



MIRtoolbox PRIMER

for absolute beginners

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I. BASICS

Matlab Environment

LAUNCH *MATLAB*

To start *Matlab* in Mac OS X 10.6, open the *Applications* folder (on the right of the dock, at the bottom-right of the screen), open the *MATLAB_2007b* folder, and in that folder, click on the *MATLAB 7.5* icon.

MATLAB COMMAND WINDOW

Once *Matlab* is launched, you should see a new window with many panels. The most important part of this window is the large white area called ‘*Command Window*’ where you can dialog with *Matlab* by writing some little commands.

mirplay: Playing an audio file

EXAMPLE AUDIO FILES

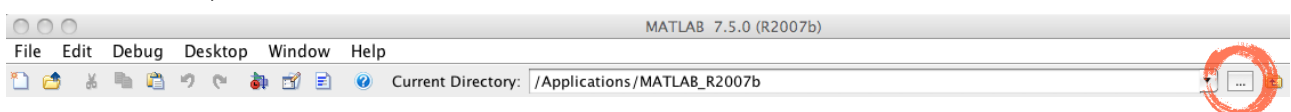
MIRtoolbox includes a set of musical examples that can be used to test the software. One of those files is a short excerpt of a piano ragtime, and is named *ragtime.wav*. To simply play that audio file, just write the following command in *Matlab* Command Window:

mirplay('ragtime')

and then press enter to execute that command.

YOUR AUDIO FILES

Now let’s try to load and play one of your own audio file. The file should be in WAV, MP3 or AU format, and should be stored in a folder accessible to your computer (for instance, your ‘*Desktop*’ folder). First of all, you need to tell *Matlab* that the *Current Directory* you want to consider now is that particular folder where your file is located. To set the Current Directory, just click on the ‘*Browse for folder*’ icon (‘...’ button next to the Current Directory field in the main *Matlab* toolbar:)



This opens a file browser where you can select that particular folder, and click ‘Open’.

Once you have selected that folder, you should now see the content of that folder on the ‘*Command Directory*’ panel on the left of the *Matlab* window. In particular, the file you want to analyze should be indicated in that panel. Now you can simply play that file as before. If for instance your file is called *myfile.wav*, then just write the following command:

mirplay('myfile')

PLAYING A FOLDER OF FILES

You can also play a complete folder by writing the following command:

mirplay('Folder')

HOW TO ABORT A PROCESS

If some particular process you have launched in *Matlab* takes too much time, you can abort it at any point. For instance, if you asked to play all the audio files of a folder, you can stop that playlist by pressing on both keys ‘*ctrl*’ and ‘*c*’ altogether. It might sometime takes some time to abort. If *Matlab* still does not react, try pressing this key combination several times.

miraudio: Audio waveform

MIRtoolbox offers a set of tools for the analysis of audio recordings, of music in particular. The simplest representation that can be obtained from an audio recording is the waveform representation of the audio signal.

To display the audio waveform of the *ragtime* file, just write the following:

miraudio('ragtime')

This opens a new *Figure* window that contains the graphical representation of the audio waveform.

SAVING FIGURES AS IMAGES

You can save that image by selecting ‘*Save*’ in the ‘*File*’ menu on the top of the *Figure* window. *Matlab* can save in various image format, that you can see in the *File Format* list. If for instance you want to save the image for further use in Microsoft Office, you can save it for instance using a file name with the PNG extension, such as *myimage.png*.

YOUR AUDIO FILE

To display the audio waveform of a file called *myfile.wav* located in the Current Directory, just write the following:

miraudio('myfile')

ANALYZING A FOLDER OF FILES

To display the audio waveforms of all the audio files located in the Current Directory, just write the following:

miraudio('Folder')

EXTRACTING A PART

You can focus on one particular part of your audio file. If for instance, you want to see only the excerpt starting at $t = 20$ seconds and ending at $t = 30$ seconds, just write the following:

miraudio('myfile', 'Extract', 20, 30)

PLAYING AN EXCERPT

You can store your excerpt in a variable – let's call it *a*, for instance:

a = miraudio('myfile', 'Extract', 20, 30)

In this way you can then play the result (i.e., that particular excerpt) by simply writing:

mirplay(a)

mirspectrum: Spectral decomposition

GLOBAL REPRESENTATION

One common representation of sound is by displaying the repartition of energy along the different frequencies. To get this spectral representation for the *ragtime* example, just write the following:

mirspectrum('ragtime')

This first representation simply gives the global repartition for the whole piece of music.

TEMPORAL EVOLUTION

Alternatively, we can also see the evolution over time of this spectral representation, by using the *'Frame'* keyword:

```
mirspectrum('ragtime', 'Frame')
```

Now the different frequencies are represented on the vertical axis, the horizontal axis corresponds to the temporal evolution of the music.

ANALYZING AN EXCERPT

You can get the spectral representation of the excerpt you have selected:

```
a = miraudio('myfile', 'Extract', 20, 30)
```

```
mirspectrum(a)
```

And similarly, for the temporal spectral evolution of that excerpt:

```
mirspectrum(a, 'Frame')
```

mirbrightness

```
mirbrightness('ragtime')
```

```
mirbrightness('ragtime', 'Frame')
```

```
a = miraudio('ragtime', 'Extract', 20, 30)
```

```
mirbrightness(a)
```

```
mirbrightness(a, 'Frame')
```

mircentroid

```
mircentroid('ragtime')
```

```
mircentroid('ragtime', 'Frame')
```

a = miraudio('ragtime', 'Extract', 20, 30)

mircentroid(a)

mircentroid(a, 'Frame')

mirroughness

mirroughness('ragtime')

a = miraudio('ragtime', 'Extract', 20, 30)

mirroughness(a)

2. RHYTHM

mirtempo('myfile')

mirtempo('myfile', 'Frame')

3. TRANSCRIPTION

mironsets('myfile')

mirpitch('myfile', 'Frame')

4. TONALITY

mirkey('myfile')

mirkey('myfile', 'Frame')