영상정보처리 실습

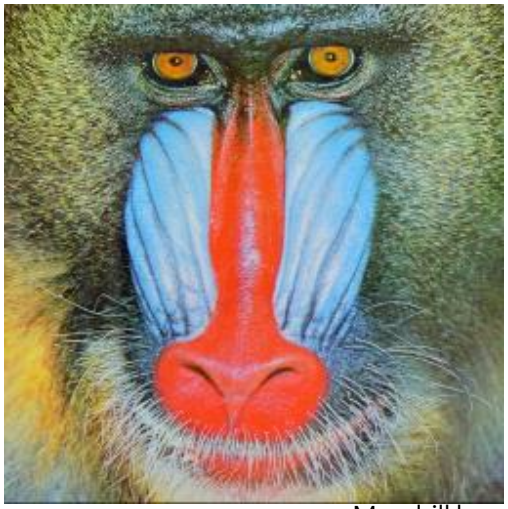
Lab2 Mask 단위 Operation

1. 실습

- Lowpass Filtering
- Noise Filtering
- Morphology
- Morphology - implementation

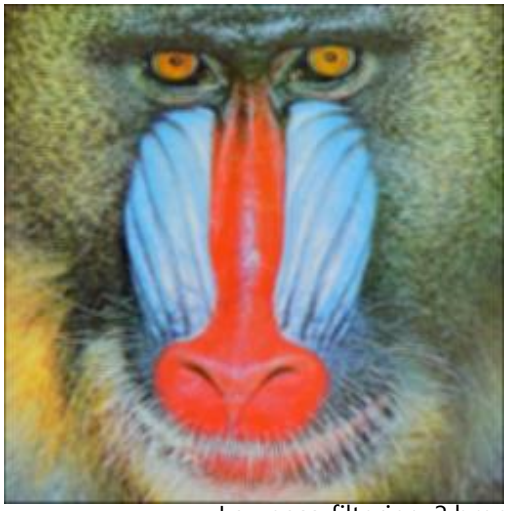
1.1 Lowpass Filtering

- 3*3, 5*5 Lowpass Filtering 구현
- 입력 영상: Mandrill.bmp



Mandrill.bmp

원본



Lowpass_filtering_3.bmp

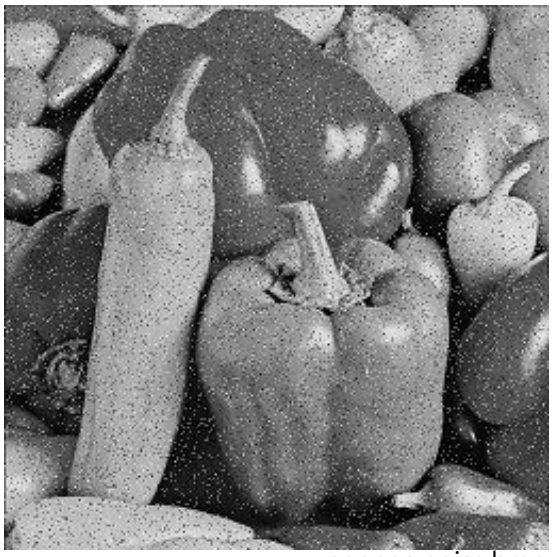
3*3 filtering

Lowpass_filtering_5.bmp

5*5 filtering

1.2 Noise (Median) Filtering

- 입력 영상: pepper_noise.bmp (흑백영상)



pepper_noise.bmp

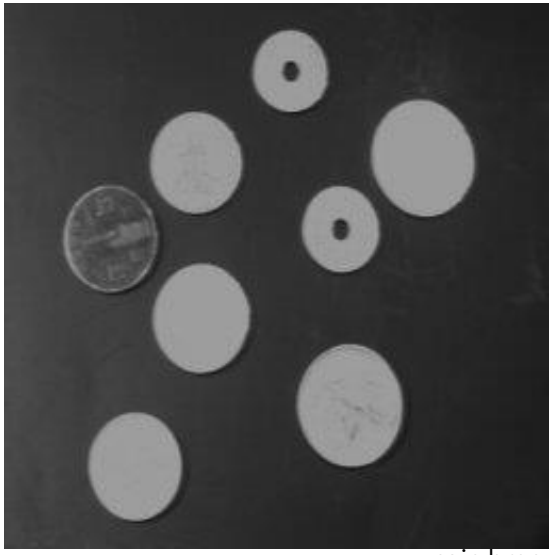
원본영상

median_filtering.bmp

결과영상

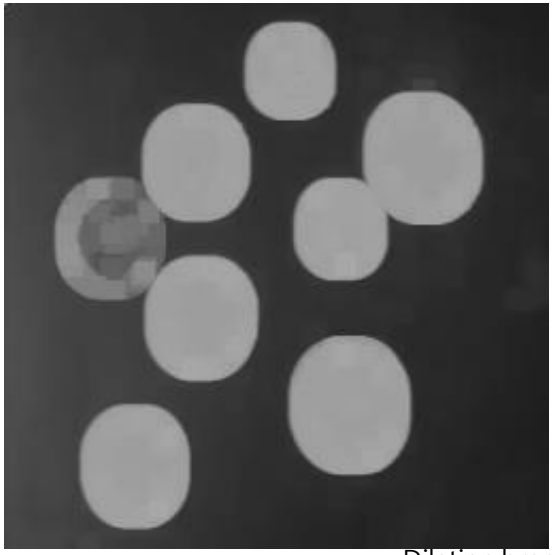
1.3 Morphology

- Dilation
- Erosion
- Closing
- 입력 영상:coin.bmp (흑백영상)



coin.bmp

원본영상

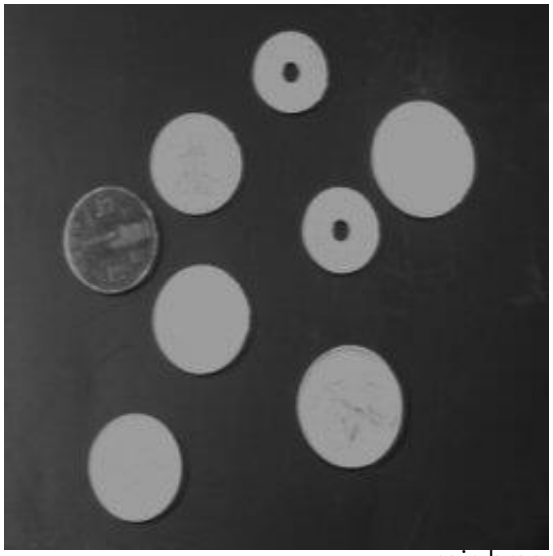


Dilation.bmp

결과영상

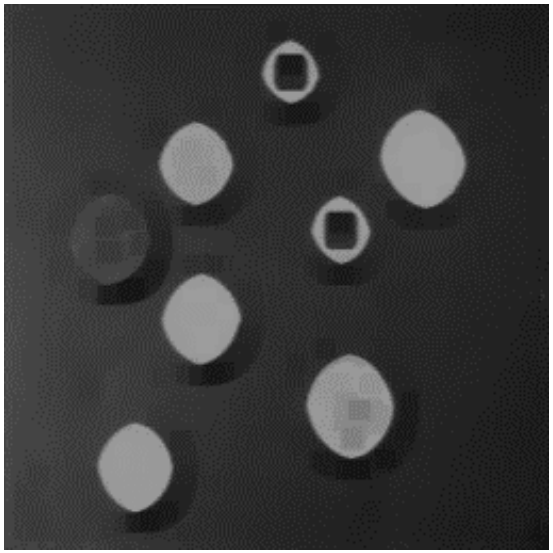
1.3 Morphology

- Dilation
- Erosion
- Closing
- 입력 영상:coin.bmp (흑백영상)



coin.bmp

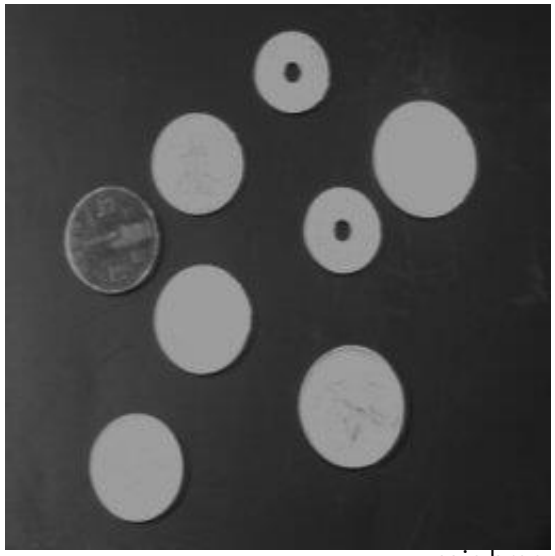
원본영상



결과영상

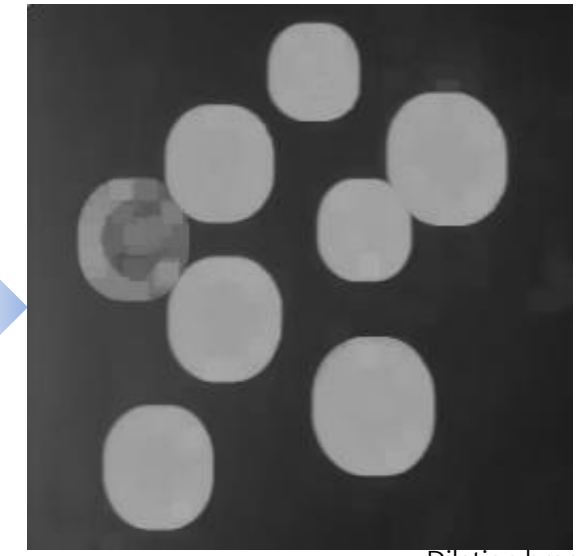
1.3 Morphology

- Dilation
- Erosion
- Closing
- 입력 영상:coin.bmp (흑백영상)



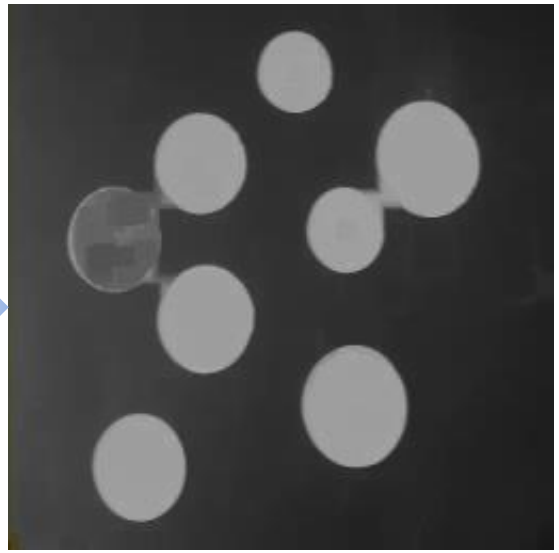
coin.bmp

원본영상



Dilation.bmp

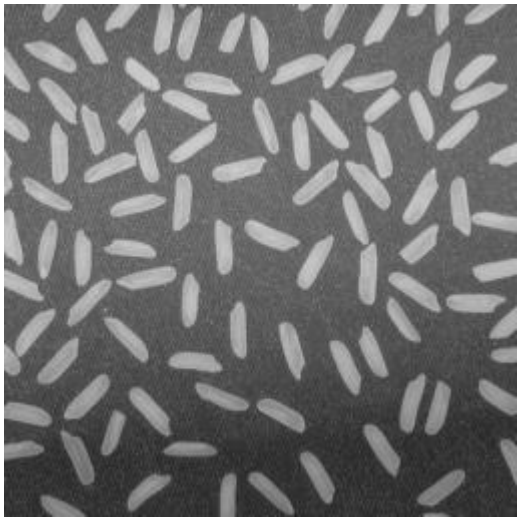
팽창 연산 후 영상



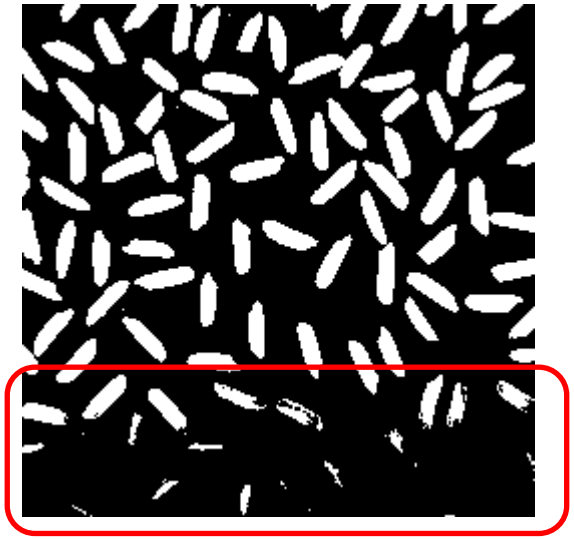
닫힘 연산 후 영상

1.4 Morphology Implementation

- Top Hat
- 입력 영상:rice.bmp (흑백영상)



원본



T=140 으로 이진화 한 결과
(아래부분의 쌀은 검출되지 않음)

Top Hat 적용 후
이진화

2. 설명

- Lowpass Filtering
- Noise Filtering
- Morphology

2.0 코드 설명

#1-1 3*3 Mask

```
src = cv.imread("Mandrill.bmp",cv.IMREAD_COLOR) // Read the file
H,W,C = src.shape[:]
dst = np.zeros((H,W,C), src.dtype)

array_3 = [[1/9 for col in range(3)] for row in range(3)]
```

#1-2 5*5 Mask

```
src = imread("Mandrill.bmp", IMREAD_COLOR) // Read the file
H,W,C = src.shape[:]
dst = np.zeros((H,W,C), src.dtype)

array_5 = [[1/25 for col in range(5)] for row in range(5)]
```

2.0 코드 설명

#1-3 반올림

```
np. Rint ( )
```

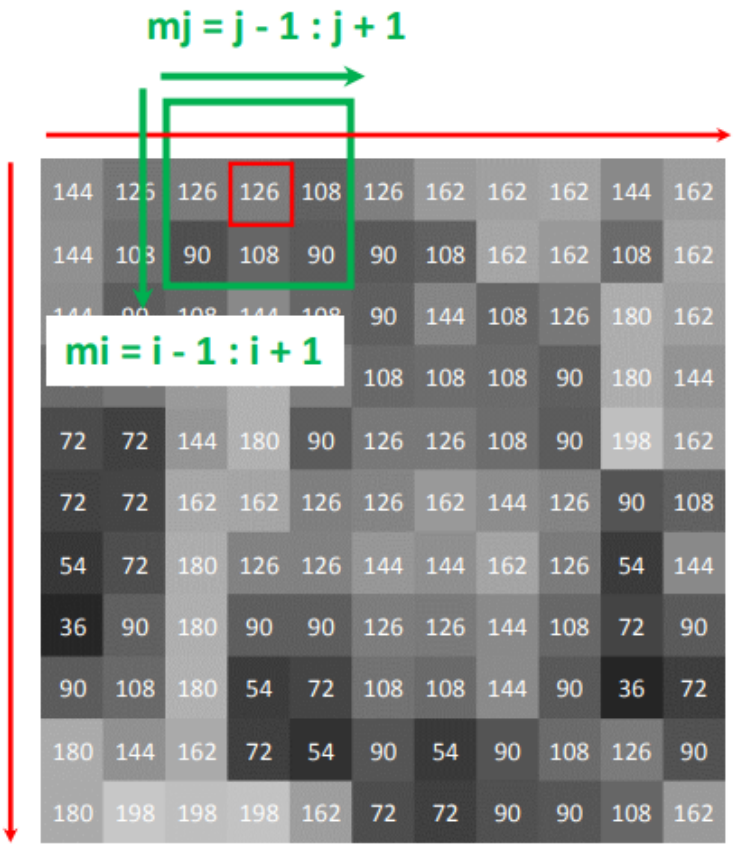
가장 가까운 정수로 반올림

#1-4 unsigned char

```
src = cv.imread("Mandrill.bmp",cv.IMREAD_COLOR) // Read the file
H,W,C = src.shape[:]
dst = np.zeros((H,W,C), src.dtype)

array = np.zeros(9, src.dtype)
```

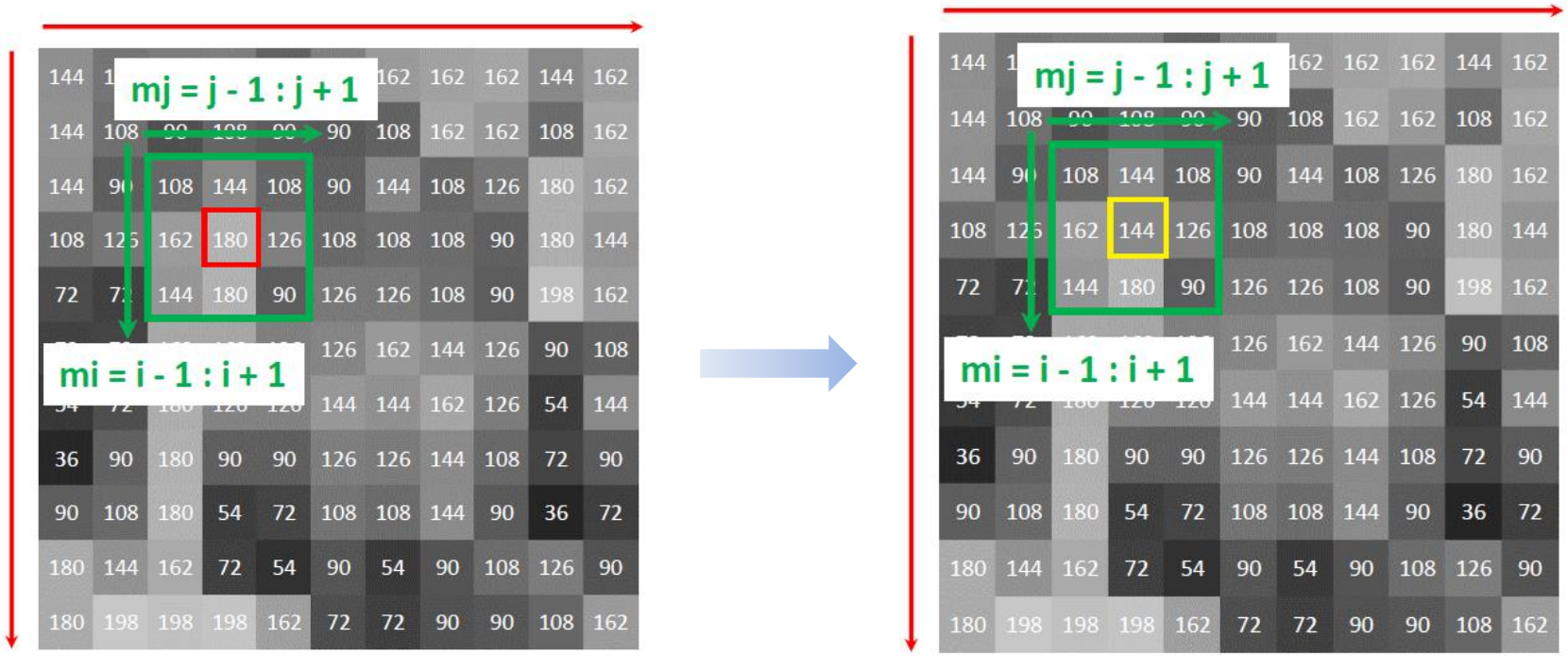
2.1 Lowpass Filtering




```
for i=0:height-1
    for j=0:width-1
        val=0
        for mi=-1:1
            for mj= -1:1
                if(-1<i+mi<height && -1<j+mj<width)
                    val=val+in[i+mi][j+mj] ×M[mi+1][mj+1]
                end
            end
        end
        out[i][j]=val;
    end
end
```

Convolution

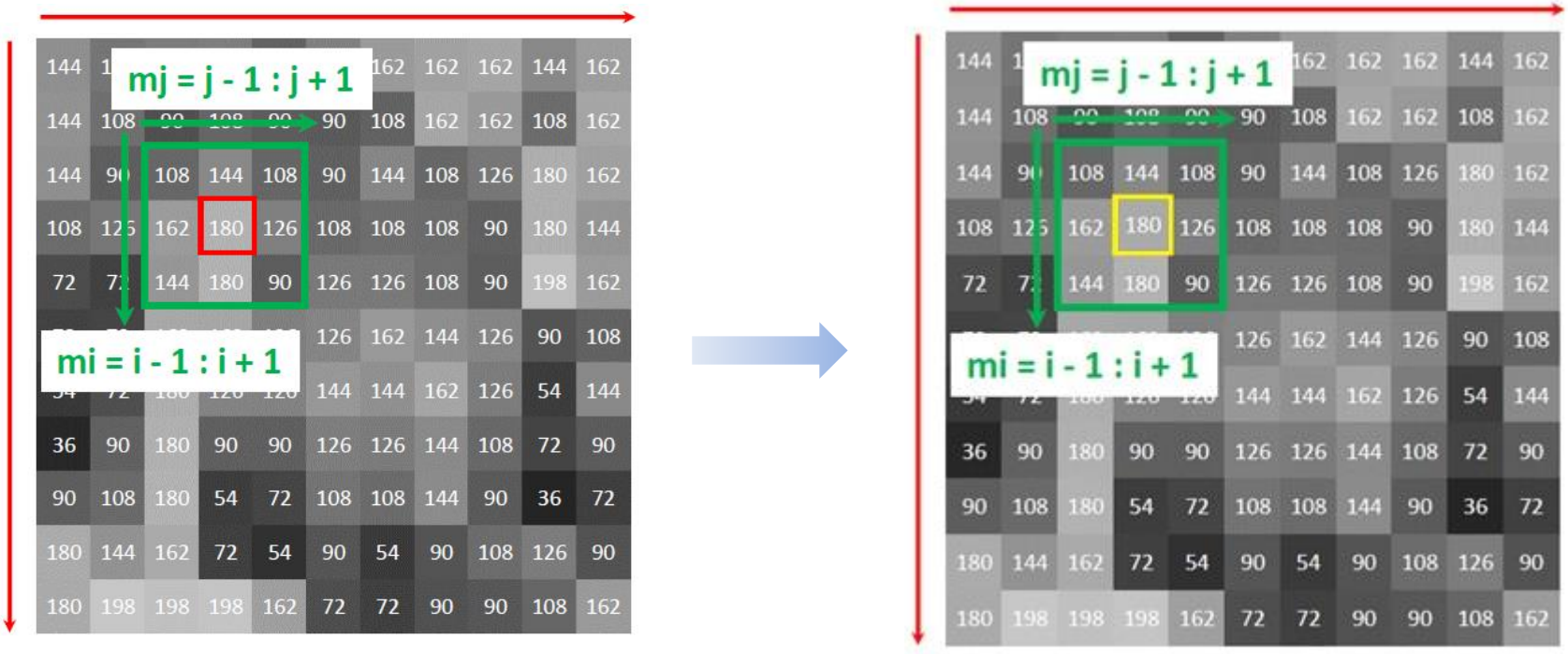
2.2 Median Filtering



mask[9]

90	108	108	126	144	144	162	180	180
0	1	2	3	4	5	6	7	8

2.3 Dilation

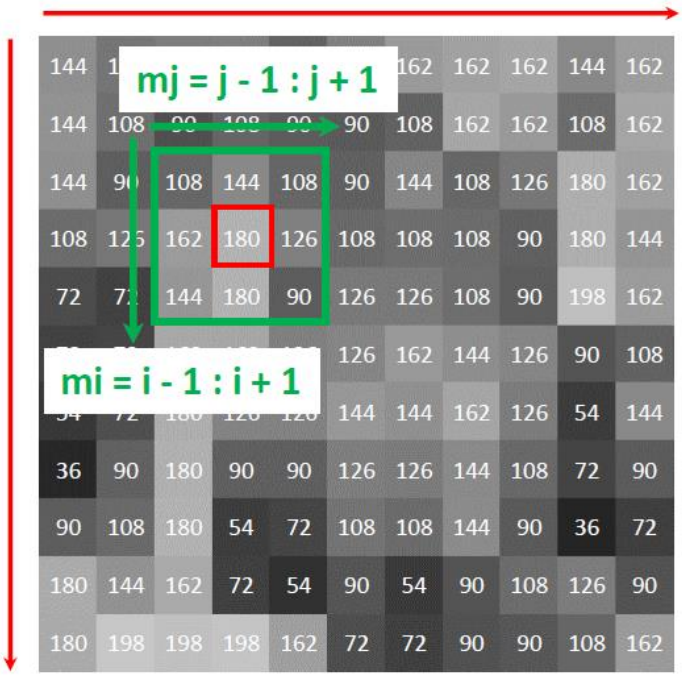


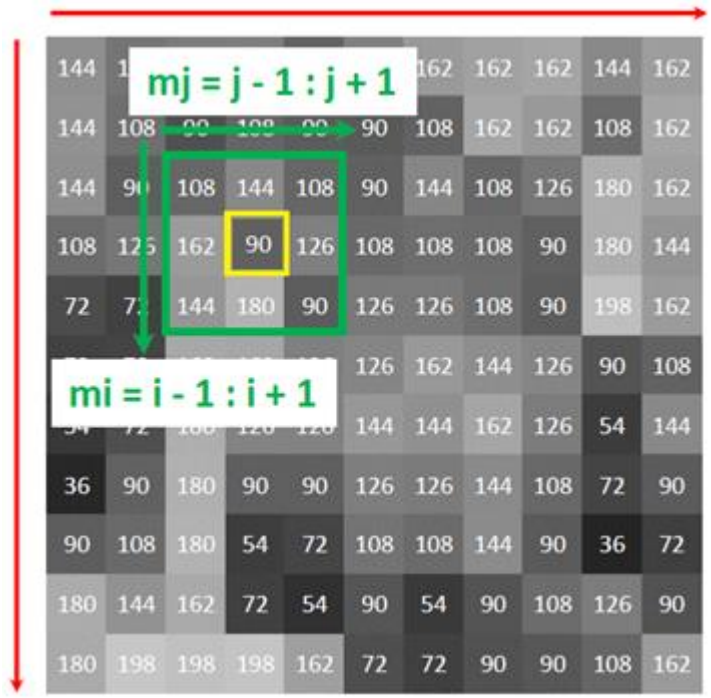
※이번 실습에서 **마스크의 크기**는 9*9로 한다.

mask[9]

90	108	108	126	144	144	162	180	180
0	1	2	3	4	5	6	7	8

2.3 Erosion





※이번 실습에서 **마스크의 크기**는 9*9로 한다.

mask[9]

90	108	108	126	144	144	162	180	180
0	1	2	3	4	5	6	7	8

2.4 Top Hat

√ 밝은 물체 추출을 위한 Top Hat

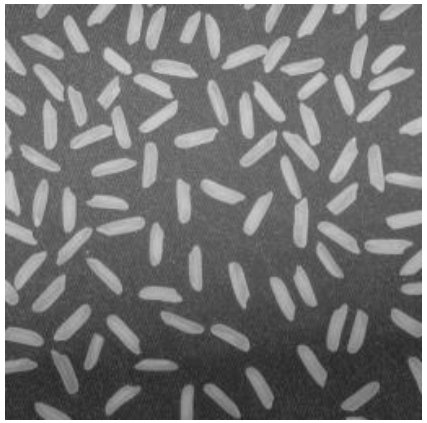
$$TopHat(f, B) = f - (f \circ B)$$
$$A \circ B = (A \ominus B) \oplus B$$

Opening 연산을 통해 밝은 물체를 없애는 것이 포인트
→ 밝은 물체를 없앨 수 있는 Opening 구조적 요소의 사이즈를 찾아야 함

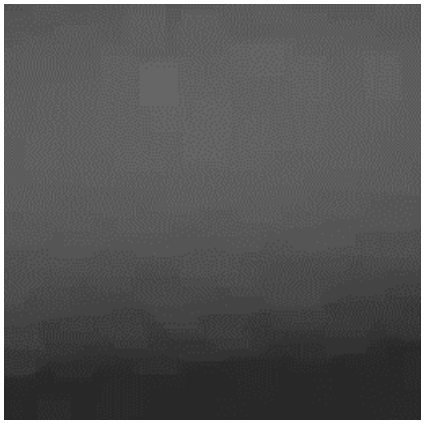
2.4 Top Hat

√ 밝은 물체 추출을 위한 Top Hat

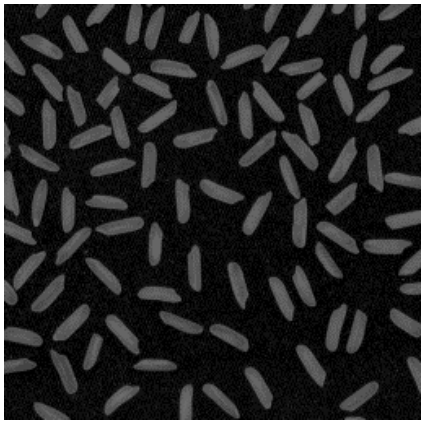
$$TopHat(f, B) = f - (f \circ B)$$
$$A \circ B = (A \ominus B) \oplus B$$



원본



$(f \circ B)$ 결과



$f - (f \circ B)$ 결과

Top Hat → 이진화

3. 과제 제출방법

- 과제 제출함에

  Lab#_본인학번_본인이름.pdf 제출.

- 보고서 작성

  - 보고서 제목 및 형식 준수: Lab#_학번_이름.pdf

  - 보고서에 포함되어야 하는 항목 :
    ✓ 문제에서 요구하는 각 세부 기능 설명
    (문제당 소스코드 제외 1페이지 안으로 작성)
    ✓ 기능별 실행 화면 캡처
    ✓ 소스코드