EE3731C – Signal Processing Methods (e-Learning Materials)

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Tutorials on Programming Tools

(select one of them to learn in more details)

Matlab

Matlab: a high-level language and interactive environment for numerical computation, visualization, and programming.

http://www.youtube.com/playlist?list=PL7CAABC40B2825C8B
  - Getting Started with MATLAB
  - Working in the Development Environment
  - Writing a MATLAB Program
  - Working with Arrays in MATLAB
  - Introducing Structures and Cell Arrays
  - Introducing MATLAB Fundamental Classes (Data Types)
  - Using Basic Plotting Functions
  - Creating a Basic Plot Interactively
- A good tutorial for starters (around 40 mins)
  - Watch the tutorial
  - Have an idea and know the basics of Matlab

Octave

Octave: a high-level interpreted language, primarily intended for numerical computations. A free alternative to Matlab.

http://xoctave.com/blog/getting-started-with-gnu-octave/
- Octave Introduction
- Moving Data Around
- Computing Data
- Plotting Data
- Control Statements
- Vectorization

- A good tutorial for starters (around 80 mins)
  - Watch the tutorial
  - Have an idea and know the basics of Octave

Online Apps / Programs

Fourier Transform

http://home.fuse.net/clymer/graphs/fourier.html

- An online applet (JavaScript) to perform Fourier Transforms
  - Visualize the typical time-domain functions
  - Perform Fourier transform
  - Visualize the transformed functions in the frequency domain

PCA

http://white.stanford.edu/~knk/Psych216A/FinalProjects/Nick/html/Psych216AFinalProject_NickWeiler.html#2

- An example of PCA in Matlab
  - Read the algorithms and get an idea of PCA (or signal processing methods in general) in Matlab
    - How to manually solve it using basic functions in Matlab
    - How to leverage on available advanced functions in Matlab
  - Take a look at the visualizations
  - Try the codes in Matlab if possible

Difference Equations

Linear case:

http://math.bu.edu/DYSYS/applets/linear-web.html

Nonlinear case:

http://math.bu.edu/DYSYS/applets/nonlinear-web.html

- Applets on difference equations
  - Visualize the quantitative behavior of various linear/nonlinear functions (read the notes on the websites for more details on how to play with the different parameters and initializations).

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