



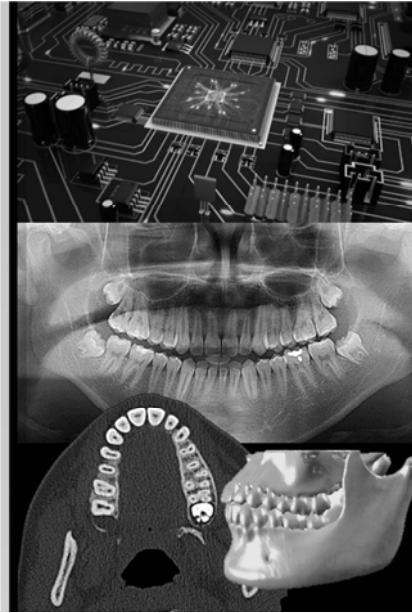
# 計算機概論 *for Dentist*

## IMAGE CONTRAST AND ZOOM IN (MATRIX INDEX AND OPERATION)

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## 請先下載本週上課資料

- 下載網址 [http://www.ym.edu.tw/~cflu/CFLu\\_course\\_DoDCompArch.html](http://www.ym.edu.tw/~cflu/CFLu_course_DoDCompArch.html)
- 下載第12週 [ 上課資料 ] [CAmaterials\\_L12.zip](#)

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2



## CREATE YOUR FIRST MATRIX

- Variable/File name cannot start with number.
  - $A1=15$ ; (correct)  $\Leftrightarrow$   $1A=15$ ; (wrong)
- Do not use preserved variable/function name.
  - pi, inf, nan, sin, cos, max, min, sum, for, end, ....

- $A=2$
- $A=[1\ 2\ 3]$
- $A=[1\ 2\ 3;4\ 5\ 6]$

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4



## MATRIX INDEX 矩陣取值

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3



# FORMAT OF INDEX

- Create matrix A.

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

```
Command Window
>> A(18)
ans =
6
```

```
Command Window
>> A(3,4)
ans =
6
```

# GET VALUE

- A specific range of index

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

```
Command Window
>> A([12:14 17:19])
ans =
4 64 6 6 6 7
```

```
Command Window
>> A(2:4,3:4)
ans =
4 6
64 6
6 7
```

# GET VALUE: TRY IT

- A specific range of index

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

# DELETE ROWS OR COLUMNS

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

```
Command Window
>> A(1:3,3:4)=[]
Subscripted assignment dimension mismatch.
```

```
Command Window
>> A(4,:)=[]
A =
12 2 33 4 46
3 7 4 6 5
4 6 64 6 84
7 4 45 23 78
```

# SET VALUE

- Rewrite values at specific locations

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

```
Command Window
>> A(7)=100
A =
12 2 33 4 46
3 100 4 6 5
4 6 64 6 84
6 5 6 7 37
7 4 45 23 78
```

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

```
Command Window
>> A(2,2)=100
A =
12 2 33 4 46
3 100 4 6 5
4 6 64 6 84
6 5 6 7 37
7 4 45 23 78
```

# SET VALUE

- Rewrite values at specific locations

**A**

12	2	33	4	46
3	7	4	6	5
4	6	64	6	84
6	5	6	7	37
7	4	45	23	78

```
Command Window
>> A([12:14 17:19])=[100 102 104 101 103 105]
A =
12 2 33 4 46
3 7 100 101 5
4 6 102 103 84
6 5 104 105 37
7 4 45 23 78
```

Column-wise index

(1)	(6)	(11)	(16)	(21)
(2)	(7)	(12)	(17)	(22)
(3)	(8)	(13)	(18)	(23)
(4)	(9)	(14)	(19)	(24)
(5)	(10)	(15)	(20)	(25)

Row-column index

(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

```
Command Window
>> A(2:4,3:4)=[100 101;102 103;104 105]
A =
12 2 33 4 46
3 7 100 101 5
4 6 102 103 84
6 5 104 105 37
7 4 45 23 78
```

# MATLAB 函式列表

- size – Size of array
- length – Length of vector
- find – Find indices of element with specific values

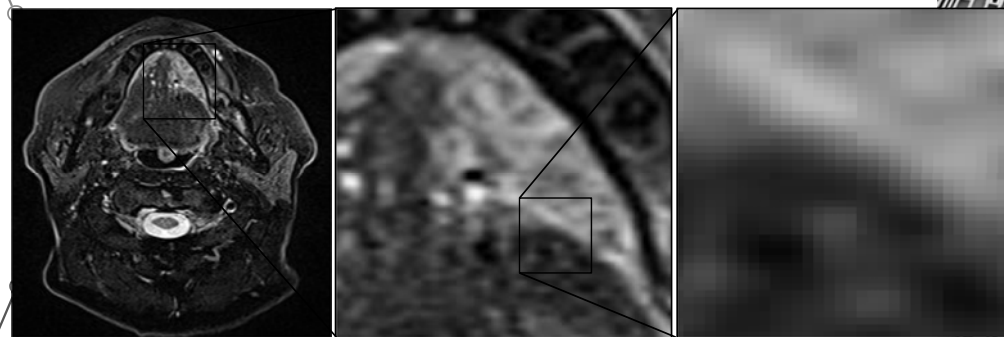
# IMAGE CONTRAST 影像對比

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13

# PIXEL INTENSITY

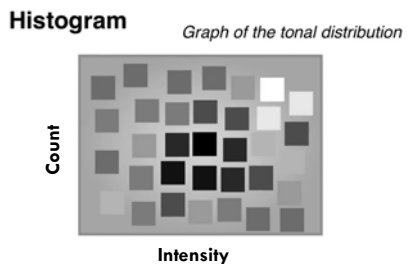


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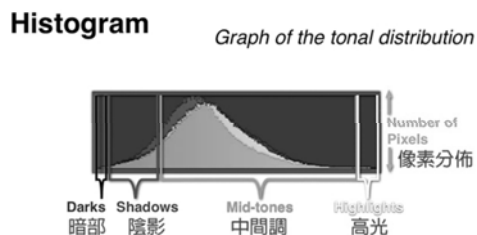
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14

# HISTOGRAM (曝光直方圖/強度直方圖)



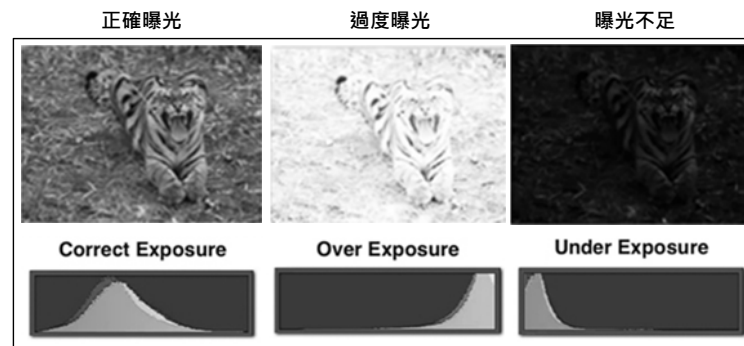
<https://youtu.be/ClbcS6QkeI8>



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15

# HISTOGRAM & EXPOSURE



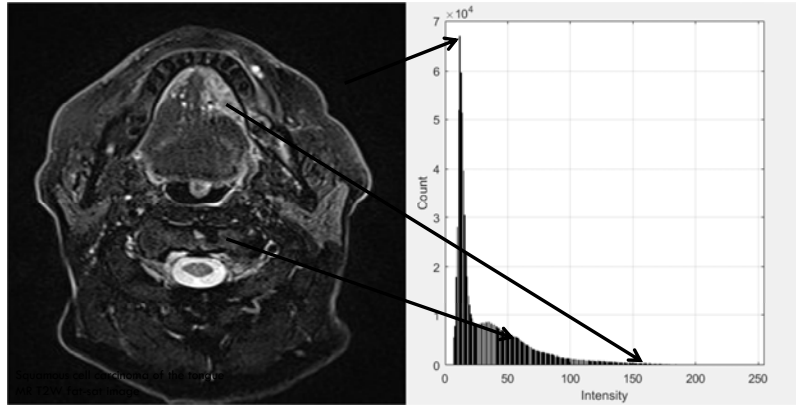
<https://youtu.be/ClbcS6QkeI8>

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16

# INTENSITY & HISTOGRAM



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17

# IMAGE READ

- `imread` Read image from graphics file.

`A = imread(FILENAME,FMT)` reads a grayscale or color image from the file specified by the string `FILENAME`. `FILENAME` must be in the current directory, in a directory on the MATLAB path, or include a full or relative path to a file.

- `img=imread('SCCtongue.jpg');`

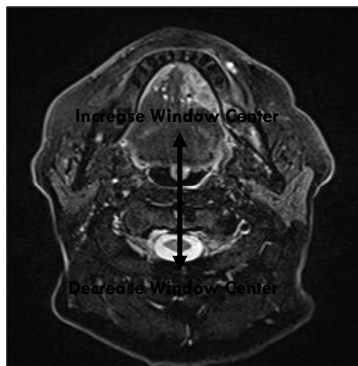
開啟CAmaterial\_L12\ImgContrast.m

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18

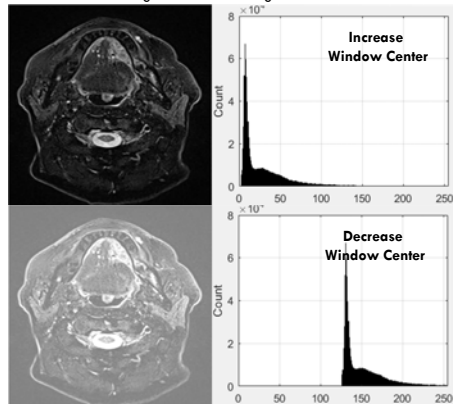
# WINDOW CENTER



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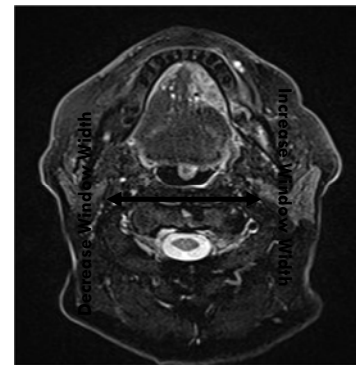
Shift histogram leftward or rightward



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19

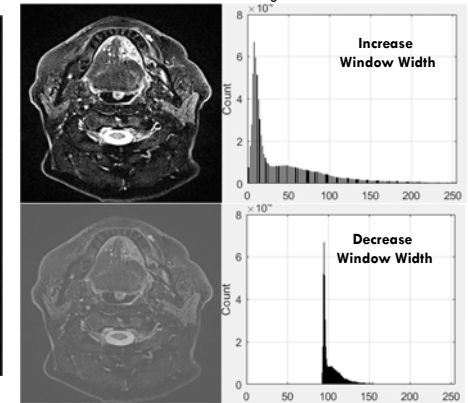
# WINDOW WIDTH



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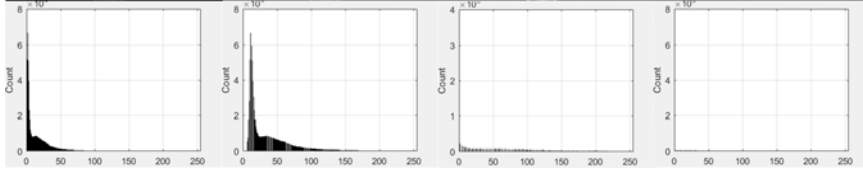
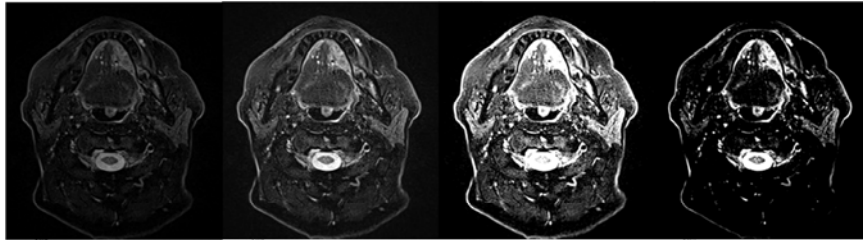
Widen or narrow the histogram



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20

## CONTRAST & HISTOGRAM



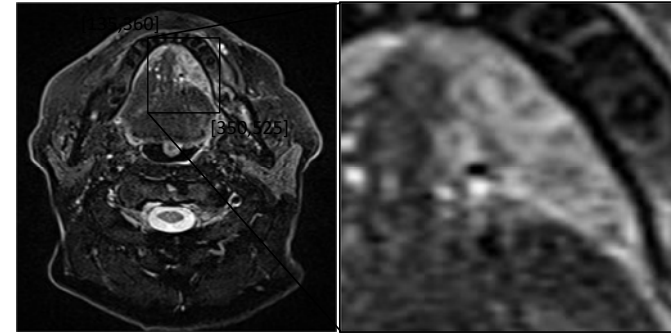
Histogram equalization

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21

## DIGITAL ZOOM IN



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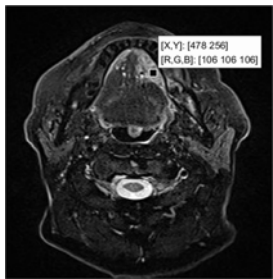
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22

## COLOR VS MONOCHROME

Monochrome



values on three layers



```
img=imread('SCCtongue.jpg');
image(img);
```

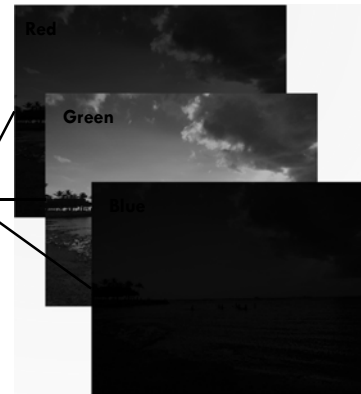
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23

## COLOR VS MONOCHROME

Color



```
img=imread('MagicIsland.JPG');
image(img);
```

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24



## MATLAB函式列表

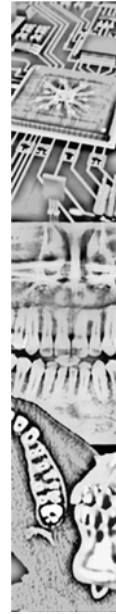
- imread – Read image from graphics file
- image – Display image from array
- figure – Create figure window



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25



## THE END

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26

