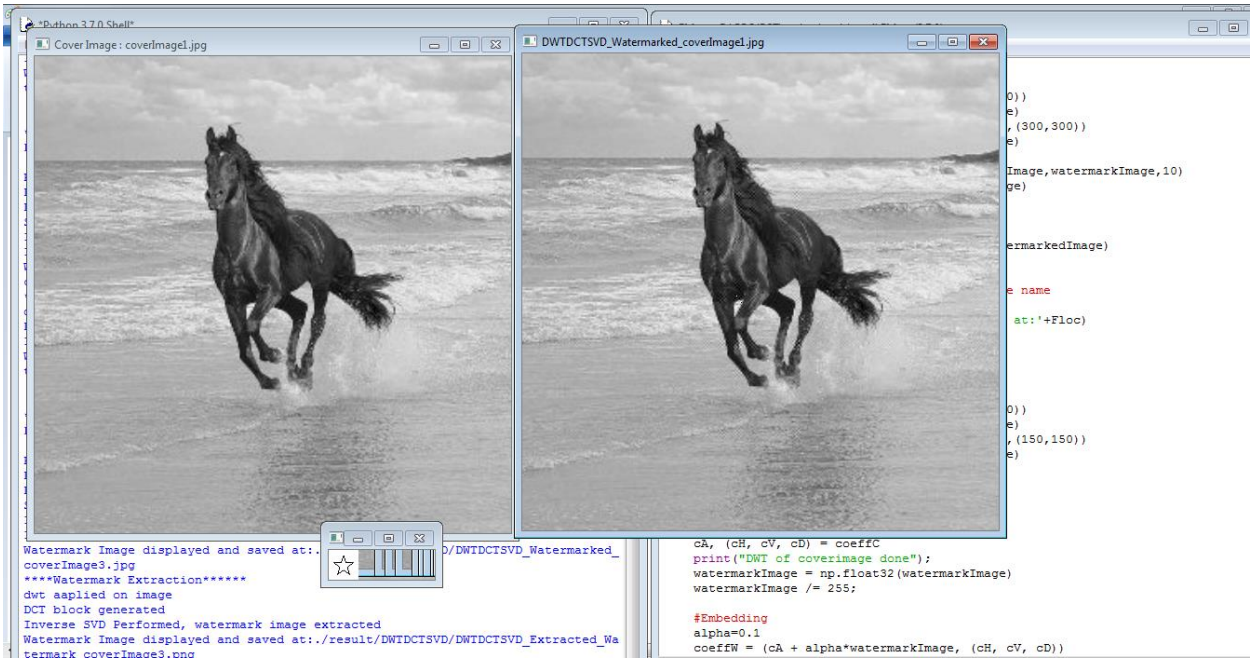


6. DWT-DCT-SVD Watermarking

Console output option 6 : DWT-SVD



Simulation screenshot cover image 1



like wise above process all cover image will be processed and will be stored at ‘result/DWT_SVD/’ folder location