Multimedia Class 2016 TA Class

Slide 1:

Introduction to Image Processing using MATLAB

First things first

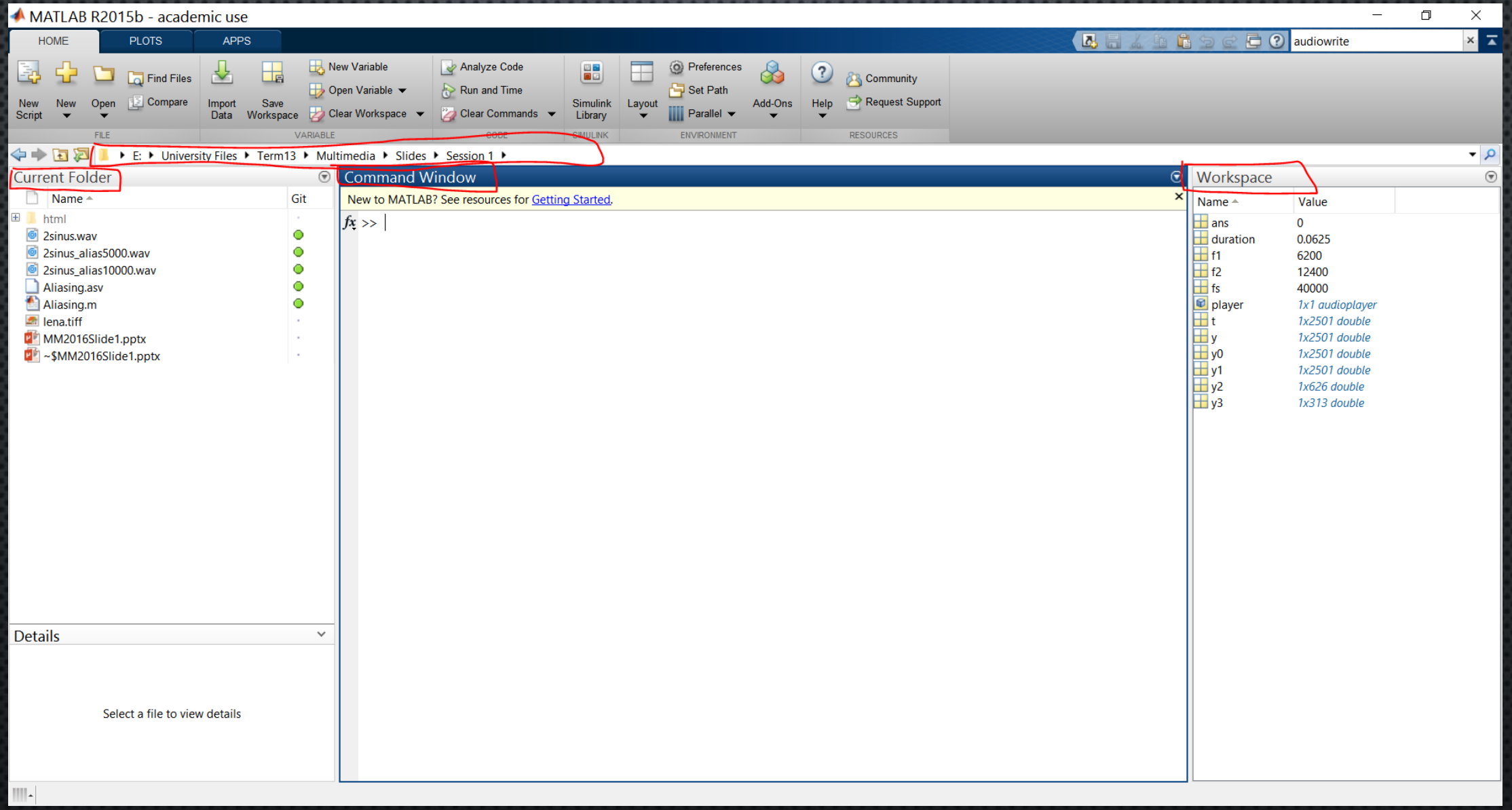
- Edmodo is for handing out your homework and announcements
  - Group Code: a6s3az
  - Each homework usually has about 7-10 days
- I will be in SPRL lab on Mondays, in case you have any questions (3rd Floor)
- ** PLAGIARISM IS "NOT" TOLERATED! (you're better off not turning in your homework)**
- About half of your score is the homework that you turn in
- The rest will be your final course project
  - Do something cool, you will enjoy it ;-)
  - Start thinking about it
  - Try new fields in computer vision / image processing / audio processing / …
  - It takes more than a couple of days to learn 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
  - Except for its competitor in computer vision: OpenCV


MATLAB R2015b - academic use
HOME
PLOTS
APPS
audiowrite
New Script
New
Open
Find Files
Compare
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
Analyze Code
Run and Time
Clear Commands
Simulink Library
Layout
Preferences
Set Path
Parallel
Add-Ons
Help
Community
Request Support
FILE
VARIABLE
CODE
SIMULINK
ENVIRONMENT
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

Help

audiowrite | audioplayer

Documentation

Search Documentation

CONTENTS Close

All Products

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

ANY QUESTIONS?