

第11節

Finding contours

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的 measure

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Contours

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^^

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那是因為
你還沒學過Python!

(線上老師 **LIVE** 直播教學 · 搶先看)

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ZOOM 學員操作說明

The screenshot shows the Zoom interface with several key areas highlighted for student use:

- Annotation Menu:** A dropdown menu is open, showing options like '原始大小' (Original Size), '請求遠端控制' (Request Remote Control), '共同註記' (Annotate), and '退出全螢幕' (Exit Full Screen). The '共同註記' (Annotate) option is highlighted with an orange box and labeled with a '5'.
- Toolbar:** The bottom toolbar contains icons for '游鼠' (Cursor), '文字' (Text), '筆' (Pen), '橡皮' (Eraser), '格式' (Format), '撤銷' (Undo), '重做' (Redo), and '清除' (Clear). The '筆' (Pen) icon is highlighted with an orange box and labeled with a '5'.
- Participants Window:** A window titled '與會者 (15)' (Participants (15)) is open, showing a list of participants. The '舉手' (Raise Hand) button is highlighted with an orange box and labeled with a '3'.
- Bottom Bar:** The bottom bar contains icons for '解除靜音' (Unmute), '啟動視訊' (Start Video), '邀請' (Invite), '與會者' (Participants), '共享螢幕' (Share Screen), '聊天' (Chat), and '錄影' (Record). The '解除靜音' (Unmute) icon is highlighted with an orange box and labeled with a '4'. The '與會者' (Participants) icon is highlighted with an orange box and labeled with a '3'.
- Chat Window:** A chat window is open, showing a list of messages. The '聊天' (Chat) icon in the bottom bar is highlighted with an orange box and labeled with a '1'.
- Share Screen Window:** A window titled '共享螢幕' (Share Screen) is open, showing a list of participants. The '共享螢幕' (Share Screen) icon in the bottom bar is highlighted with an orange box and labeled with a '2'.

Annotations and their corresponding actions:

- 1 聊天** (Chat): The chat window is open, showing a list of messages.
- 2 共享螢幕** (Share Screen): The share screen window is open, showing a list of participants. The text indicates: 老師須先停止共享螢幕 才能請學生共享螢幕 (The teacher must first stop sharing the screen before asking the student to share the screen).
- 3 與會者/舉手** (Participants/Raise Hand): The participants window is open, showing a list of participants. The '舉手' (Raise Hand) button is highlighted.
- 4 解除靜音** (Unmute): The '解除靜音' (Unmute) icon in the bottom bar is highlighted.
- 5 查看選項/共同註記/筆** (View Options/Annotate/Pen): The '共同註記' (Annotate) option in the dropdown menu and the '筆' (Pen) icon in the toolbar are highlighted.

Finding contours

Original image



Contours



- Measure size
- Classify shapes
- Determine the number of objects

Total points in domino tokens: 35.

Binary images

Thresholded Image



Contours



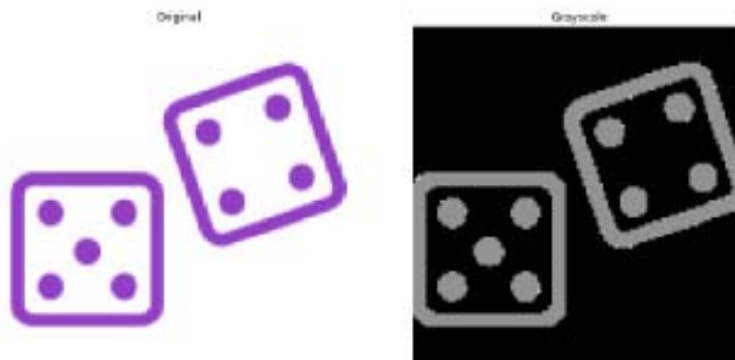
We can obtain a binary image applying
thresholding or using edge detection

Find contours using scikit-image

PREPARING THE IMAGE

Transform the image to 2D grayscale.

```
# Make the image grayscale  
image = color.rgb2gray(image)
```



Find contours using scikit-image

PREPARING THE IMAGE

Binarize the image

```
# Obtain the thresh value  
thresh = threshold_otsu(image)  
  
# Apply thresholding  
thresholded_image = image > thresh
```

Thresholded



Find contours using skimage-image

And then use `find_contours()` .

```
# Import the measure module
from skimage import measure

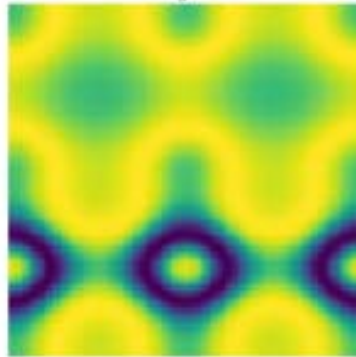
# Find contours at a constant value of 0.8
contours = measure.find_contours(thresholded_image, 0.8)
```

Contours

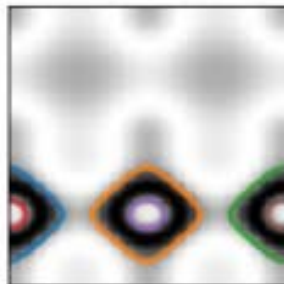


Constant level value

Original



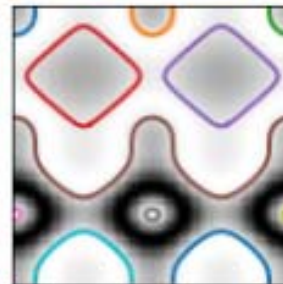
Level value of 0.1



Level value of 0.5



Level value of 0.8



The steps to spotting contours

```
from skimage import measure
from skimage.filters import threshold_otsu

# Make the image grayscale
image = color.rgb2gray(image)

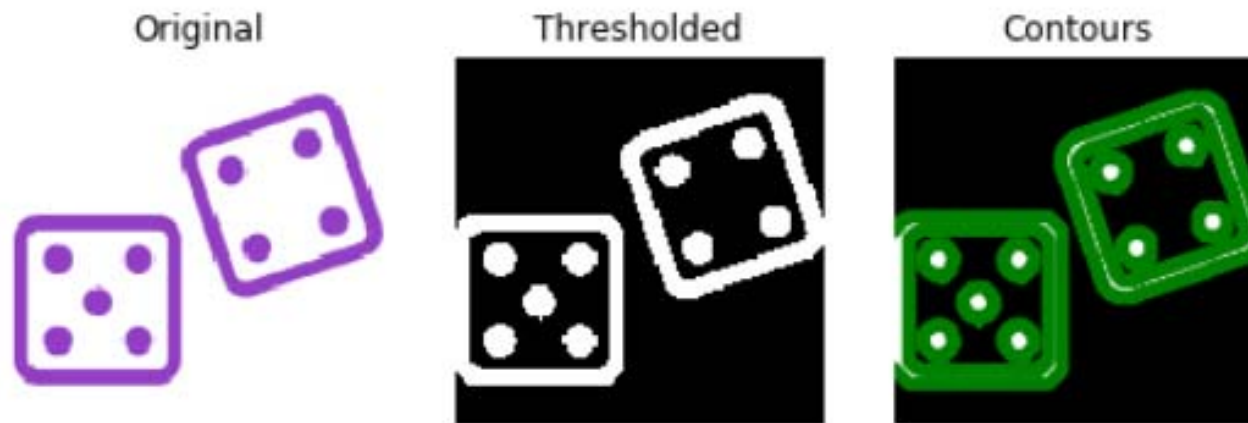
# Obtain the optimal thresh value of the image
thresh = threshold_otsu(image)

# Apply thresholding and obtain binary image
thresholded_image = image > thresh

# Find contours at a constant value of 0.8
contours = measure.find_contours(thresholded_image, 0.8)
```

The steps to spotting contours

Resulting in



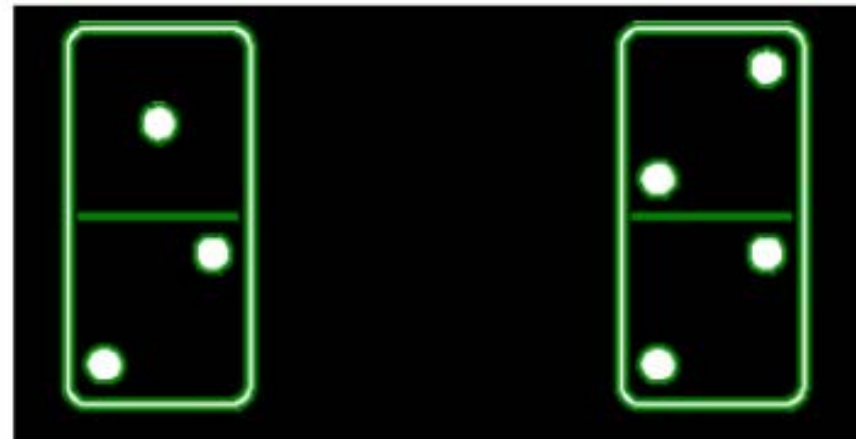
A contour's shape

Contours: list of (n,2) - ndarrays.

```
for contour in contours:  
    print(contour.shape)
```

```
(433, 2)  
(433, 2)  
(401, 2)  
(401, 2)  
(123, 2)  
(123, 2)  
(59, 2)  
(59, 2)  
(59, 2)  
(57, 2)  
(57, 2)
```

Contours

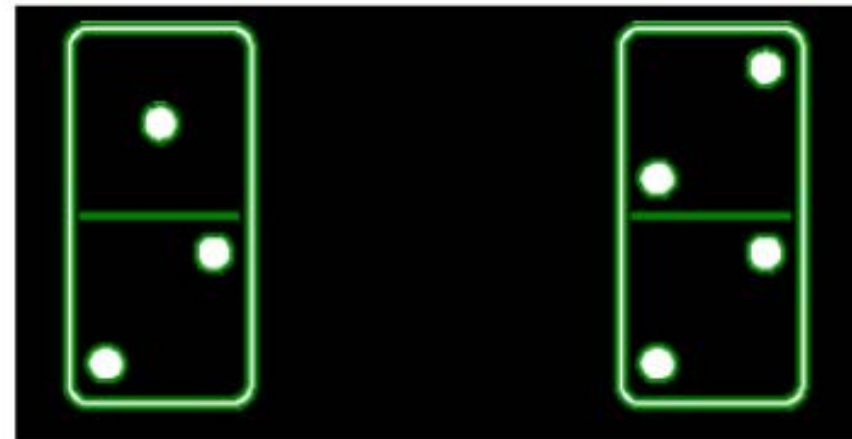


A contour's shape

```
for contour in contours:  
    print(contour.shape)
```

```
(433, 2)  
(433, 2) --> Outer border  
(401, 2)  
(401, 2)  
(123, 2)  
(123, 2)  
(59, 2)  
(59, 2)  
(59, 2)  
(57, 2)  
(57, 2)  
(59, 2)  
(59, 2)
```

Contours

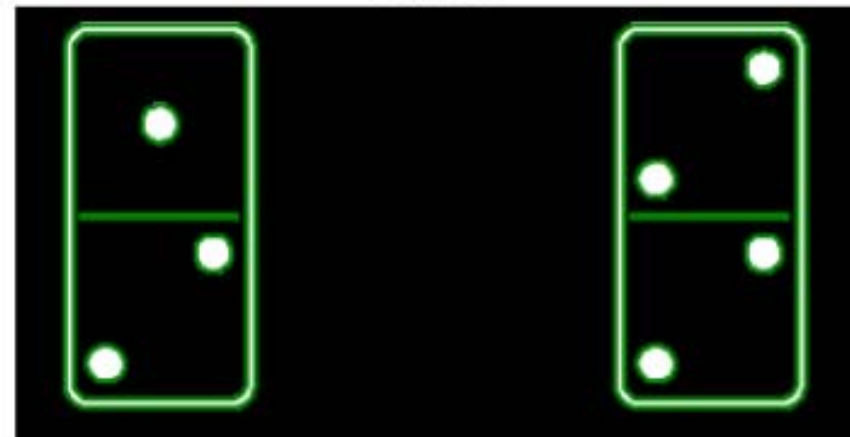


A contour's shape

```
for contour in contours:
    print(contour.shape)
```

```
(433, 2)
(433, 2) --> Outer border
(401, 2)
(401, 2) --> Inner border
(123, 2)
(123, 2) --> Divisory line of tokens
(59, 2)
(59, 2)
(59, 2)
(57, 2)
(57, 2)
(59, 2)
(59, 2) --> Dots
```

Contours



練習時間

Jump into filtering.ipynb



jupyter 11.Finding contours Last Checkpoint: 9 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted | Python 3

Markdown

練習

Contouring shapes In this exercise we'll find the contour of a horse.

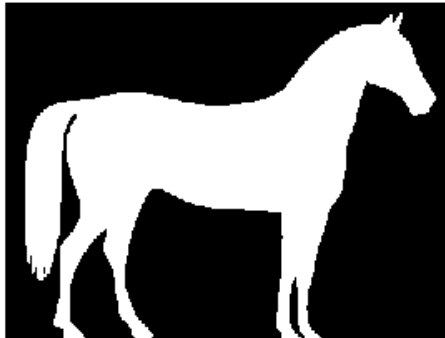
For that we will make use of a binarized image provided by scikit-image in its data module. Binarized images are easier to process when finding contours with this algorithm. Remember that contour finding only supports 2D image arrays.

Once the contour is detected, we will display it together with the original image. That way we can check if our analysis was correct!

`show_image_contour(image, contours)` is a preloaded function that displays the image with all contours found using Matplotlib.

Shape of a horse in black and white Remember you can use the `find_contours()` function from the `measure` module, by passing the thresholded image and a constant value.

Horse



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<http://www.pcschoolonline.com.tw>

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➤ 課程檔案下載：

學員的「上課教材」，下載檔案為壓縮檔 ([解壓縮操作步驟](#))。
如無法觀看上課教材，請安裝 [PDF閱讀軟體](#)。

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自107年1月1日起，課程錄影檔由180天改為365天(含)內無限次觀看 (上課隔日18:00起)。

問卷

上課日期	課程名稱	課程節次	教材下載		
2017/12/27 2000 ~ 2200	線上真人-ZBrush 3D動畫造型設計	18	上課教材	錄影	課堂問卷
2017/12/20 2000 ~ 2200	線上真人-ZBrush 3D動畫造型設計	17	上課教材	錄影檔	
2017/12/18 2000 ~ 2200	線上真人-ZBrush 3D動畫造型設計	16	上課教材	錄影檔	



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