

Biodiversity data analysis with R

BIS-Fogo post-graduate school 2014



Course Description

The course gives both an introduction to R and to selected aspects of ecological data analysis and biodiversity prediction based on simple (linear) models.

While the lecture notes introduce the respective subjects in a more general sense, the working sheets will use actual data from the 2014 field survey at Fogo island so a first analysis of this recently collected data set is performed.

The individual sessions can be grouped into three sections:

- First contact: in sessions 1 and 2, running R code and handling basic data structures will be in the focus of the learning targets.
- Linear models: in sessions 3 to 7 we will analyze potential linear dependencies in our sample data sets and use them to predict biodiversity information. The section will be closed by looking into visualization options for standard descriptive statistics.
- Advanced applications: in sessions 8 to 13 we will put our R and analysis skills to the next level starting with non-linear regression analysis and prediction. After a quick look on publication quality visualizations of one dimensional data sets, the focus shifts to spatial GIS data and its visualization and utilization for area-wide predictions of biodiversity information. The section will close with ecological ordinations which potentially provide explanatory insights into the relationships between biodiversity and environmental parameters.

Have fun!

Syllabus

The course has 1 session per week, 3 hours per session.

Session	Topic	Content
Day one		
1	Welcome to R	R , R scripts, R Studio
2	Tabulated data I/O	Reading CSV files, accessing values in a data frame
Day two		
3	Correlation	Correlating ecological variables from the 2014 field survey
4	Linear regression models	Fitting linear functions to field survey variables evaluation of model results
5	Predicting biodiversity I	A closer look on r squared predicting animals using linear models
6	Validating prediction models	For loops, leave-one-out validation
Day three		
7	Descriptive statistics	Mean, median, standard deviation Box-whisker plots
8	Local regression model	Fitting local polynomials to field survey variables interpretation of model results
9	Pimping plots	Axis labels, titles and colors
10	Spatial GIS data	Reading ESRI shape files and raster data sets Visualizing spatial data Google
Day four		
11	Area-wide prediction	Predicting animals using satellite observations and simple linear models
12	Subsetting data frames	Logical operators, boolean algebra Subsetting data frames
13	Explaining biodiversity	Ordination
14	Wrap up	Open questions

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