

# 第七節

# Morphology

1

Morphology 技術說明 2

認識

Erosion in scikitimage 3

認識

Dilation in scikit-image

#### 同學,歡迎你參加本課程

- ☑ 請關閉你的FB、Line等溝通工具,以免影響你上課。
- ☑ 考量頻寬,請預設關閉麥克風、攝影機,若有需要再打開。
- ☑ 隨時準備好,老師會呼叫你的名字進行互動。
- ✓ 如果有緊急事情,你必需離開線上教室,請用聊天室私訊給老師, 以免老師癡癡呼喚你的名字。
- ☑ 先倒好水、上個洗手間,準備上課囉^^

# 課程檔案下載



# ZOOM 學員操作說明





## **Binary images**

original



Thresholded image





## Morphological filtering

- Better for binary images
- Can extend for grayscale

Binary image



Grayscale





## Morphological operations

- Dilation
- Erosion

Original



Dilated



Original

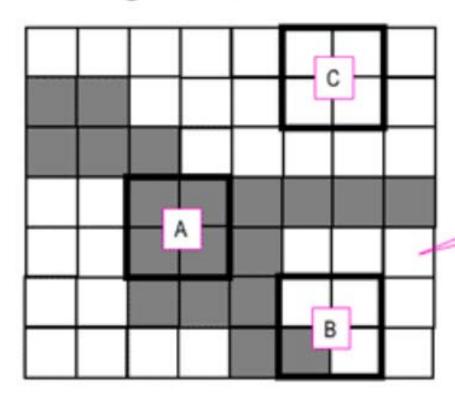


Eroded





#### Structuring element



- A the structuring element fits the image
- B the structuring element hits (intersects) the image
- C the structuring element neither fits, nor hits the image

Structuring element

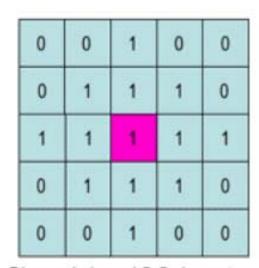




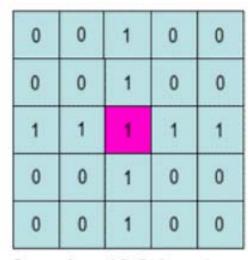
### Structuring element

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

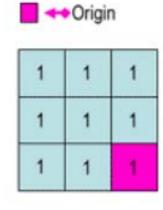
Square 5x5 element



Diamond-shaped 5x5 element



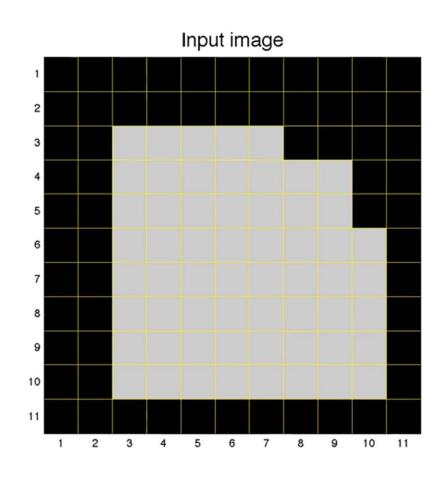
Cross-shaped 5x5 element

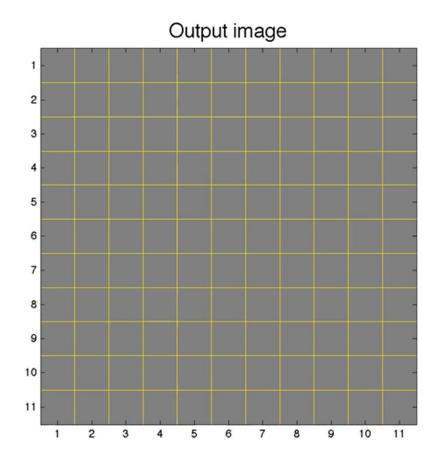


Square 3x3 element

# 









### Shapes in scikit-image

```
from skimage import morphology
square = morphology.square(4)
```

```
[[1 1 1 1]
[1 1 1 1]
[1 1 1 1]
[1 1 1 1]]
```

```
rectangle = morphology.rectangle(4, 2)
```

```
[[1 1]
[1 1]
[1 1]
[1 1]]
```



#### **Erosion in scikit-image**

```
from skimage import morphology

# Set structuring element to the rectangular-shaped
selem = rectangle(12,6)

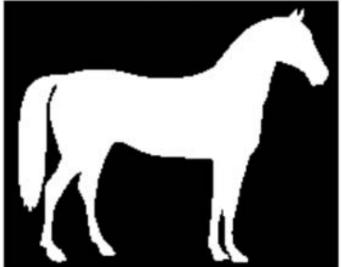
# Obtain the erosed image with binary erosion
eroded_image = morphology.binary_erosion(image_horse, selem=selem)
```



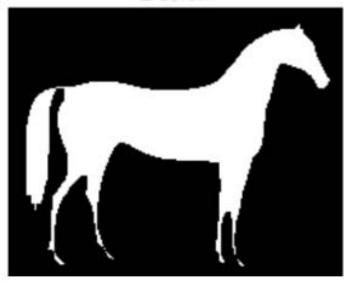
## **Erosion in scikit-image**

```
# Show result
plot_comparison(image_horse, eroded_image, 'Erosion')
```





Erosion

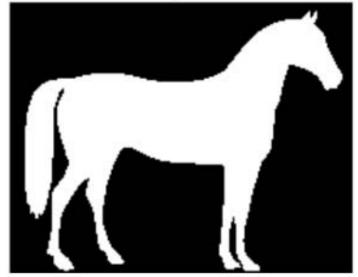




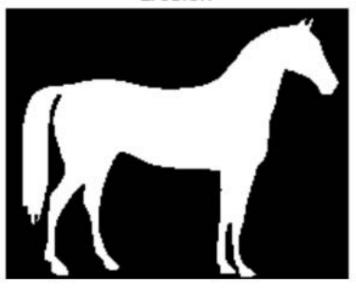
## Binary erosion with default selem

# Binary erosion with default selem
eroded\_image = morphology.binary\_erosion(image\_horse)

#### original

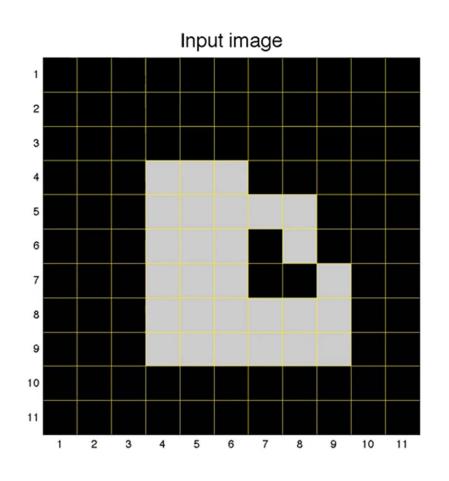


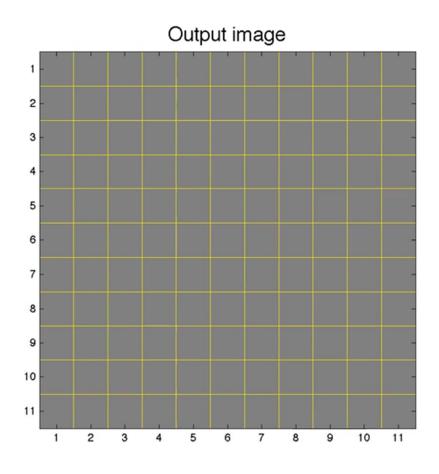
#### Erosion



# 









### Dilation in scikit-image

```
from skimage import morphology

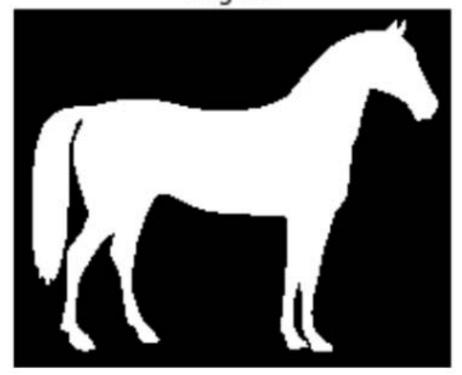
# Obtain dilated image, using binary dilation
dilated_image = morphology.binary_dilation(image_horse)

# See results
plot_comparison(image_horse, dilated_image, 'Erosion')
```

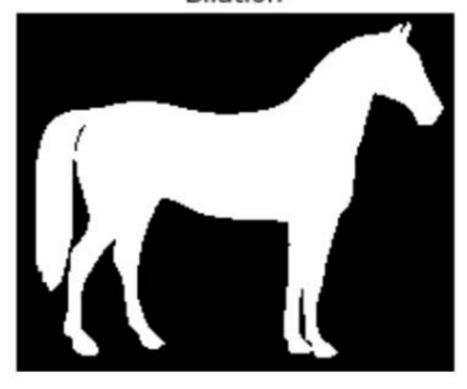


## Dilation in scikit-image

original

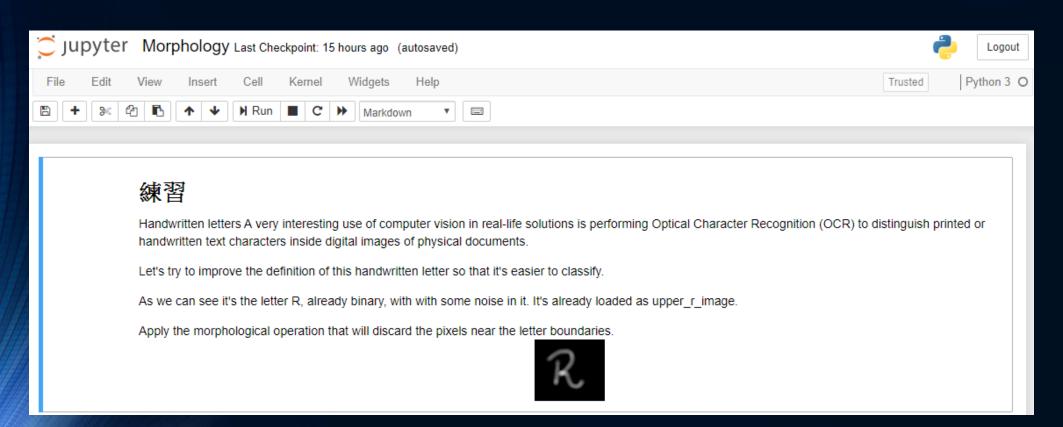


Dilation



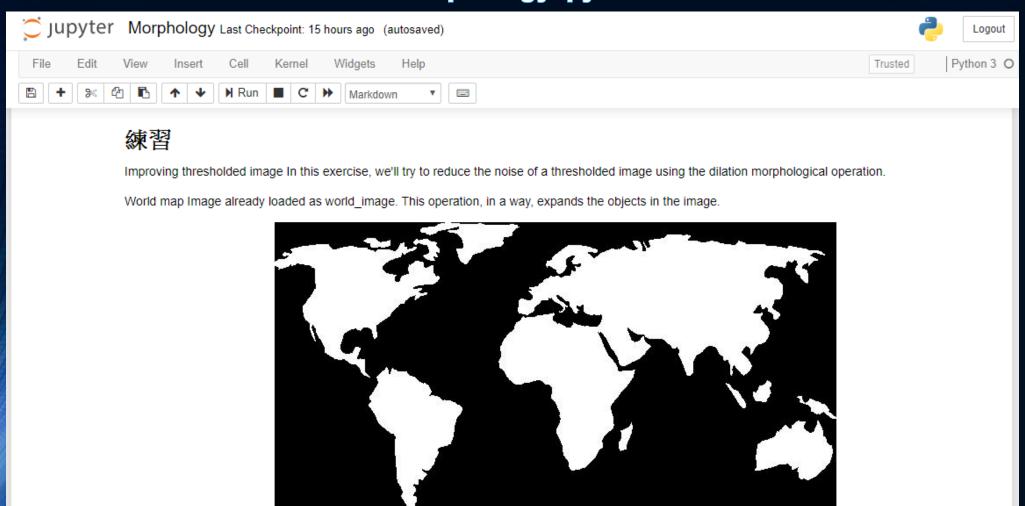
#### 練習時間 Morphology.ipynb





#### 練習時間 Morphology.ipynb





# 問卷

#### http://www.pcschoolonline.com.tw



