

# 1<sup>st</sup> Discussion Session

Jan. 7th

Jungah Son

# Contents

1. MATLAB Remote Access
2. Intro to MATLAB
3. MATLAB image toolbox

# MATLAB Remote Access

✓ Windows users

1. Download VNC Viewer (ex. UltraVNC)

2. PuTTY

Host Name:

csil.cs.ucsb.edu (bart, lisa, or  
homer.cs.ucsb.edu)

or linux.engr.ucsb.edu

3. Start your VNC Desktop

```
vncserver :1 -geometry 1280x800 -depth 24
```

# MATLAB Remote Access

4. Connect VNC Viewer

5. If you are using CSIL, path for MATLAB is:

`/fs/ece/Matlab/R2013b/bin/matlab &`

If you are using ECI:

Just type matlab in terminal

# MATLAB Remote Access

- ✓ Mac/Linux users

Download XQuartz (Mac) or X11 server (Linux)

```
ssh -X username@bart.cs.ucsb.edu
```

If you are using CSIL, path for MATLAB is:  
/fs/ece/Matlab/R2013b/bin/matlab &

If you are using ECI:

Just type matlab in terminal

**Use VNC Viewer if this is not working!**

# Turnin

✓ turnin prog1 @cs181b folderName (or  
filelist)

cf. See Homework Turnin Instructions  
section on course website.

<http://www.cs.ucsb.edu/~cs181b/>

**MATLAB**  
**MATrix LABoratory**

```
for (i =0; i<10; i++)
```



```
for i=1:10
```

```
end
```



# Frequently used functions

`zeros(n,m)`

`ones(n,m)`

`length(x)`

`sum(A)`

**Use 'Help'!**

Loop - for, while

Conditional statement - if

**Also use 'Help'!**

# Writing functions

```
function [output1, output2] =  
functionName(input1, input2...)
```

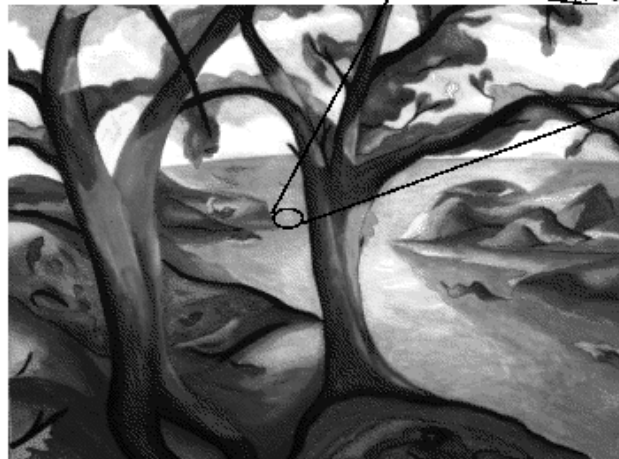
- 1. functionName has to be same as .m file name**
- 2. Outputs need to be assigned in function**

# Image Processing in MATLAB



# Images in MATLAB

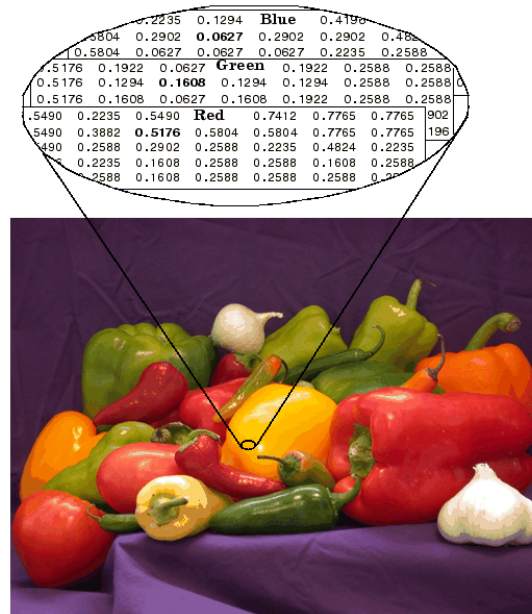
- ✓ Binary images: {0, 1}
- ✓ Intensity images: `uint8 [0,255]`, `double [0,1]`



0.2251	0.2563	0.2826	0.2826	0.4		
0.5342	0.2051	0.2157	0.2826	0.3822	0.4391	0.4391
0.5342	0.1789	0.1307	0.1789	0.2051	0.3256	0.2483
0.4308	0.2483	0.2624	0.3344	0.3344	0.2624	0.2549
0.3344	0.2624	0.3344	0.3344	0.3344	0.3344	0.3344

# Images in MATLAB

- ✓ Binary images:  $\{0, 1\}$
- ✓ Intensity images: `uint8 [0,255]`, `double [0,1]`
- ✓ RGB images:  $m \times n \times 3$

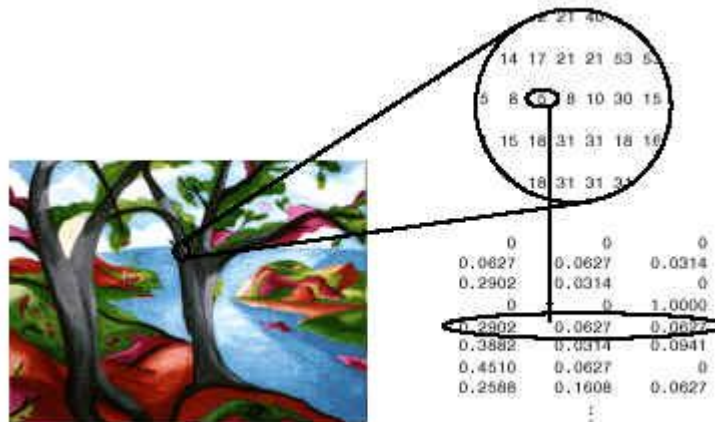


# Images in MATLAB

- ✓ Indexed images: image matrix, colormap

Image matrix – contains a value that is an index into the colormap

colormap –  $m \times 3$  matrix





# Working with Image Data

# Image Conversion

- ✓ `gray2ind` - intensity image to index image
- ✓ `im2bw` - image to binary
- ✓ `im2double` – convert to  $[0,1]$  double, different from `double(I)`, which only convert type. Consider which one you need in your program
- ✓ `im2uint8` - image to 8-bit unsigned integers
- ✓ `im2uint16` - image to 16-bit unsigned integers
- ✓ `ind2gray` - indexed image to intensity image
- ✓ `mat2gray` - matrix to intensity image
- ✓ `rgb2gray` - RGB image to grayscale
- ✓ `rgb2ind` - RGB image to indexed image

# Codes that we used in the discussion session

```
% Example 1: MATLAB variables  
and matrix
```

```
a = 3 % Scalars are 1x1 matrices  
b = a^2
```

```
c = [1 0 0] % row vector  
d = [3; 2] % column vector
```

```
e = [1 2 3; 4 5 6; 7 8 9] % matrix
```

```
% image processing (course website)
```

```
clc; clear all;
```

```
% read and write
```

```
img = imread('peppers.png');
```

```
figure;
```

```
imshow(img);
```

```
imwrite(img, 'output.png', 'png');
```

```
img2 = rgb2gray(img);
```

```
figure;
```

```
imshow(img2);
```

# Codes that we used in the discussion session

```
% Draw a circle and display
```

```
for i=1:256
    for j=1:256
        if sqrt((i-128).^2 + (j-128).^2) < 100
            img3(i,j) = 1;
        else
            img3(i,j) = 0;
        end
    end
end
figure;
imshow(img3);
```

# Codes that we used in the discussion session

Function in a separate m-file

ex) additon.m

```
function c = addition(a,b)
c = a + b;
```

Test the function

```
addition(6,5)
```