Learning MATLAB through Biomedical Case Studies

The purpose of this course is to introduce the tools of MATLAB for biomedical data analysis to noobs. This will be done through a series of case studies. Case studies have long been used in Bschools, Lschools, and Med schools, but they can be used in any discipline when the emphasis is placed on how these concepts apply to "real world" situations.

List of Potential Case Studies

- Calculating and Visualizing Sequence Statistics
- Aligning Pairs of Sequences
- Exploring Gene Expression Data
- Exploring Protein-DNA Binding Sites from Paired-End ChIP-Seq Data
- Selecting a Sample Size
- Signal Generation and Visualization
- Practical Introduction to Frequency-Domain Analysis
- Detect and Measure Circular Objects in an Image
- Measuring Regions in Grayscale Images
- Detecting a Cell Using Image Segmentation
- Thresholding an image
- Image Segmentation Tutorial ("BlobsDemo")
- Visualizing Microarray Data

Our intent is to focus on why and how to apply a MATLAB function or concept, not on remembering facts and details. Through a team-oriented, line-by-line review of case study scripts, we hope that these concepts will allow participants to implement their own code for their particular analysis needs.

Sounds great right? But where do we begin? Before diving into these case studies, we begin with the basics.

Section 1: The Basics

- Getting started
- Matrix operations
- Functions
- Flow of control
- Data structures
- Plotting
- Scripts

Section 2: Core Concepts of each case study

- Data import
- Data management
- Data exploration
- Data visualization
- Generate report/publication figures

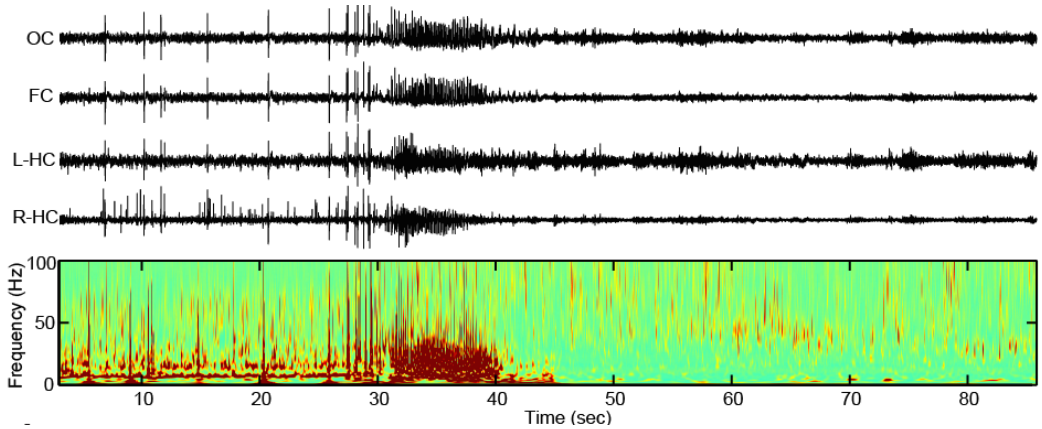
Section 3: Advanced

- Form groups and develop your own case study
- Lead the class through your own case study by going over a script and displaying visuals of your analysis

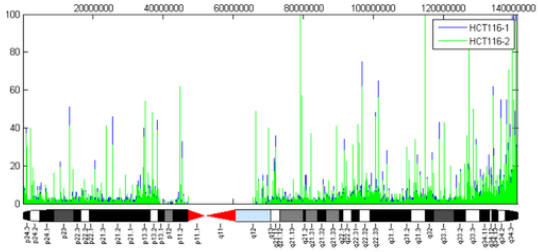
Installation: Visit this link: http://hsl.med.nyu.edu/software
Ask the Help desk if you have problems installing MATLAB. Remember to include all available toolboxes in the download (e.g. Statistics, Bioinformatics, Signal Processing, Image Processing, Computer Vision System, etc.)

Class website: Teaching material (scripts, datasets) and Student Q&A will be located here
https://piazza.com/nyu/summer2014/tbd/home

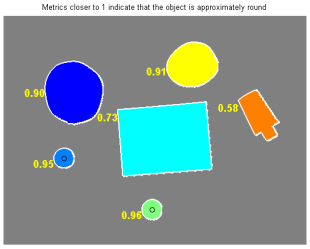
Signal Processing



Visualize Sequencing



Automated image measurements



Microarray data comparison