Multimedia Class 2016 TA Class

Slide 1:

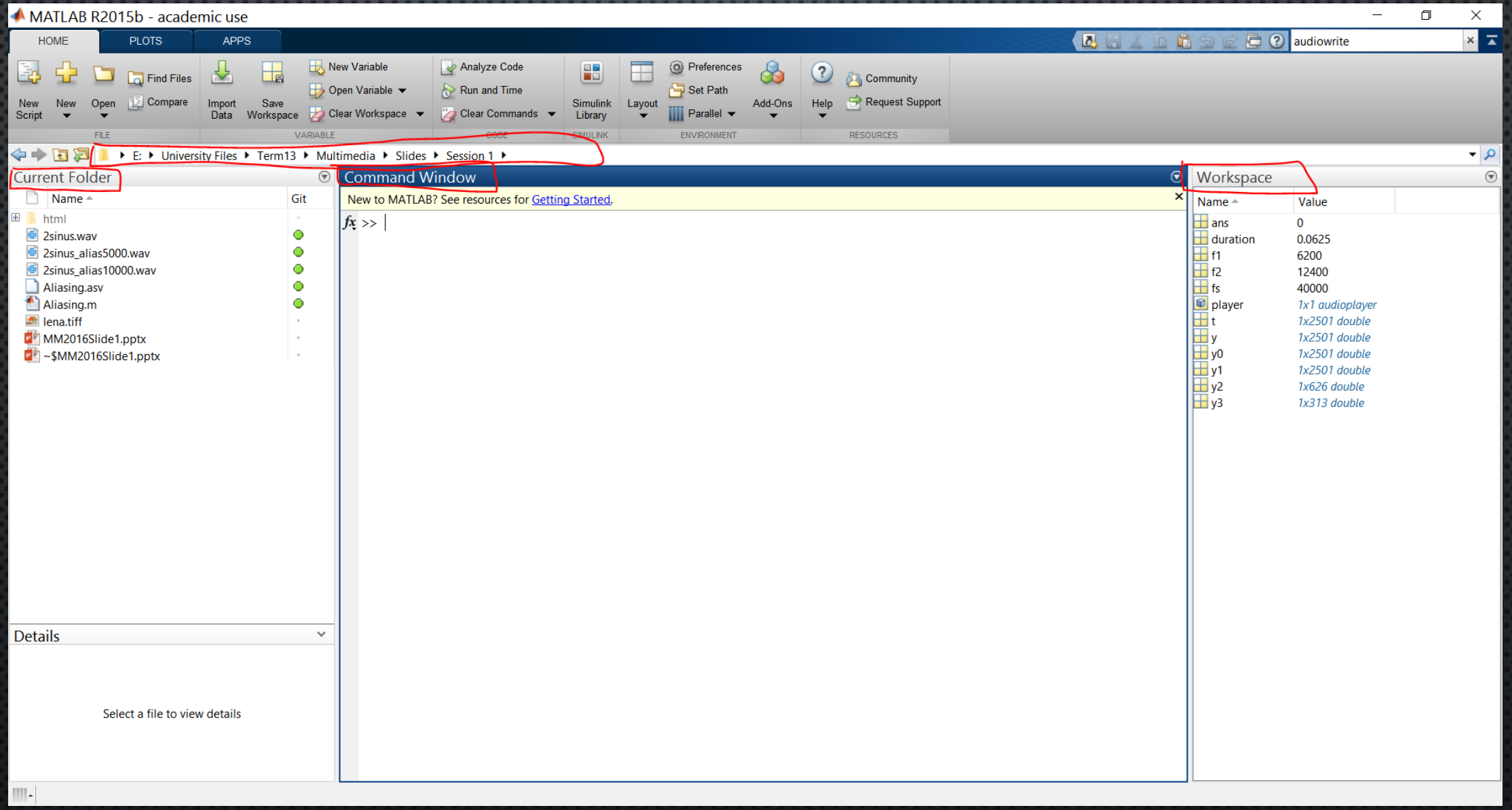
Introduction to Image Processing using MATLAB

Outline

- Introduction to MATLAB
  - Basics and examples
- Introduction to Image Representation in MATLAB
  - Basics and examples

Why MATLAB?

- MATLAB = Matrix Laboratory
- MATLAB is a high-level language and interactive environment that enables you to perform computationally intensive tasks faster than with traditional programming languages such as C, C++ and Fortran.
- MATLAB is an interactive, interpreted language that is designed for fast numerical matrix calculations
- A huge amount of Toolboxes and Code samples (Check out your MATLAB Help)
- A de facto standard framework for academic advancements


MATLAB R2015b - academic use
HOME
PLOTS
APPS
audiowrite
New Script
New
Open
Find Files
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New Variable
Open Variable
Clear Workspace
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Layout
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RESOURCES
E: University Files Term13 Multimedia Slides Session 1
Current Folder
Name
Git
html
2sinus.wav
2sinus_alias5000.wav
2sinus_alias10000.wav
Aliasing.asv
Aliasing.m
lena.tiff
MM2016Slide1.pptx
~$MM2016Slide1.pptx
Details
Select a file to view details
Command Window
New to MATLAB? See resources for Getting Started.
>>
Workspace
Name
Value
ans 0
duration 0.0625
f1 6200
f2 12400
fs 40000
player 1x1 audioplayer
t 1x2501 double
y 1x2501 double
y0 1x2501 double
y1 1x2501 double
y2 1x626 double
y3 1x313 double

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MATLAB

Data Import and Export

Standard File Formats

Audio and Video

Audio Recording and Playback

audioplayer

ON THIS PAGE

audioplayer

Create object for playing audio

collapse all in page

Syntax

```
player = audioplayer(Y,Fs)
player = audioplayer(Y,Fs,nBits)
player = audioplayer(Y,Fs,nBits,ID)
player = audioplayer(recorder)
player = audioplayer(recorder,ID)
```

Description

`player = audioplayer(Y,Fs)` creates an `audioplayer` object for signal `Y`, using sample rate `Fs`. The function returns a handle to the `audioplayer` object, `player`.

`player = audioplayer(Y,Fs,nBits)` uses `nBits` bits per sample for signal `Y`.

`player = audioplayer(Y,Fs,nBits,ID)` uses the audio device identified by `ID` for output.

`player = audioplayer(recorder)` creates an `audioplayer` object using audio recorder object `recorder`.

`player = audioplayer(recorder,ID)` creates an object from `recorder` that uses the audio device identified by`ID` for output.

Input Arguments

`Y`

Audio signal represented by a vector or two-dimensional array containing `single`, `double`, `int8`, `uint8`, or `int16` values.

The value range of the input sample depends on the data type. The following table lists these ranges.

Data Type	Sample Value Range
`int8`	-128 to 127
`uint8`	0 to 255
`int16`	-32768 to 32767
`single`	-1 to 1
`double`	-1 to 1

`Fs`

Sampling rate in Hz. Valid values depend on the specific audio hardware installed. Typical values supported by most sound cards are 8000, 11025, 22050, 44100, 48000, and 96000 Hz.

`nBits`

Bits per sample. Specify only when signal `Y` is represented by floating-point values. Valid values depend on the audio hardware installed: `8`, `16`, or `24`.

Default: `16`

MATLAB BASICS

- To find out the type and value of a variable you are using: who, whos

```
>> who

Your variables are:

ans        f1         fs         t          y0         y2
duration   f2         player     y          y1         y3
```

```
>> whos y
  Name        Size                Bytes  Class     Attributes

  y           1x2501              20008  double
```

- Saving and loading variables to *.mat files: save, load
- A good practice to include in your files before doing anything:
  - clear all, clc, close all, fclose all;

MATLAB BASICS

- Main matlab variable type: Matrix
- Creating matrices:
  - A = [1 2 3; 4 5 6; 7 8 9]
  - Special Matrices: zeros, ones, rand, randn, eye
  - Finding size of matrix: size(A) = [3 3]
  - Sum(A), sum(A, 2), sum(sum(A))
  - CODE
- Finding something in a matix:
  - Find(A < 4)

Control statements

- If statement
- Switch statement
- For loop
- While loop
  - Continue
  - Break
  - End

- Whenever in doubt, use MATLAB Help

M-FILES

- There are 2 kinds of *.m files
  - Functions
    - Well, you should know what functions are, if not, Google it ☺
    - We will get into more details later
  - Scripts
    - Scripts are simple MATLAB code that will be run line by line
    - It's like you would run them line by line in command window

Let's get to business

- Check the MATLAB Code