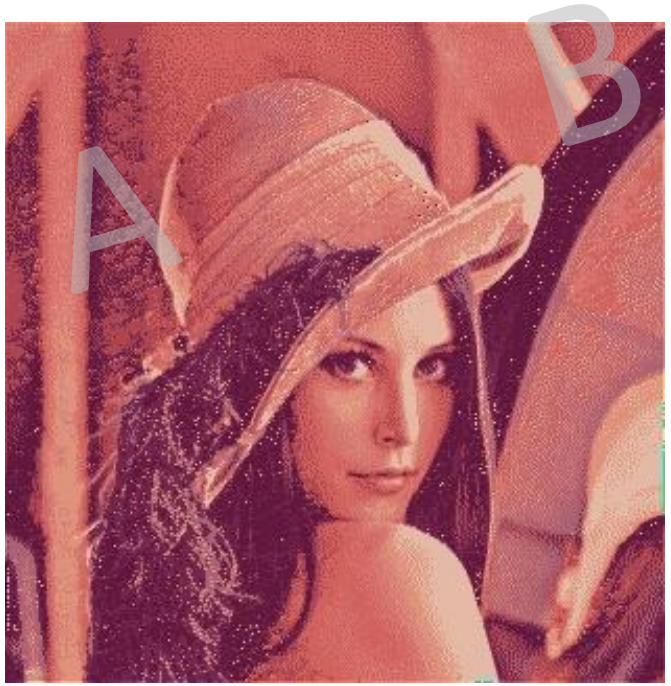
Multimedia HW1

Problem1 – case: n=3

origin

Median-cut



Error diffusion dithering

Note : result image contain 8 color only.

Problem2

bilinear interpolation

x4 upsample

Nearest interpolation

Problem2

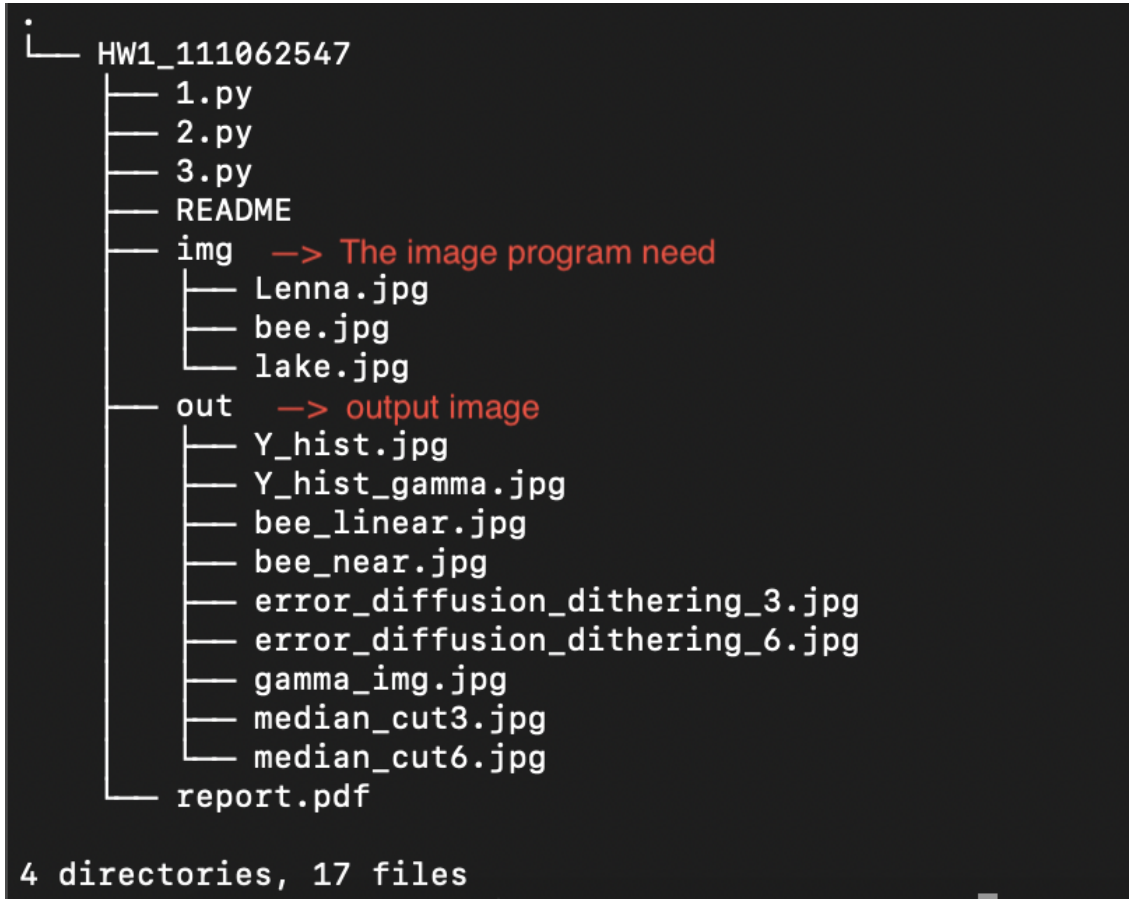
- Hint : Inverse mapping

Problem3

Directory structure

- You can add directory “exp”
  to put your others experiment image.

- 可以額外增加自己的function set
  : utils.py

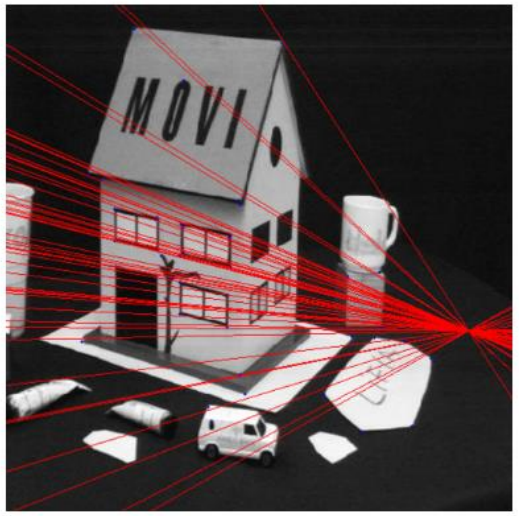


Report—example 參考

- Explain how to implement the code.
- The output result for each question.

Result:

a_img1



1. Fundamental Matrix Estimation

(a) Compute Fundamental Matrix without normalization

```
def Problem_ab(pts_1,pts_2,nlen):
    '''
    least-square eight-point algorithm
    '''
    # solve Ax=0 where x the fundamental matrix
    A=np.zeros((nlen,9))

    for i in range(nlen):
        A[i,:]=np.array([pts_1[i,0]*pts_2[i,0],pts_1[i,0]*pts_2[i,1],pts_1[i,0],pts_1[i,1]
    U,S,VT=np.linalg.svd(A)

    F=VT[-1,:].reshape((3,3))

    # now we need to enforce F to rank 2 use SVD to find the approximate matrix under frob
    U,S,VT=np.linalg.svd(F)
    F=U[:,:2]@np.diag(S[:2])@VT[:2,:]
    # print("rank %d" % np.linalg.matrix_rank(F))
    print("Fundamental matrix: ")
    print(F)

    return F
```

Step:

1. Use SVD to solve the least square solution that is eigenvector corresponding to the last eigenvalue. The solution x is the element of fundamental matrix F.
2. F is not rank 3 , we use SVD to find the best approximate solution constrain with rank 2 under frobenius norm .
3. show the fundamental matrix

```
not normal :
Fundamental matrix:
[[-5.63087200e-06 -2.77622828e-05  1.07623595e-02]
 [ 2.74976583e-05 -6.74748522e-06 -1.22519240e-02]
 [-6.42650411e-03  1.52182033e-02 -9.99730547e-01]]
```

Code – example 參考

```python
def Problem_a():
    # todo : implement problem a
    pass

def Problem_b():
    # todo : implement problem a
    pass

if __name__=='__main__':
    # problem a
    Problem_a()

    # problem b
    Problem_b()
```