Lecture 7: Signal and Image Processing

Matlab patch for OS X Yosemite

7 Answers

Answer by MathWorks Support Team on 1 Aug 2014

Accepted answer

3 votes

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Link

MATLAB R2014b is supported on Mac OS X 10.10 (Yosemite). R2014b works without any modifications.

Issues on Yosemite may manifest in two ways:

1. MATLAB R2011a through R2014a (R2011a, R2011b, R2012a, R2012b, R2013a, R2013b and R2014a) may trigger a Java exception and abrupt exit upon startup. Once patched, they appear to work normally, but compatibility cannot be guaranteed. The patch can be downloaded from the bug report that can be accessed from the link below:

https://www.mathworks.com/support/bugreports/1098655

2. Launching MATLAB on certain versions of Mac OS X 10.10 (Yosemite) displays the following error message in a dialog:

```
"You can't use this version of the application".
```

This issue can be resolved by following the steps in the Bug Report linked below:

https://www.mathworks.com/support/bugreports/1116607

Versions of MATLAB earlier than R2011a are *not *compatible with Mac OS X 10.10 (Yosemite).

For more information, please refer to the platform roadmap:

http://www.mathworks.com/support/sysreq/roadmap.html

http://www.mathworks.com/matlabcentral/answers/159016-is-matlab-compatible-with-mac-os-x-10-10-yosemite

Outline

- Signal processing basics
- the power of Fourier analysis
- Peak detection
- Image processing

What constitutes a ‘signal’ ?

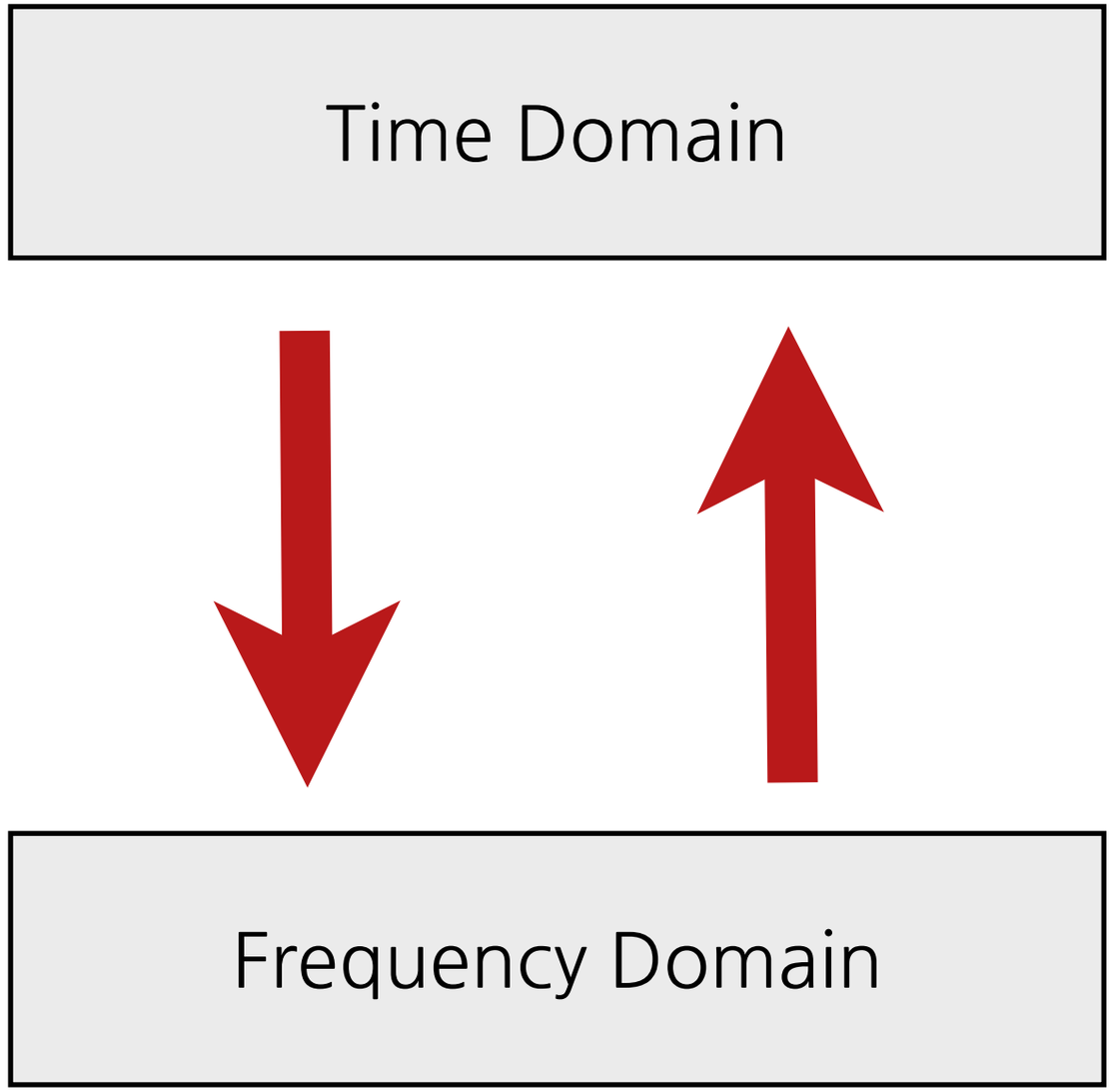
- Any piece of data, really …
- Most common: data varying across time or space
- Properties of signals:
    - dimensionality (1D, 2D, etc.)
    - sampling rate (samples per second)

Fourier Analysis: A primer

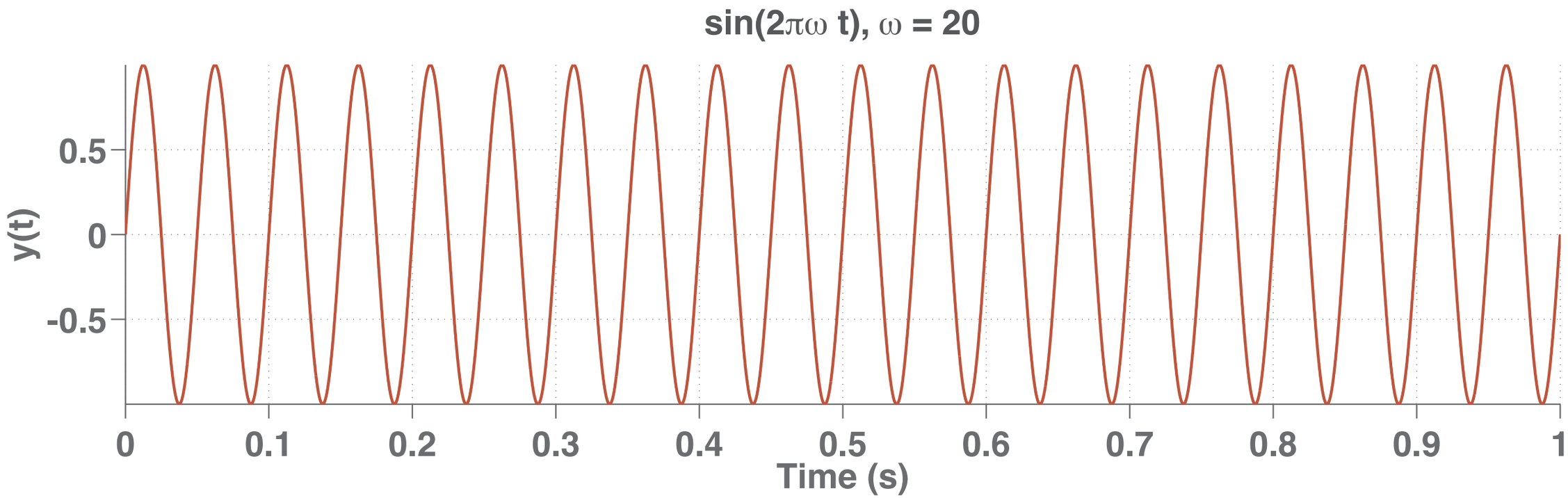
Useful for:

- Noise Reduction
- Period Estimation
- Anti-aliasing
- and much, much more ....

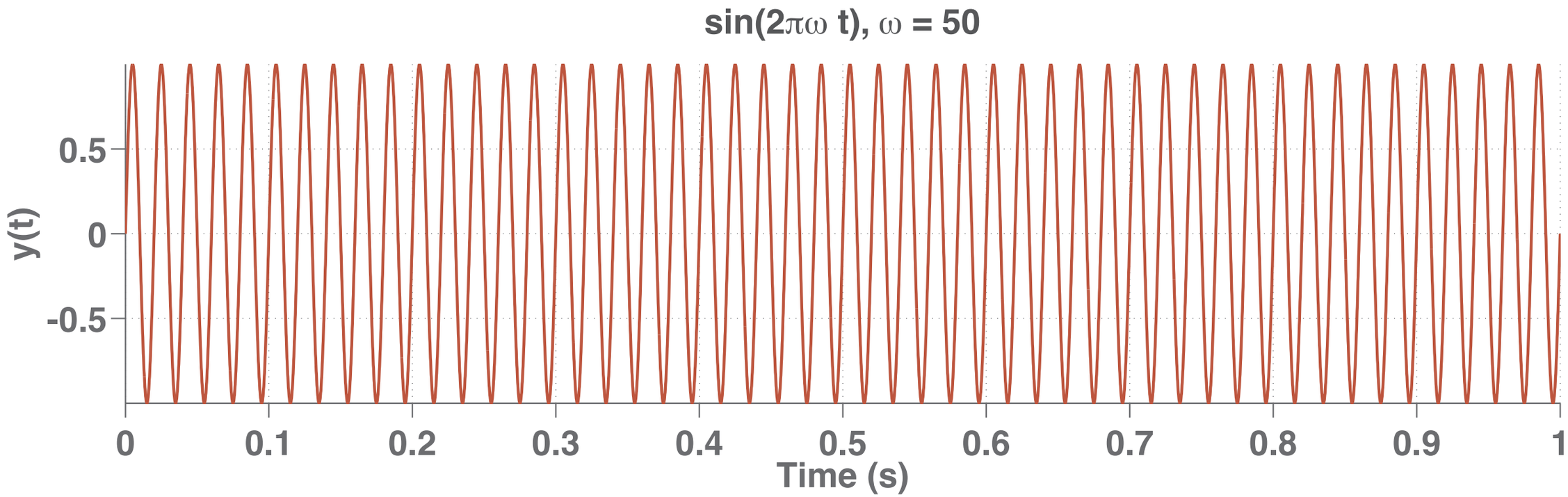
Fourier Analysis: A primer



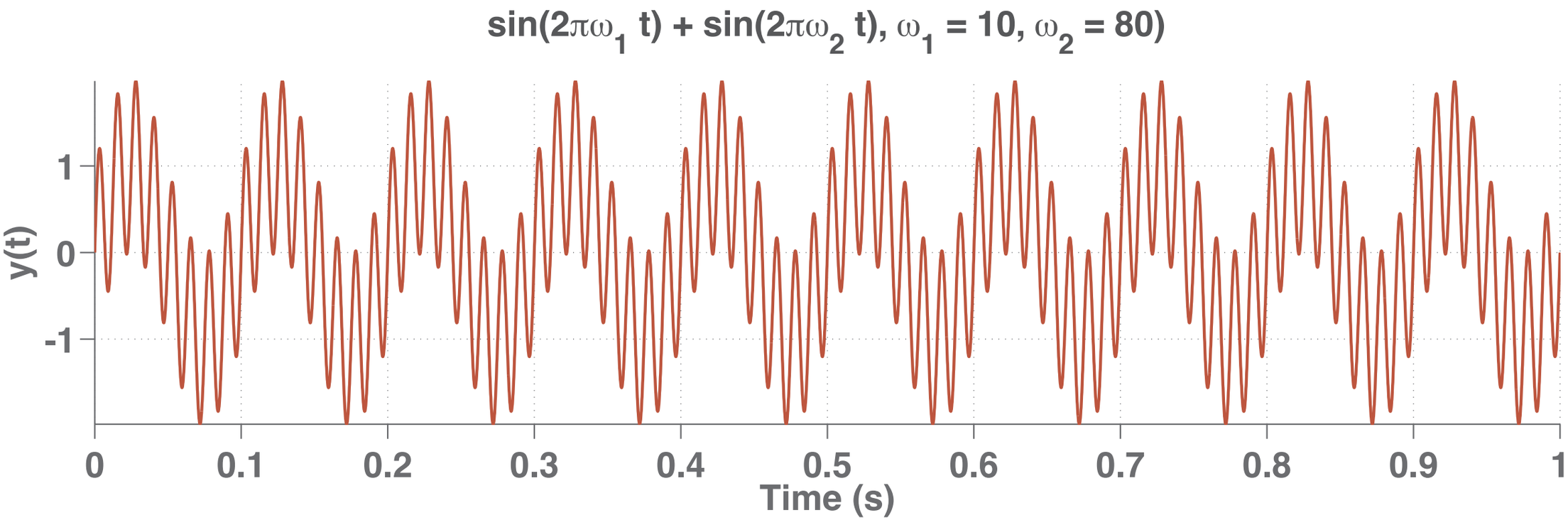
Simple Signals



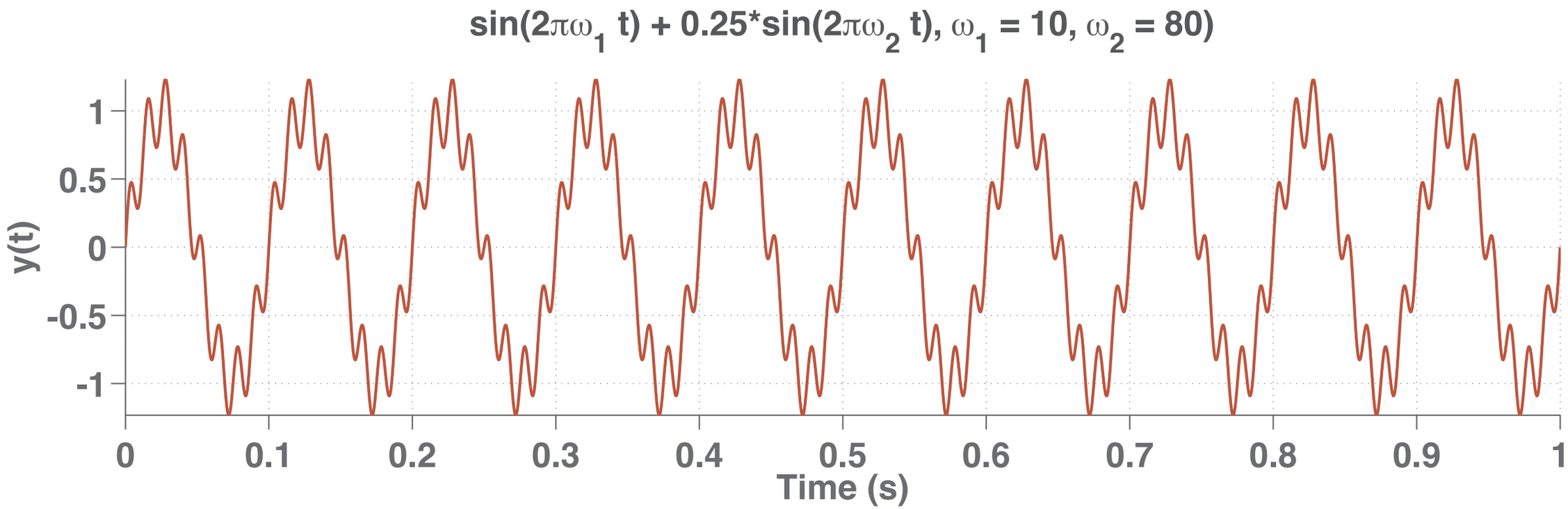
Simple Signals



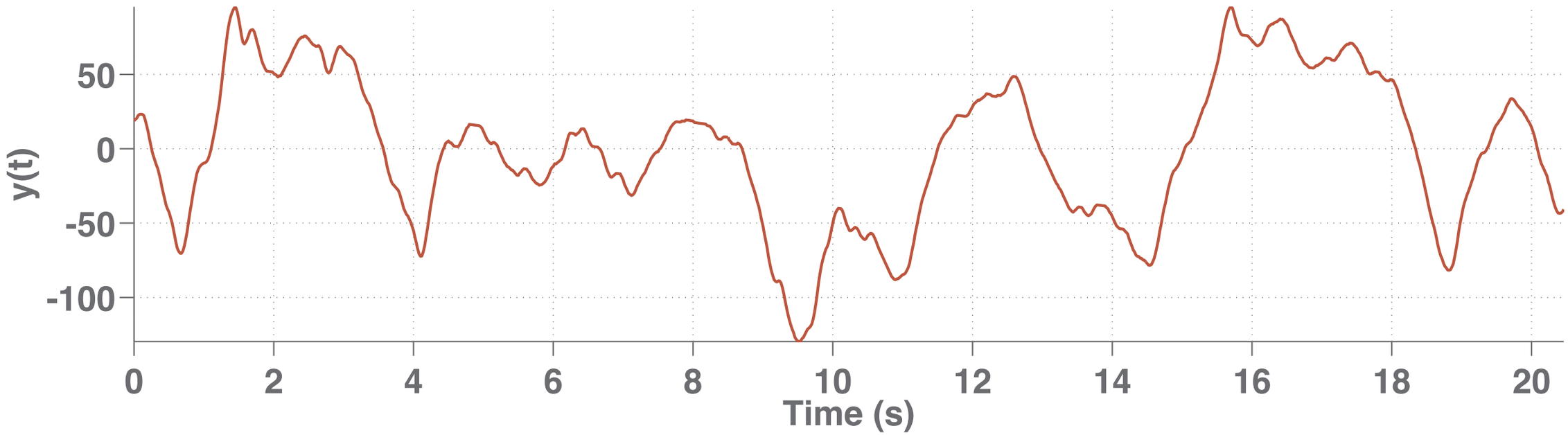
Linearity


sin(2πω1 t) + sin(2πω2 t), ω1 = 10, ω2 = 80)
y(t)
1
0
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Time (s)

Linearity


sin(2πω1 t) + 0.25*sin(2πω2 t), ω1 = 10, ω2 = 80)
y(t)
1
0.5
0
-0.5
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Time (s)

Complex Signals



Fourier Analysis in Matlab

Given a signal y(t):

```
F = fft(y);
```

Computes the Fast Fourier Transform (FFT)

F is a vector the same size as y

Nyquist limit

You can only resolve or estimate frequencies up to **half** of the sampling rate

(tradeoff between resolution and processing time / storage space)

Demo:

Fourier Analysis

Signal Processing in Matlab

Other useful functions (see documentation for more info):

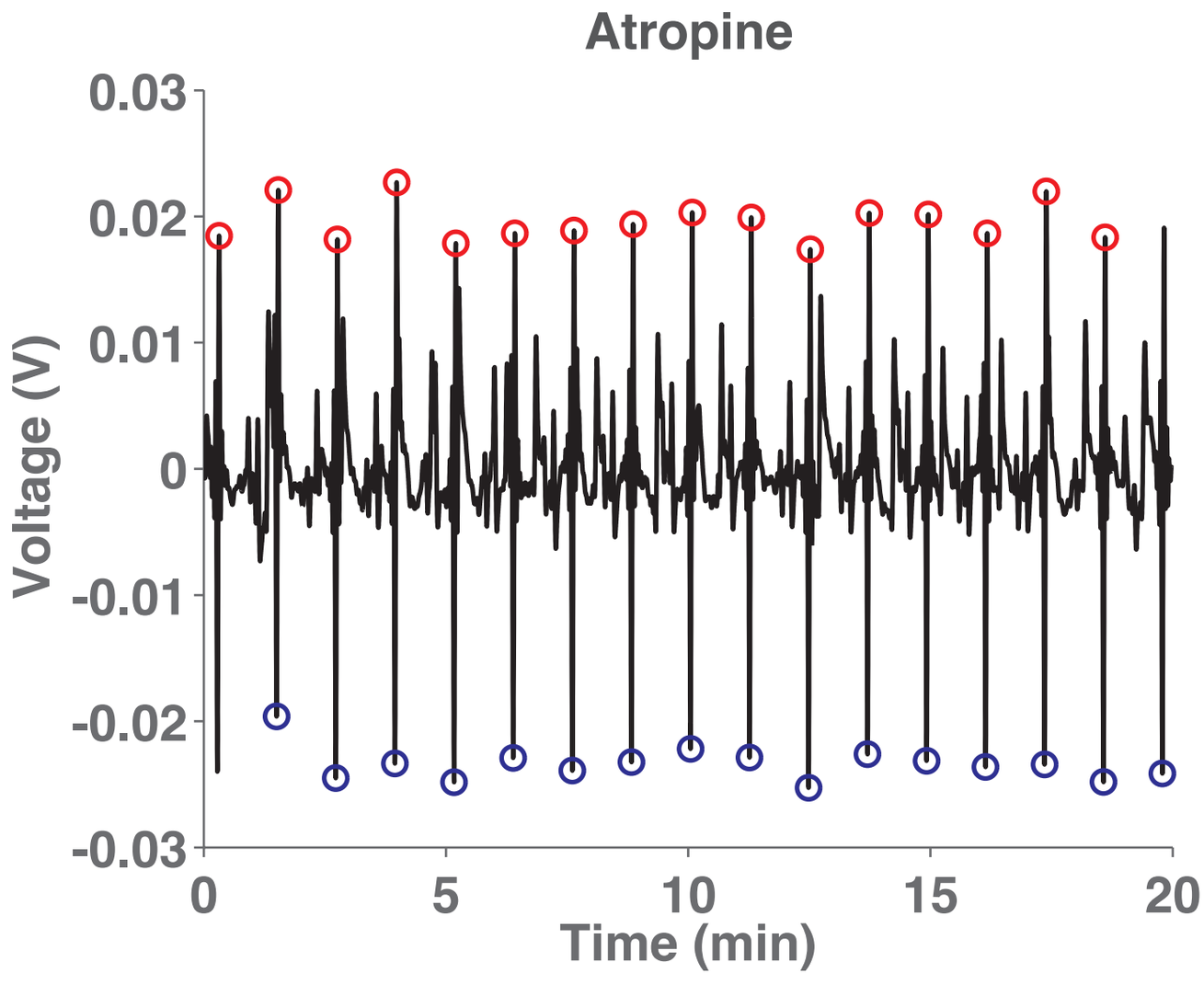
`filter`

`conv`

`xcorr`

Peak Detection

Lots of different algorithms, we will use one on FileExchange:



Demo:
Smoothing and Peak detection

Image Processing

Loading/Displaying images:

`imread`

`imshow`

`rgb2gray`

Filtering images:

`imfilter`

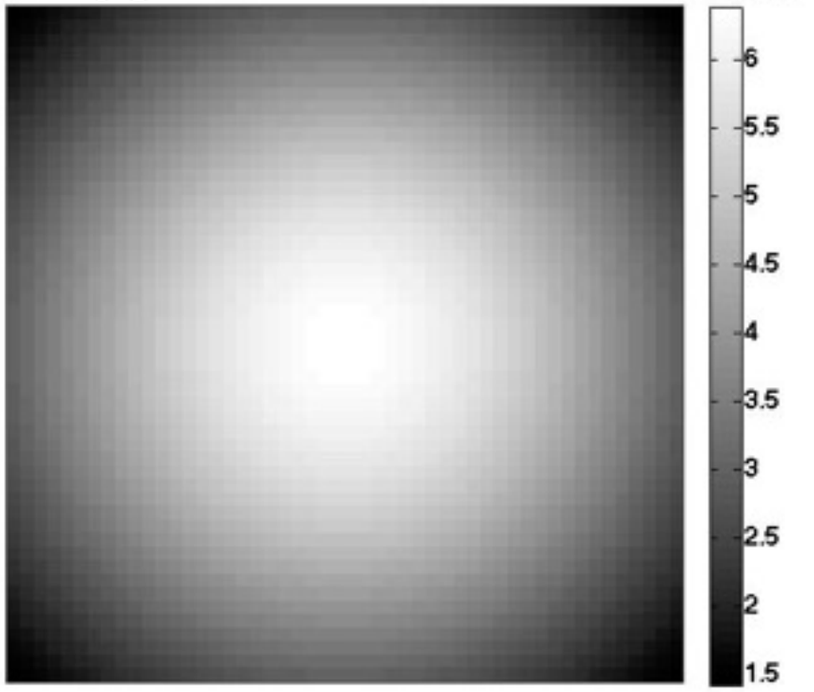
`fspecial`

Image Processing

image

*

filter



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Demo:

Image Processing

Audio

Reading audio files:

```
[y, fs] = wavread('sound.wav');
% also see: audioread


% use wavwrite to save audio
```

Demo:

Audio

Recap

- Fourier Analysis
- Peak detection / smoothing
- Image Processing
- Audio