Component Labelling

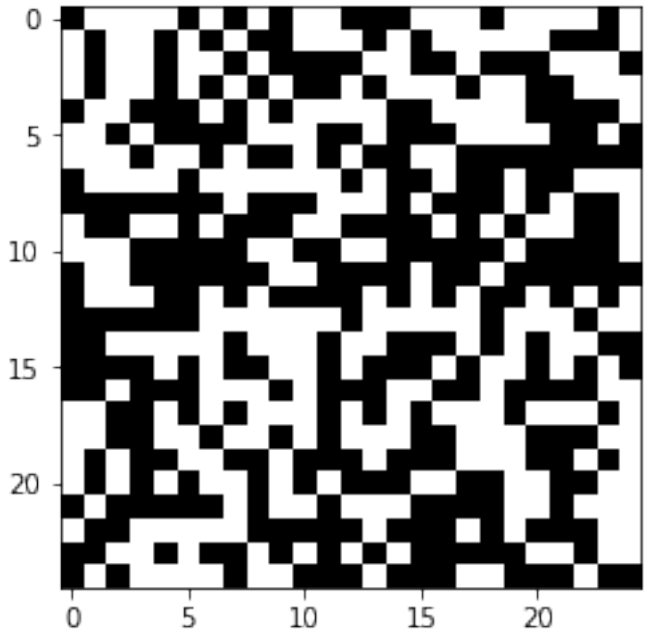
In [1]:
```
import cv2
import numpy as np
import matplotlib.pyplot as plt
```

In [2]:
```
shp = (25,25)
img = np.floor(np.random.random(shp) + 0.5)
```

In [3]:
```
def plot(out):
    fig, ax = plt.subplots(figsize=(20,10))

    ax.imshow(out)
    for i in range(shp[0]):
        for j in range(shp[1]):
            c = out[j,i]
            ax.text(i, j, str(c), va='center', ha='center')
```

In [4]:
```
fig = plt.figure(100)
fig.canvas.set_window_title('Main')
plt.imshow(img, cmap="Greys")
```

Out[4]:
```
<matplotlib.image.AxesImage at 0x1195c2828>
```



In [5]:
```
def first_pass(img):


            label=1


            for i in range(shp[0]):
                for j in range(shp[1]):
                    if img[i][j]==1:
                        continue
                    if i==0 and j==0:
                        out[i][j] = label
                        if label not in parents:
                            parents[label]=label
                        label+=1
                    elif i==0:
                        if out[i][j-1]==0:
                            out[i][j] = label
                            if label not in parents:
                                parents[label]=label
                            label+=1
                        else:
                            out[i][j] = out[i][j-1]
                    elif j==0:
                        if out[i-1][j-1]==0:
                            out[i][j] = label
```

```
                        if label not in parents:
                            parents[label]=label
                        label+=1
                    else:
                        out[i][j] = out[i-1][j]
                else:
                    if out[i-1][j]==0 and out[i][j-1]==0:
                        out[i][j] = label
                        if label not in parents:
                            parents[label]=label
                        label+=1
                    elif out[i-1][j]==0:
                        out[i][j] = out[i][j-1]
                    elif out[i][j-1]==0:
                        out[i][j] = out[i-1][j]
                    else:
                        out[i][j] = min(out[i-1][j],out[i][j-1])
                        parent1 = parents[out[i-1][j]]
                        current1 = out[i-1][j]
                        while parent1!=current1:
                            current1 = parent1
                            parent1=parents[current1]

                        parent2 = parents[out[i][j-1]]
                        current2 = out[i][j-1]
                        while parent2!=current2:
                            current2 = parent2
                            parent2=parents[current2]

                        parents[out[i-1][j]] = min(parent1,parent2)
                        parents[out[i][j-1]] = min(parent1,parent2)
```

In [6]:
```
def second_pass(out):

    for i in range(shp[0]):
        for j in range(shp[1]):
            if out[i][j]==0:
                continue
            else:
                if parents[out[i][j]]==out[i][j]:
                    continue
                else:
                    parent = parents[out[i][j]]
                    current = out[i][j]
                    while parent!=current:
                        current = parent
                        parent=parents[current]
                    parents[out[i][j]] = parent
```

```
                        out[i][j] = parent
```

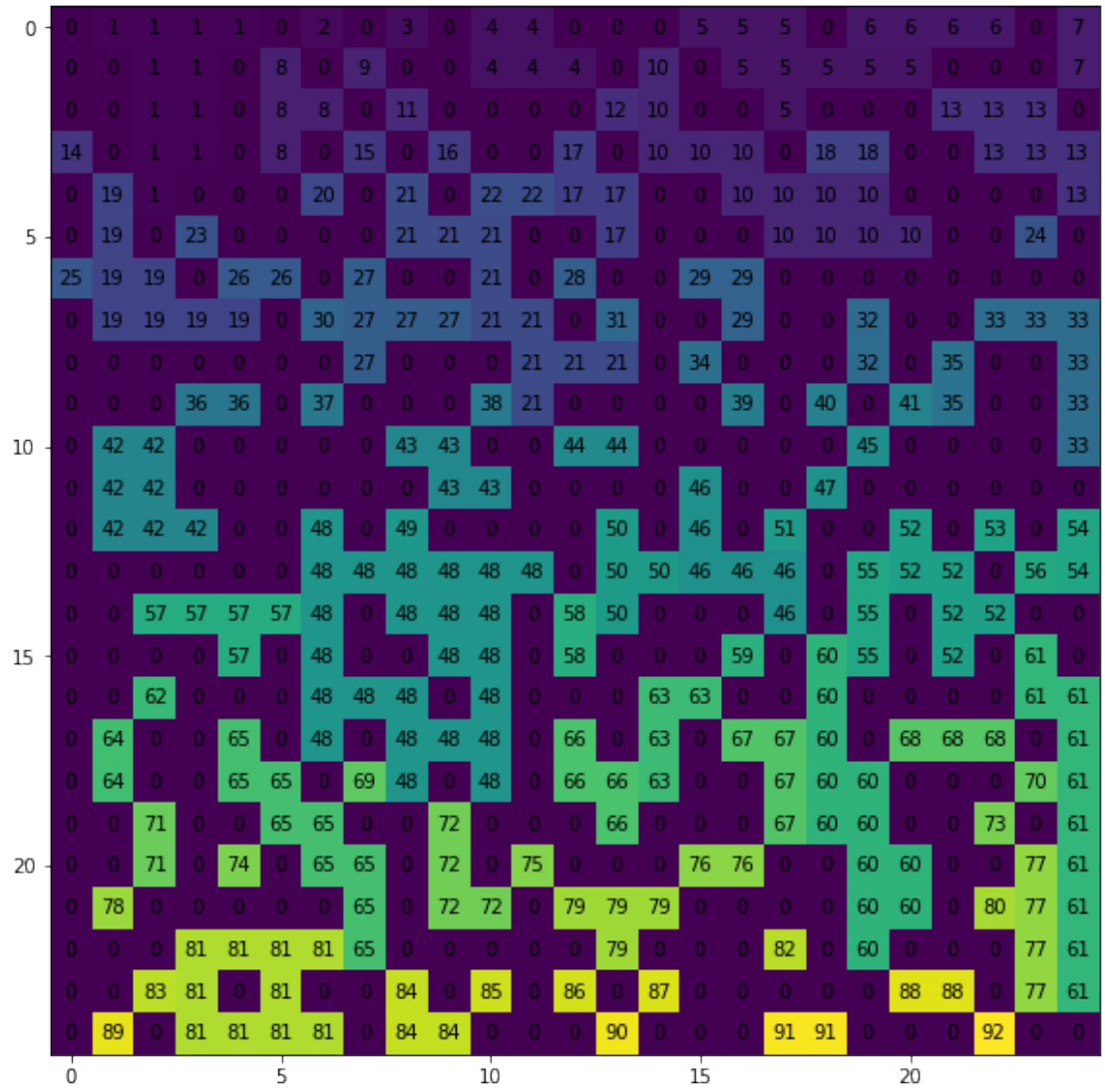
```
In [7]: def replace(out):

            for i in range(shp[0]):
                for j in range(shp[1]):
                    if out[i][j]==0:
                        continue
                    out[i][j] = final_components[out[i][j]]
```

```
In [8]: def final_list_gen(parents):
            for key,value in parents.items():
                if key==value:
                    final_list.append(key)
                else:
                    continue
```

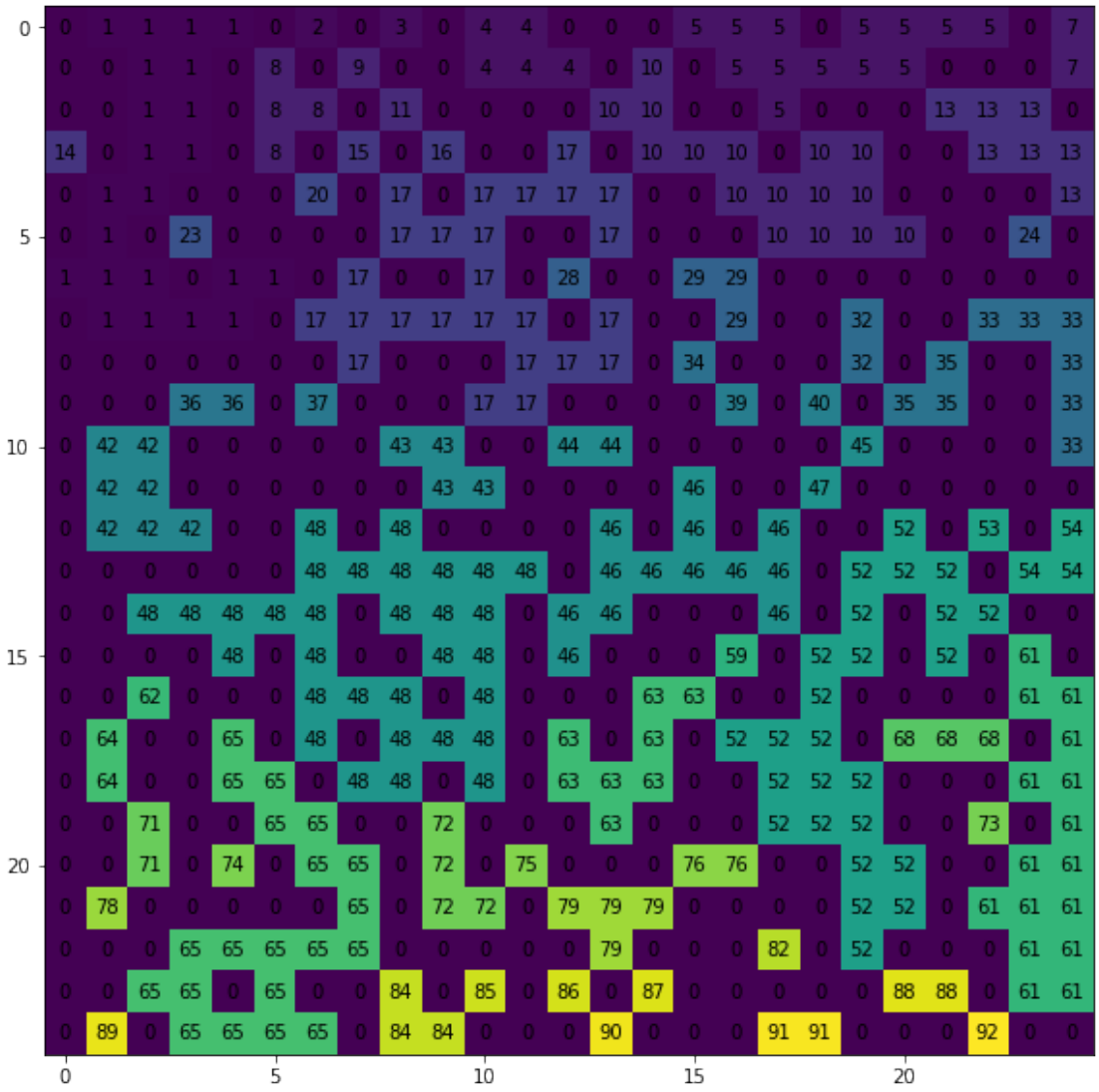
```
In [9]: def final_components_gen(final_list):
            for i in range(1,len(final_list)+1):
                final_components[final_list[i-1]] = i
```

```
In [10]: parents = {
                  1:1
              }
         out = np.zeros(shp,dtype=int)
```

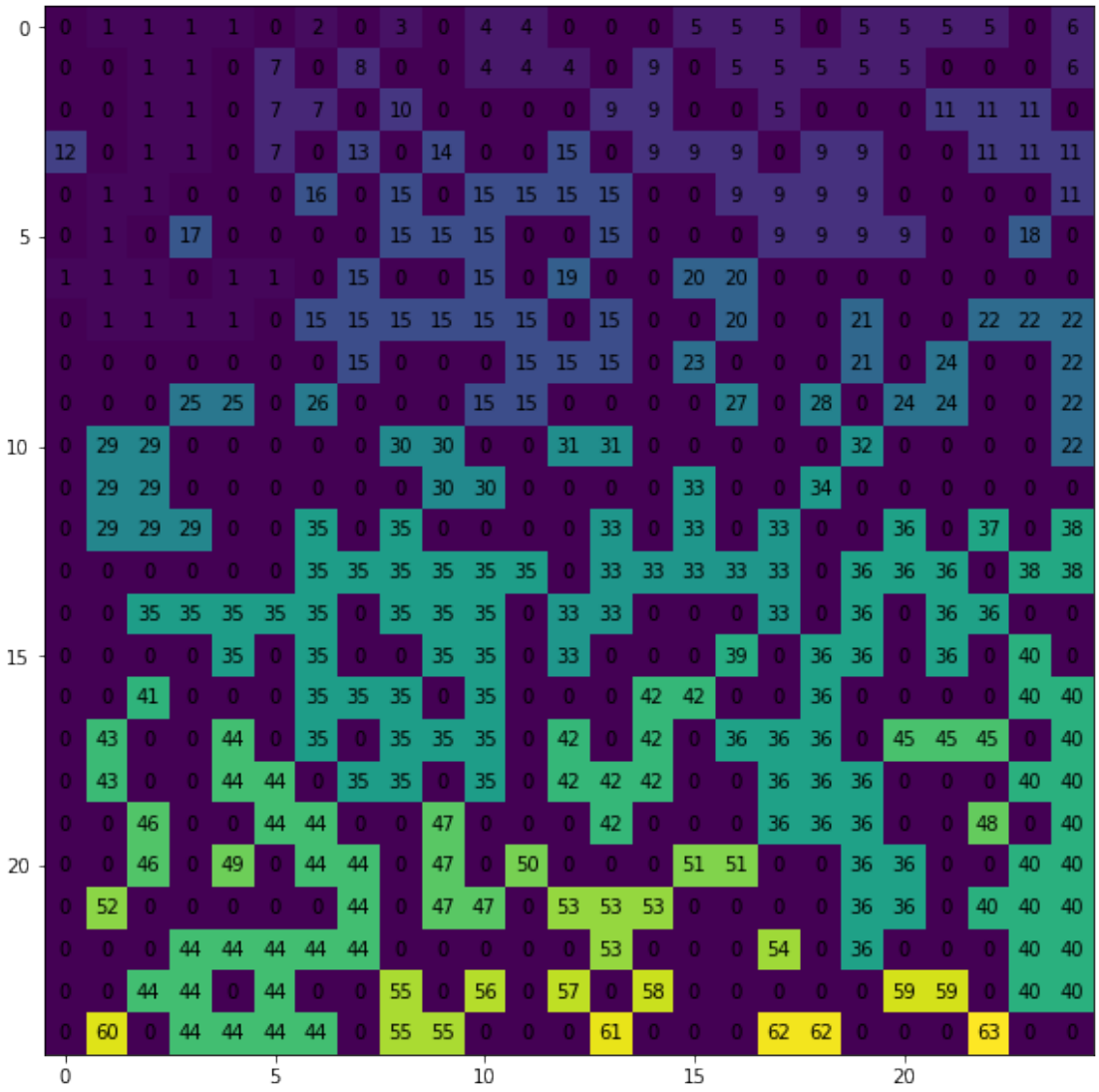
```
In [11]: first_pass(img)
         plot(out)
```



In [12]:
```
second_pass(out)
plot(out)
```



In [13]:
```
final_list = []
final_list_gen(parents)
final_components = {}
final_components_gen(final_list)
replace(out)
plot(out)
```



In [14]: parents

Out[14]: {1: 1,
 2: 2,
 3: 3,
 4: 4,
 5: 5,
 6: 5,
 7: 7,
 8: 8,
 9: 9,
 10: 10,
 11: 11,

```
12: 10,
13: 13,
14: 14,
15: 15,
16: 16,
17: 17,
18: 10,
19: 1,
20: 20,
21: 17,
22: 17,
23: 23,
24: 24,
25: 1,
26: 1,
27: 17,
28: 28,
29: 29,
30: 17,
31: 17,
32: 32,
33: 33,
34: 34,
35: 35,
36: 36,
37: 37,
38: 17,
39: 39,
40: 40,
41: 35,
42: 42,
43: 43,
44: 44,
45: 45,
46: 46,
47: 47,
48: 48,
49: 48,
50: 46,
51: 46,
52: 52,
53: 53,
54: 54,
55: 52,
56: 54,
57: 48,
58: 46,
59: 59,
```

```
            60: 52,
            61: 61,
            62: 62,
            63: 63,
            64: 64,
            65: 65,
            66: 63,
            67: 52,
            68: 68,
            69: 48,
            70: 61,
            71: 71,
            72: 72,
            73: 73,
            74: 74,
            75: 75,
            76: 76,
            77: 61,
            78: 78,
            79: 79,
            80: 61,
            81: 65,
            82: 82,
            83: 65,
            84: 84,
            85: 85,
            86: 86,
            87: 87,
            88: 88,
            89: 89,
            90: 90,
            91: 91,
            92: 92}

In [15]: final_components

Out[15]: {1: 1,
          2: 2,
          3: 3,
          4: 4,
          5: 5,
          7: 6,
          8: 7,
          9: 8,
          10: 9,
          11: 10,
          13: 11,
          14: 12,
```

```
15: 13,
16: 14,
17: 15,
20: 16,
23: 17,
24: 18,
28: 19,
29: 20,
32: 21,
33: 22,
34: 23,
35: 24,
36: 25,
37: 26,
39: 27,
40: 28,
42: 29,
43: 30,
44: 31,
45: 32,
46: 33,
47: 34,
48: 35,
52: 36,
53: 37,
54: 38,
59: 39,
61: 40,
62: 41,
63: 42,
64: 43,
65: 44,
68: 45,
71: 46,
72: 47,
73: 48,
74: 49,
75: 50,
76: 51,
78: 52,
79: 53,
82: 54,
84: 55,
85: 56,
86: 57,
87: 58,
88: 59,
89: 60,
```

```
 90: 61,
 91: 62,
 92: 63}
```

```
In [16]: print("Number of components:", len(final_components.keys()))
```

```
Number of components: 63
```

```
In [17]: size = {}

         def find_size(out):
             for i in range(shp[0]):
                 for j in range(shp[1]):
                     if out[i][j]==0:
                         continue
                     value = out[i][j]
                     if value not in size.keys():
                         size[value] = 1
                     else:
                         size[value]+=1
```

```
In [18]: find_size(out)
         size
```

```
Out[18]: {1: 22,
          2: 1,
          3: 1,
          4: 5,
          5: 13,
          6: 2,
          7: 4,
          8: 1,
          9: 16,
          10: 1,
          11: 7,
          12: 1,
          13: 1,
          14: 1,
          15: 25,
          16: 1,
          17: 1,
          18: 1,
          19: 1,
          20: 3,
          21: 2,
          22: 6,
          23: 1,
          24: 3,
```

```
 25: 2,
 26: 1,
 27: 1,
 28: 1,
 29: 7,
 30: 4,
 31: 2,
 32: 1,
 33: 13,
 34: 1,
 35: 31,
 36: 25,
 37: 1,
 38: 3,
 39: 1,
 40: 16,
 41: 1,
 42: 8,
 43: 2,
 44: 20,
 45: 3,
 46: 2,
 47: 4,
 48: 1,
 49: 1,
 50: 1,
 51: 2,
 52: 1,
 53: 4,
 54: 1,
 55: 3,
 56: 1,
 57: 1,
 58: 1,
 59: 2,
 60: 1,
 61: 1,
 62: 2,
 63: 1}
```

In [ ]: