STATISTICS 579

S-Plus Tutorial : Class 7

In the following example we shall use some plotting functions to plot scatterplot matrices, contour plots, and three dimensional surfaces. The `pairs()` function creates a graph that consists of a scatterplot for each combination of variables that is supplied through an Splus object argument. A `panel=` argument can be used to add overlays on each scatterplot.

    motif()

    pairs(state.x77)

    pairs(state.x77, panel=function(x,y) {points(x,y); lines(lowess(x,y))})

The `contour()` and the `persp()` functions create contour plots, and three dimensional surfaces. Here we shall use these functions, to plot contours and 3-D graphs of a bivariate normal density function. First construct a function to compute values of the bivariate normal density at a point (x, y) for a specified value of ρ, the correlation parameter.

    normf = function(x, y, rho){

        c1 = 1/(6.28318531 * sqrt(1 - rho^2))

        c2 = -1/(2 * (1 - rho^2))

        f = c1 * exp(c2 * (x^2 - 2 * rho * x * y + y^2))

    return(f)

    }

Then for a grid of pairs of values (x, y) we use the `outer()` function to compute the values z of the bivariate normal density and use (x, y, z) as arguments in the `contour()` and the `persp()` functions.

    x = seq(-4, 4,, 40)

    y = seq(-4, 4,, 40)

    outer(x,y,"plot")

    z = outer(x, y, "normf", 0.8)

    contour(x, y, z, nlevels=15)

    title("Bivariate Normal (Rho=0.8) Contours")

    persp(x,y,z)

    persp(x, y, z, eye=c(-48,-64,2))

    persp(x, y, z, eye=c(+48,-64,2))

    title("Bivariate Normal (Rho=0.8) Surface")

    brush(state.x77)

Using Splus under Emacs S-mode

Setting up the .emacs file

First add the following line into your existing .emacs file:

(load "/home/stat/elisp/smode.emacs")

If you do not have a .emacs file in your home directory, create a new .emacs file with this line as the only line in it. If you already have some other lines in your .emacs referring to smode, comment them out by inserting a ";" at the beginning of each line. Save the editted .emacs file in your home directory.

Starting-up the S-mode

With this step successfully completed, you are ready to try the S-mode in emacs. From your stat579 directory execute the following Unix commands:

% add stat

% add splus

% emacs &

Then move to the emacs window, (make make it larger to fill screen) and enter C-x 3. That is, press Ctrl-x and then 3. The window splits in two halves (so that the window can display *two* buffers at the same time).

Make sure the left half is active by clicking the mouse (left button) in it. Then enter M-x S. That is press the Alt-x and then uppercase S. (On the Alpha keyboards the Alt key is the Compose key; on PC's you may have to use the Esc and x keys to get M-x). This should bring up Splus start-up message and prompt on the left window. Splus may query you (at the bottom buffer) whether you are in the correct directory or not, prior to this. Just press Enter or change the directory to the right one and press Enter.

Editing an existing S object

By clicking on the left- and right-hand side windows verify that two different sets of menu bars exist for the two buffers. On the Splus window, there is a Menu item called "Inf-S" that has two options named:

Edit S Object(C-c C-d)

Load source file(C-c C-l)

Clicking on the first item (or equivalently, using the key combinations shown) will allow you to get an existing S object into a buffer visible on the righ-hand side window, so you can edit it as usual (Smode will prompt you for the name of the object in the bottom.). This is useful for modifying and existing function or data object. Click on the second window to obtain the new menu bar; particularly, note the "S-mode" menu.

Once you have modified your object you can source it back to the Splus buffer as an S object by clicking on the option named

Load file(C-c C-l)

found on the S-mode menu.

Editing a new Splus function

Click on the Edit S Object(C-c C-d) item on the "Inf-S" menu as usual, and specify a name of a new Splus function you want to create. This will open up an "empty" funtion on the right-hand side window that you can edit to define the new function.

Sourcing an existing Splus text file

Click on the Load source file(C-c C-l) item on the "Inf-S" menu, and specify the path of that file in the bottom buffer to source it into Splus. Check if it is loaded using ls() or just printing it on the Splus window.