Workshop preparation

Homework and software installation for the HARMONY advanced training workshop

Matt Denwood Giles Innocent

2020-02-11

Overview

This document will help you to prepare for the HARMONY advanced training workshop being held in Athens from 19th-21st February 2020. The workshop will be oriented around practical exercises, so it is very important that you bring a laptop with the necessary software installed. You should also be familiar enough with R that you can use it for basic tasks, although we will try to keep the programming to a minimum during the workshop. You will also need to download the teaching material from our GitHub site, so you might find it helpful to have created an account with GitHub before the course so that you can access the material more easily during the week. Finally, the advanced training workshop will start from the assumption that you have a basic understanding of Bayes' theorem, and what the difference is between a likelihood, prior and posterior distribution. The purpose of this document is to ensure that you have the necessary software installed, access to the GitHub repository where the teaching material

Software installation

You need to install R (version 3.6.0 or later) from https://cran.r-project.org/ and we recommend that you also use Rstudio which can be downloaded separately from https://www.rstudio.com/products/rstudio/download/

Please also install the latest versions of the following R packages: PriorGen, rjags, runjags, coda, TeachingDemos, HSROC, MCMCpack, mada

You will also need the standalone JAGS software (version 4.3.0 or later) for the course - download the installer for your platform from here: https://sourceforge.net/projects/mcmc-jags/files/JAGS/4.x/

To check that you have installed the software correctly please run the following code within R (or RStudio) and make sure that no errors are produced:

```
stopifnot(getRversion() >= "3.6.0")
```

GitHub

Basics

GitHub is an online code repository that in it's most basic form stores the version history of any code project you are working on, and allows you to go back in time to a previous version before someone introduced a bug. It is particularly useful when collaborating with others because it allows you to see who made a change, when it was made, and what the code looked like before that. It also allows changes from different people to be merged into the same central repository to ensure that nobody gets out of sync with everybody else's code.
We will primarily be using GitHub as a way to disseminate the lecture notes and R/JAGS code for the exercises on course, so you only need to use the most basic features of GitHub (but it is a good thing to learn).

Simple Web Usage

We have created a public repository containing the teaching

Revision of Basic Principles

Introduction

The aim of this pre-course work is to revise the underlying principles of Bayesian statistics that you will need during the course. It is designed so you can run the code shown and check that your results agree with those shown here. Feel free to play around with the code to see what happens - that is the best way to learn! If you have not encountered a function before then consult the help file for that function with a question mark followed by the function name, for example: ?seq Some prior familiarity with R will be assumed for this exercise but if you need to brush up then there are lots of tutorials online e.g. https://www.datacamp.com/courses/free-introduction-to-r We will assume that you have all worked through this material in advance of the course.

Probability distributions

Likelihood theory is at the heart of most inferential statistics - it describes the chances of an event happening under certain