Solutions to lab 3 exercise 6

Bob Douma

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Below the solutions to Exercise 6 of Lab 3

1. The first step is to read in the data. The data is stored in different sheet of the file `shapes.xlsx`. Select a sheet, go to `file` and 'save as' and save the sheet as a comma-separated-file (.csv). Beware that if you are using a computer with dutch settings, you may run into problems for two reasons: First, the decimal character is a comma `,` in Dutch while a dot `.` in english. Second the defaul list separator is a semicolon `;` in Dutch while a `,` in English. Check the file that you saved to check the settings of your computer. If this is not correct; go to control panel; to region and language settings; to advanced settings and change the decimal character into a `.` and the list separator (lijstschijdingsteken) in to a `,`.

```
setwd("D://...//...//...) # fill in location
shapes1 = read.csv(shapes1.csv)
```

2. After you have read in the data, you can make a plot through `plot(shapes1$y~ shapes1$x)`. Multiple plots can be made through specifying `par(mfrow=c(3,2))`. This will setup the grid, after using `plot` six times, the grid will be filled with plots.

3. Choosing appropriate deterministic functions

   dataset 1 light response curve. There are a number of options of functions to choose from, depending on the level of sophistication: $\frac{ax}{(b+x)}$, $a(1-e^{(-bx)})$, $\frac{1}{2\theta}(\alpha I + p_{max} - \sqrt(\alpha I + p_{max})^2 - 4\theta I p_{max})$ see page 98 of Bolker.

   dataset 2 The dataset describes a functional response. Bolker mentions four of those $min(ax, s)$ $\frac{ax}{(b+x)}$, $\frac{ax^2}{(b^2+x^2)}$, $\frac{ax^2}{(b+cx+x^2)}$

   dataset 3 Allometric relationships have the form ax^b

   dataset 4 This could be logistic growth $n(t) = \frac{K}{1+(\frac{K}{n_0})e^{-rt}}$ or the gompertz function $f(x) = e^{-ae^{-bx}}$

   dataset 5 What about a negative exponential? ae^{-bx} or a power function ax^b

   dataset 6 Species reponse curves are curves that describe the probability of presence as a function of some factor. A good candidate good be a unimodel response curve. You could take the equation of the normal distribution without the scaling constant: e.g. $ae^{\frac{-(x-\mu)^2}{2\sigma^2}}$

4. See the word file on blackboard "Bestiary of functions.docx"

5. Curves can be added to the plots through `curve`: e.g. `curve(2x+2x,from=0,to=20)`

   dataset 1 Reasonable values for the first dataset assuming a michaelis menten relationship are a=25 and b=60. For the non-rectangular parabola one could choose values of theta = 0.7; a = 0.25; pmax = 25.

   dataset 2 `curve(ifelse(x>27,18,(2/3)*x),add=T)`

   `curve(20*x/(10+x),add=T)`

   dataset 3 `curve(0.6*x^2,add=T)`

   dataset 4 `K = 200; r = 0.2; N0=2; curve(K/(1+(K/N0)*exp(-r*x)),add=T)`

   dataset 5
   `curve(8*(exp(-0.75*x)),add=T)`

dataset 6 `mu = 5; b = 2; curve(exp(-(mu-x)^2/b)  ,add=T)`