

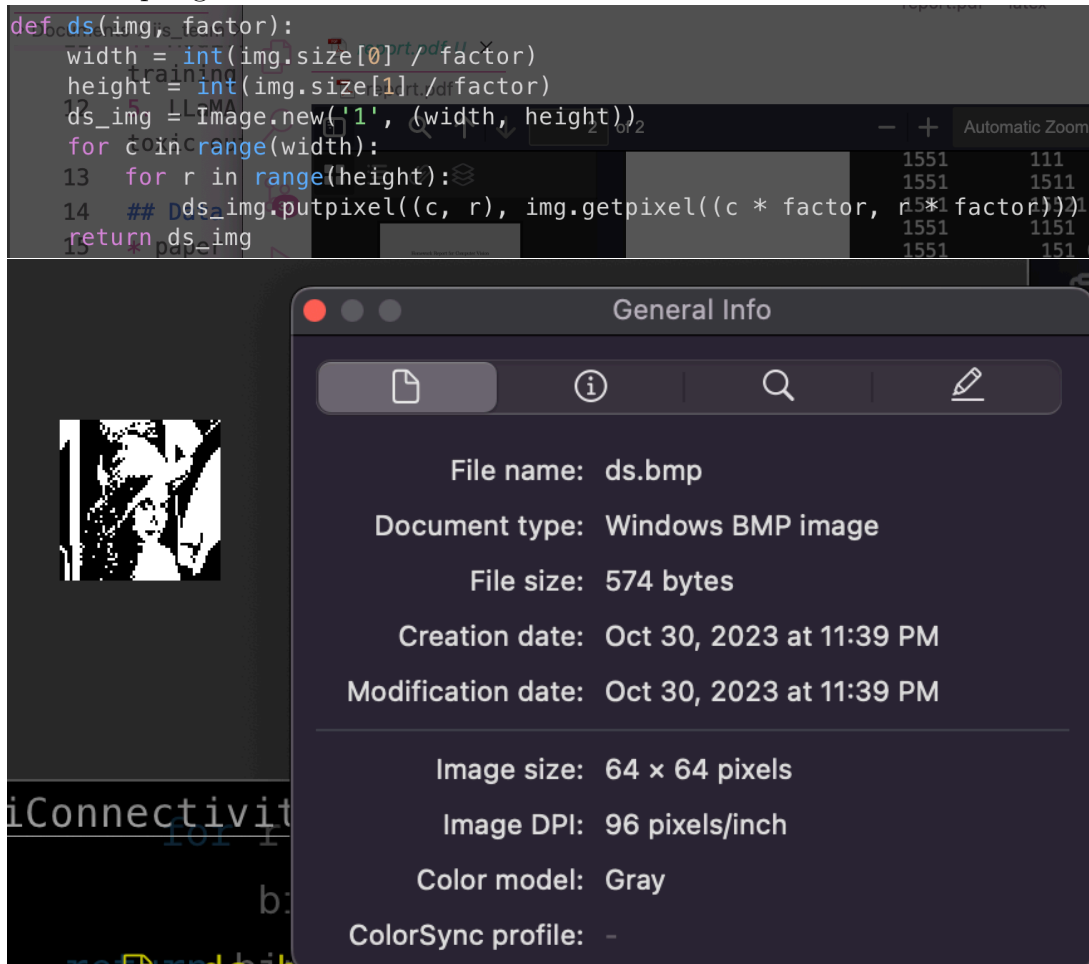
Homework Report for Computer Vision

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[You can check this github for more information](#)

(a) Downsampling Lena to 64×64 :



(b) yokoi:

In this code, we need to record the neighbor pixel, then we check h function to see if two neighbors are the same, or only just one. In the end, we use f to aggregate the information.

```

def get_nb(img, pos):
    x, y = pos
    nb = np.zeros(9)
    for dx in range(3):
        for dy in range(3):
            destX, destY = x + dx - 1, y + dy - 1
            if 0 <= destX < img.size[0] and 0 <= destY < img.size[1]:
                nb[3 * dy + dx] = img.getpixel((destX, destY))
    return nb

```

When you want to map this 3x3 grid into a 1D array:

```

0 1 2
3 4 5
6 7 8

```

Copy code

Here's how the mapping works:

```

def h(b, c, d, e):
    if b == c and (b != d or b != e):
        return 'yokoi'
    elif b == c:
        return 'surround'
    return 'bruh'

```

* `(0,0)` maps to `3*0 + 0 = 0`
 * `(1,0)` maps to `3*0 + 1 = 1`
 * `(2,0)` maps to `3*0 + 2 = 2`
 * `(0,1)` maps to `3*1 + 0 = 3`

```

def f(a1, a2, a3, a4):
    return 5 if all([a == 'surround' for a in [a1, a2, a3, a4]]) else [a1, a2, a3, a4].count('yokoi')

```

... and so on.

```

def yokoi(img):
    ycn = np.full(img.size, ' ')
    for c in range(img.size[0]):
        for r in range(img.size[1]):
            if img.getpixel((c, r)) != 0:
                nb = get_nb(img, (c, r))
                ycn[c, r] = f(
                    h(nb[4], nb[5], nb[2], nb[1]),
                    h(nb[4], nb[1], nb[0], nb[3]),
                    h(nb[4], nb[3], nb[6], nb[7]),
                    h(nb[4], nb[7], nb[8], nb[5]))
    return ycn

```

factor of 3 comes because each row in the 2D grid has 3 columns.
 so when you move down one row (`dy` increases by 1), you jump 3
 columns in the 1D array. The `dx` then adjusts the position within that row.

an, just mapping from 2d to 1d

Regenerate

11111111	12111111111122322221	111111111111	0 0
15555551	115555555511 2 11 11	115555555511	0
15555551	1 2115555112 21112221	155555555551	21
15555551	1 2 155112 22221511	1555555555511	1
15555551	22 2112 22 121 0 0	15555555555511	0
15555551	1 2 21 2 1 1	15555555555551	0
15555551	12 1 121111 1321	155555555555511	
15111551	1322 1155551111	155555555555551	
111 1551	1 121555555511	155555555555511	
11 1551	21155555511	15511155555511	
21 1551	2 15555555111	1551 11555511	
1 1551	2 155555555511	1551 115551	1
1551	1121155555555551	1551 15511	12
1551	15555555555555511	1551 1111	111
1551	1 222115555555555511	1151 11	1151
1551	2 22 1 1555555555555511	151 11111	1551
1551	2 1 1155555555555551	151 115551	11551
1551	2 1155555555555555111511155511		115551
1551	12 1155555555555555555555555551		155551
1551	11 0 22155555555555555555555555112		1155551
1551	111 22 15555555555555555555555551 1		1555551
1551	1511 1 125112111112111555555555111		11555551
1551	15521 1 121 1 11 1 15555555111 0		15555551
1551	1151 132 2 1155555111 0		115555551
1551	151 0 322 115555111 121		155555551
1551	1221 2 1555551 131		1155555551
1551	2 0 1 115555511 1		1155555551
1551	2 0 0 1155555551 0		1 155555551
1551	2 11555555551		21155555551
1551	1 0 115555555551		15555555551
1551	1 11511115555521 1		115555555551
1551	1 1 11111 1155511 2		155555555551
1551	131 111 15111 2		155555555551
1551	121 0 1121 1 111 1 2		1155555555551
1551	11 111 1 221 11 1 2		15555555555551
1551	12 0 1 21 121 11 1111 2		15555555555551
1551	1 12 22 151111111551 2		115555555555551
1551	1 2 1555551115511 1		155555555555551
1551	2 0 0 22 12555551 15551 1		155555555555551
1551	1 1555511 11511 2		1155555555555551
1551	0 0 21 155551 1 151 2		1555555555555551
1551	2 15555112 151 2		1555555555555551
1551	1 1 1 1155555511111 2		1555555555555551
1551	2 22 111511111212 21155555555555551		21155555555555551
1551	0 1 12 151 2 1 15555555111555551		15555555511555551
1551	0 0 0 1111 121 155555551 1555551		1555555551 1555551
1551	0 11111111 155555551 1555551		1555555551 1555551
1551	0 115551 155555551 1555511		2111111111 155511
1551	15551 211111111 155511		2 11 115511
1 151 0	1 1 155555111 2111 15511		155555111 1511
22 1511	1 15555555111 155551 1151		155551 1511
22 1511	1 15555555551 155551 1511		155551 1511
2 151	0 1 111555555555511 15551 12151		155511 1551
2 1521	0 1 1555555555555511 155511 1511		155551 1511
2 151	121 1555555555555551 111111151		111111151
2 1511	0 1555555555555551 115511		111511
21 1511	11 1555555555555551 151		151
11 151	0 1155555555555551 211		1
11 151	0 1155555555555551 1		1
11 151	0 1555555555555551		

