

## 第五節

## Contrast enhancement

1

Contrast  
影像處理

2

Equalization  
處理技巧

3

進階  
Equalization  
處理技巧

## 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

巨匠電腦線上真人

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課程總覽

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學員專區

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最新消息



您好! [登出](#)

## 程式語言好難學?

那是因為  
你還沒學過Python!

(線上老師 **LIVE** 直播教學 · 搶先看)

巨匠電腦真人課程

點數卡產品兌換

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學習諮詢

常見問題

個資維護

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登出

課程檔案下載

# 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 '滑鼠' (Mouse), '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'.

5 查看選項/共同註記/筆 (連連看)

2 共享螢幕 (指導演練；點評作品)  
老師須先停止共享螢幕  
才能請學生共享螢幕

1 聊天

3 與會者/舉手

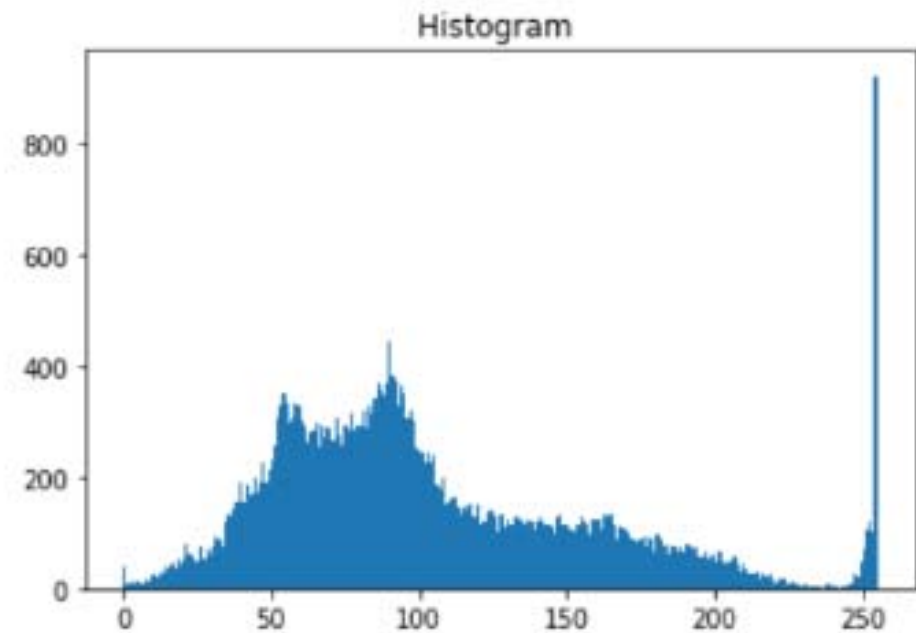
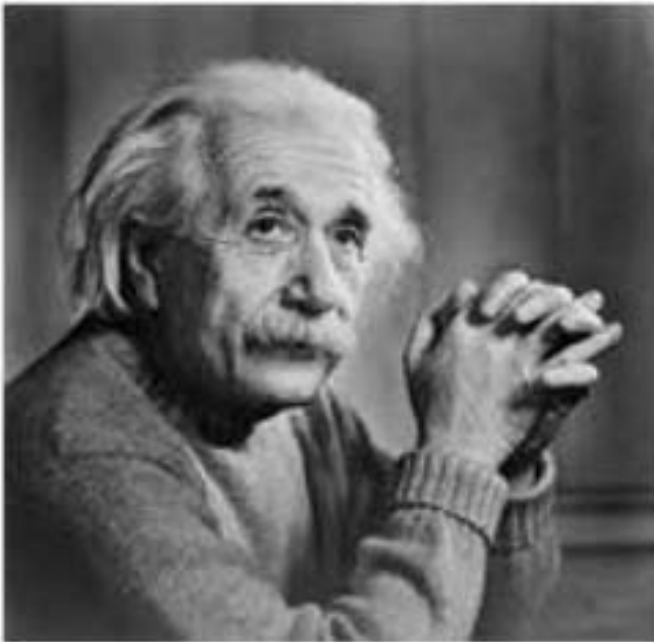
4 解除靜音

## Contrast enhancement



# Contrast

Histograms for contrast enhancement



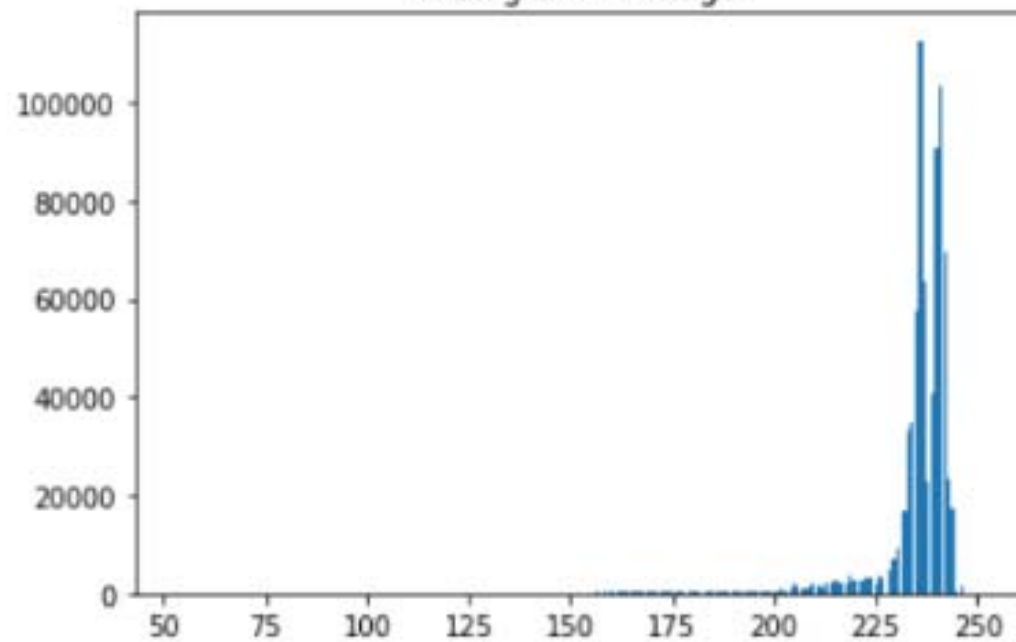


# Contrast

Low contrast image - light



Histogram of image



# Enhance contrast

- Contrast stretching
- Histogram equalization



# Types

- Histogram equalization
- Adaptive histogram equalization
- Contrast Limited Adaptive Histogram Equalization (CLAHE)

Low contrast image



Contrast stretching



Histogram equalization



Adaptive equalization



# Histogram equalization

Original



Histogram Equalization



# Histogram equalization

Original



# Histogram equalization

```
from skimage import exposure

# Obtain the equalized image
image_eq = exposure.equalize_hist(image)

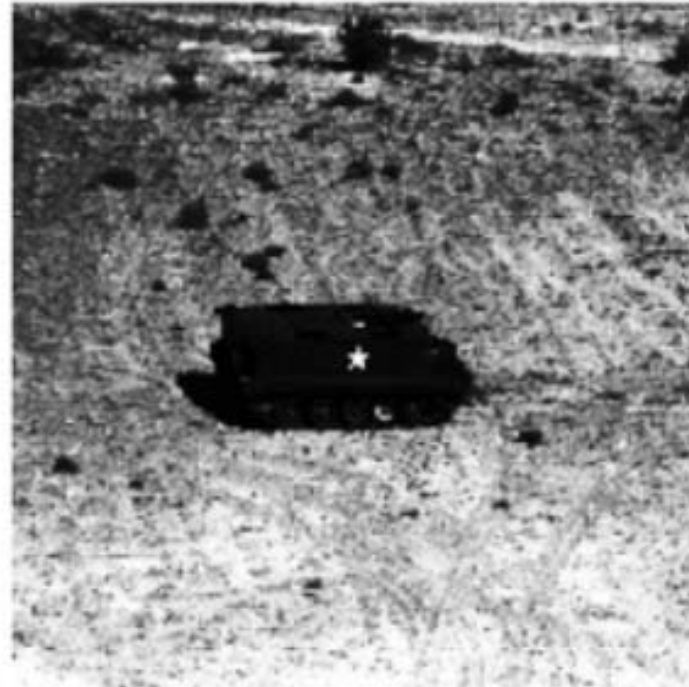
# Show original and result
show_image(image, 'Original')
show_image(image_eq, 'Histogram equalized')
```

# Histogram equalization

Original



Histogram Equalization





# Adaptive Equalization

- Contrastive Limited Adaptive Histogram Equalization

Original



Adaptive Equalization



# Contrastive Limited Adaptive Equalization

Original



Histogram Equalization Adaptive Equalization



# CLAHE in scikit-image

```
from skimage import exposure

# Apply adaptive Equalization
image_adapteq = exposure.equalize_adapthist(image, clip_limit=0.03)

# Show original and result
show_image(image, 'Original')
show_image(image_eq, 'Adaptive equalized')
```

## CLAHE in scikit-image

Original




Adaptive Equalization



# 練習時間


## Contrast enhancement.ipynb





 jupyter













Contrast enhancement

Last Checkpoint: 5 hours ago (autosaved)

 Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted  Python 3 

       Run    Code  

### 練習

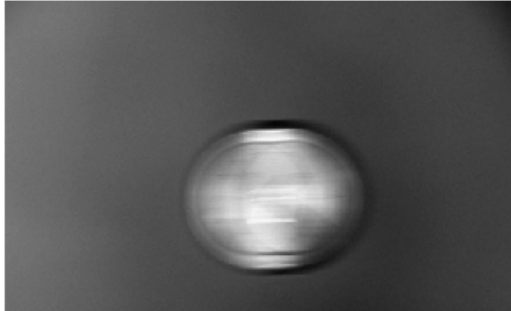
What's the contrast of this image? Black and white clock hanging and moving Histogram of the clock's image

The histogram tell us.

Just as we saw previously, you can calculate the contrast by calculating the range of the pixel intensities i.e. by subtracting the minimum pixel intensity value from the histogram to the maximum one.

You can obtain the maximum pixel intensity of the image by using the `np.max()` method from NumPy and the minimum with `np.min()` in the console.

The image has already been loaded as `clock_image`, NumPy as `np` and the `show_image()` function.





# 練習時間

## Contrast enhancement.ipynb



jupyter Contrast enhancement Last Checkpoint: 5 hours ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

Save + Undo Copy Paste Up Down Run Stop Restart Code

### 練習

Medical images You are trying to improve the tools of a hospital by pre-processing the X-ray images so that doctors have a higher chance of spotting relevant details. You'll test our code on a chest X-ray image from the National Institutes of Health Chest X-Ray Dataset X-ray chest image

Image loaded as `chest_xray_image`. First, you'll check the histogram of the image and then apply standard histogram equalization to improve the contrast. Remember we obtain the histogram by using the `hist()` function from Matplotlib, which has been already imported as `plt`.



# 練習時間

## Contrast enhancement.ipynb



jupyter

Contrast enhancement

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Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted Python 3

Run Code

### 練習

Aerial image In this exercise, we will improve the quality of an aerial image of a city. Which has low contrast and therefore we can not detail very well the objects and figures in it.


Aerial image, airport taken from the air Image loaded as `image_aerial`. For this we will use the normal or standard technique of Histogram Equalization.




# 練習時間

## Contrast enhancement.ipynb
















 jupyter

Contrast enhancement Last Checkpoint: 5 hours ago (autosaved)

 Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted  Python 3 

       Run    Code 

### 練習


Let's add some impact and contrast Have you ever wanted to enhance the contrast of your photos so that they appear more dramatic?

In this exercise, you'll increase the contrast of a cup of coffee. Something you could share with your friends on social media. Don't forget to use #ImageProcessingDatacamp as hashtag!

Even though this is not our Sunday morning coffee cup, you can still apply the same methods to any of our photos.

Cup of coffee A function called `show_image()`, that displays an image using Matplotlib, has already been defined. It has the arguments `image` and `title`, with `title` being 'Original' by default.

Original



# 問卷

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

開課查詢

免費體驗專區

課程總覽

專業師

1

學員專區

講師專區



➤ 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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2

課程檔案下載

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	<a href="#">上課教材</a>	<a href="#">錄影</a> 3	<a href="#">課堂問卷</a>
2017/12/20 2000 ~ 2200	線上真人-ZBrush 3D動畫造型設計	17	<a href="#">上課教材</a>	<a href="#">錄影檔</a>	
2017/12/18 2000 ~ 2200	線上真人-ZBrush 3D動畫造型設計	16	<a href="#">上課教材</a>	<a href="#">錄影檔</a>	





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