Assignment 3.1 (Logical Operations on Binary Images)

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In [1]:
```python
from random import *
```

In [5]:
```python
def generate_Matrix(size):
    '''
        Function to generate random matrix with binary values
    '''
    matrix = [[0 for i in range(size)] for j in range(size)]
    for row in range(len(matrix)):
        for col in range(len(matrix[row])):
            matrix[row][col] = randint(0, 1)
    return matrix
```

Logical AND

In [46]:
```python
def logicalAND(matrix1, matrix2):
    '''
        Function to perform logical AND operation on binary image
    '''
    output = [[0 for j in range(len(matrix1))] for i in range(len(matrix1))]

    for i in range(len(matrix1)):
        for j in range(len(matrix1)):
            output[i][j] = 1 if matrix1[i][j] and matrix2[i][j] else 0
    return output
```

Logical OR

In [47]:
```python
def logicalOR(matrix1, matrix2):
    '''
        Function to perform logical OR operation on binary image
    '''
    output = [[0 for j in range(len(matrix1))] for i in range(len(matrix1))]

    for i in range(len(matrix1)):
        for j in range(len(matrix1)):
            output[i][j] = 1 if matrix1[i][j] or matrix2[i][j] else 0
    return output
```

Logical XOR

In [48]:
```python
def logicalXOR(matrix1, matrix2):
    '''
        Function to perform logical XOR operation on binary image
    '''
    output = [[0 for j in range(len(matrix1))] for i in range(len(matrix1))]

    for i in range(len(matrix1)):
```

```
        for j in range(len(matrix1)):
            output[i][j] = 1 if matrix1[i][j] ^ matrix2[i][j] else 0
    return output
```

Logical NOT

In [53]:
```
def logicalNOT(matrix):
    '''
        Function to perform logical NOT operation on binary image
    '''
    output = [[0 for j in range(len(matrix))] for i in range(len(matrix))]

    for i in range(len(matrix)):
        for j in range(len(matrix)):
            output[i][j] = 1 if not matrix[i][j] else 0
    return output
```

In [40]:
```
def display(matrix):
    for i in range(len(matrix)):
        print(matrix[i], end="\n")
```

USER INPUT

In [41]:
```
matrix_size = int(input("Enter matrix size"))
```

In [42]:
```
matrix1 = generate_Matrix(matrix_size)
matrix2 = generate_Matrix(matrix_size)
```

In [50]:
```
print("Randomly generated Matrix 1:\n")
display(matrix1)
```

```
Randomly generated Matrix 1:

[1, 1, 1, 1, 0]
[0, 1, 0, 0, 0]
[0, 0, 1, 0, 1]
[1, 0, 1, 1, 1]
[0, 0, 1, 1, 0]
```

In [51]:
```
print("Randomly generated Matrix 2:\n")
display(matrix2)
```

```
Randomly generated Matrix 2:

[0, 1, 1, 1, 0]
[0, 0, 1, 0, 0]
[0, 1, 0, 1, 0]
[1, 1, 1, 0, 0]
[1, 0, 1, 0, 1]
```

Logical Operations Result

In [56]:
```
print("Logical NOT of Matrix 1:\n")
display(logicalNOT(matrix1))
print("\nLogical NOT of Matrix 2:\n")
display(logicalNOT(matrix2))
```

Logical NOT of Matrix 1:

```
[0, 0, 0, 0, 1]
[1, 0, 1, 1, 1]
[1, 1, 0, 1, 0]
[0, 1, 0, 0, 0]
[1, 1, 0, 0, 1]
```

Logical NOT of Matrix 2:

```
[1, 0, 0, 0, 1]
[1, 1, 0, 1, 1]
[1, 0, 1, 0, 1]
[0, 0, 0, 1, 1]
[0, 1, 0, 1, 0]
```

In [57]:
```python
print("Logical AND of Matrix 1 and Matrix 2:\n")
display(logicalAND(matrix1, matrix2))
```

Logical AND of Matrix 1 and Matrix 2:

```
[0, 1, 1, 1, 0]
[0, 0, 0, 0, 0]
[0, 0, 0, 0, 0]
[1, 0, 1, 0, 0]
[0, 0, 1, 0, 0]
```

In [58]:
```python
print("Logical OR of Matrix 1 and Matrix 2:\n")
display(logicalOR(matrix1, matrix2))
```

Logical OR of Matrix 1 and Matrix 2:

```
[1, 1, 1, 1, 0]
[0, 1, 1, 0, 0]
[0, 1, 1, 1, 1]
[1, 1, 1, 1, 1]
[1, 0, 1, 1, 1]
```

In [59]:
```python
print("Logical XOR of Matrix 1 and Matrix 2:\n")
display(logicalXOR(matrix1, matrix2))
```

Logical XOR of Matrix 1 and Matrix 2:

```
[1, 0, 0, 0, 0]
[0, 1, 1, 0, 0]
[0, 1, 1, 1, 1]
[0, 1, 0, 1, 1]
[1, 0, 0, 1, 1]
```

In [ ]: