

Statistics and Simple Plots



Outline

- Announcements:
 - Homework II: due Today. by 5, by e-mail
- Statistics
- Simple plots

Statistics

- Descriptive
 - summarize properties of data
- Comparative
 - compare data sets
 - test hypotheses

Descriptive Stats

- Most common descriptive stats are in "datafun" toolbox
 - mean, median, min/max, std
 - vectorized, operate on columns
 - Ex: x & y are column vectors with data
 - `m=mean([x,y])`
 - `m(1)=mean of x, m(2)=mean of y`

Descriptive Stats

- The descriptive stats functions don't like nans
 - `mean([nan;x])` returns NaN
- The statistics toolbox has `nanmean`, `nanmin`, `nanstd`, etc. that ignore nans
 - Simple to write your own versions

Basic Comparative Stats

- Curve fitting with `polyfit`
- Correlation coefficient (r) with `corrcoef`

“Advanced” Comparative Stats

- Statistics toolbox has functions for
 - regress--like polyfit, but get stats (p, R2)
 - ANOVA

Summary of Matlab Stats

- Matlab has basic stats built-in
- Can expand with the stats toolbox
- Most statistical tests are easy to program
 - Can program Matlab to deal with your data!
 - look for vector-products!

Simple plots

- Plot 1D functions (2D data) with plot
 - plot(x,y) plots (x,y) with a blue line
 - plot(y) is plot([1:length(y)],y)
 - plot(x,[y1,y2,y3]) plots (x,yX) each in a different color

Customizing plot

- `plot(x,y,'r')` is a red line
- `plot(x,y,'o')` plots circles rather than lines
- `plot(x,y,'yp')` plots yellow pentagrams
- Type `help plot` to get more options

Specialized 1D graphics

- `bar--bar` chart
- `pie--pie` chart
- `polar--polar` coordintes
- `semilogy`, `semilogx`, `loglog--plotting` with log-scales

2D basics

- Assume data `Z` is on a regular grid defined by `X` and `Y`
- `pcolor`, `imagesc`, `contour` plot in 2D
- `surf`, `mesh` plot in 3D (perspective)

2D basics

- 2D graphics use colors to represent data
- Color of z is defined by a colormap and caxis
- several built-in colormaps--help graph3d

Generic graphics functions

- xlabel, ylabel, title label your plots
- hold on--allows multiple plots on same axes
- clf clears the figure window
- axis([xmin,xmax,ymin,ymax]) controls axis properties

Multiple plots

- subplot(m,n,j) creates the jth plot in an m-by-n matrix of plots

n=col

	1	2	3	4
1	1	2	3	4
2	5	6	7	8
3	(row-1)*n+col	10	11	12

m=row

Axes & Figures

- Matlab plots into figures
 - figure(n) makes n the current figure or creates a figure numbered n
- Figures contain axes
 - If no axes exist in current figure, then any graphics call will create one
 - Can explicitly create with subplot or axes

Printing figures

- print will send(gcf) to printer (or use GUI)
- print -depsc fname.eps will save graphics in EPS format
- print -djpeg fname.jpg will save into JPG format
