

Digital Image Processing

CE-38-B

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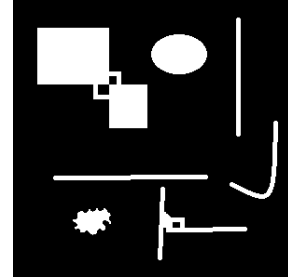
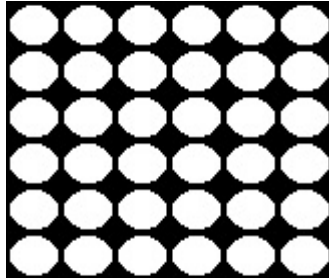
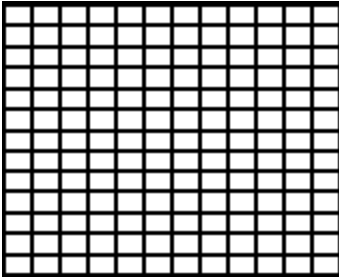
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Task:

For the image given below (provided with the lab handout), apply the connected component labelling and count the total number of white objects. First threshold the images (replace pixel values less than 127 equal to 0 and above 127 equal to 1) and then do connected component analysis.



Algorithm:

```
# newarray = np.array([
#     [1, 1, 1, 1, 1, 1, 1, 1, 1, 1],
#     [1, 255, 255, 255, 1, 1, 1, 1, 1, 1],
#     [1, 255, 255, 255, 1, 1, 1, 1, 1, 1],
#     [1, 255, 255, 255, 1, 1, 1, 1, 1, 1],
#     [1, 1, 1, 1, 1, 1, 1, 1, 1, 1],
#     [1, 1, 1, 1, 255, 1, 1, 255, 255, 1],
#     [1, 1, 1, 1, 255, 1, 1, 255, 255, 1],
#     [1, 1, 1, 1, 255, 255, 255, 255, 255, 1],
#     [1, 255, 255, 255, 255, 255, 255, 255, 255, 1],
#     [1, 255, 255, 255, 255, 255, 255, 255, 255, 1],
#     [1, 1, 1, 1, 1, 1, 1, 1, 1, 1]])

# row, col = np.shape(newarray)

labels = [] # [200, 180, 180, 120, 80, 40]
for i in range(2, 555):
    labels.append(i)
print(labels)
equilencyList = []
# Raster scan step 1
for i in range(0, row):
    for j in range(0, col):
        if newarray[i][j] != 1:
            if newarray[i-1][j] == 1 and newarray[i][j-1] == 1: # check top and left, if both
background then true
                temp = labels.pop()
                equilencyList.append([temp, temp])
                newarray[i][j] = temp # give new label
            elif newarray[i-1][j] == newarray[i][j-1]: # if top and left are equal, then copy
same value
                newarray[i][j] = newarray[i-1][j]
            elif newarray[i-1][j] == 1: # if top is background then copy value of left
                newarray[i][j] = newarray[i][j-1]
            elif newarray[i][j-1] == 1: # if left is background then copy value of top
                newarray[i][j] = newarray[i-1][j]
            else: # if different objects but connected
                if newarray[i-1][j] < newarray[i][j-1]:
                    newarray[i][j] = newarray[i-1][j]
                    for x in equilencyList:
                        if x[1] == newarray[i][j-1]:
                            x[1] = newarray[i-1][j]
                else:
                    newarray[i][j] = newarray[i][j-1]
                    for x in equilencyList:
                        if x[1] == newarray[i-1][j]:
                            x[1] = newarray[i][j-1]
```

```

# Raster scan step 2
for i in range(0, row):
    for j in range(0, col):
        if newarray[i][j] != 1:
            for x in equivalencyList:
                if newarray[i][j] == x[0]:
                    newarray[i][j] = x[1]

# count number of object in picture
countList = []
for x in equivalencyList: # [:][1:1]
    countList.append(x[1])
count = len(np.unique(countList))

# Printing
print("Number of objects", count)
print("Equivalency list", equivalencyList)
print("Image", newarray)
cv.imwrite("newarray.png", newarray)

```

Result:

Number of objects: 36

Equivalency list [[554, 514.0], ... , [259, 259], [258, 258]]

Image [[1. 1. 1. ... 1. 1. 1.]

[1. 1. 1. ... 1. 1. 1.]

[1. 1. 1. ... 1. 1. 1.]

...

[1. 1. 1. ... 1. 1. 1.]

[1. 1. 1. ... 1. 1. 1.]

[1. 1. 1. ... 1. 1. 1.]]

