Bayesian First Aid: A Package that Implements Bayesian Alternatives to the Classical *.test Functions in R

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This talk will introduce BayesianFirstAid1, an R package that implements Bayesian alternatives to the most commonly used statistical tests. It is inspired by the BEST package [2] and is similarly intended both as a practical tool and as a teaching aid. A main feature of the package is that the Bayesian alternatives are called in the same way as the corresponding classical test functions, save for the addition of bayes. to the beginning of the function name. For example, if binom.test(x=7, n=10) runs a classical binomial test then bayes.binom.test(x=7, n=10) runs the Bayesian alternative. This makes the package easy to pick up and use, especially if you are already used to the classical *.test functions, and it also facilitates comparing the output of the different approaches. All models are implemented using the JAGS modeling language, called from R using the rjags package. The generic function model.code makes it straightforward to start modifying the models underlying the package. It takes a BayesianFirstAid object and prints out the underlying model code which is ready to be copy-n-pasted into an R script and tinkered with from there. All BayesianFirstAid objects have default plots that show the posteriors of the parameters of interest together with a display that enables a quick posterior predictive check.

Below is an example of the output from the Bayesian First Aid alternative to cor.test(...). The data is the hand grip strength (in kg) and index / ring finger ratio for the male group in [1].

```r
> bayes.cor.test(digit_ratio, grip_strength)
Bayesian First Aid Pearson Correlation Coefficient Test
data: digit_ratio and grip_strength (n = 97)
Estimated correlation:
-0.34
95% credible interval:
-0.52 -0.16
The correlation is more than 0 by a probability of 0.001 and
less than 0 by a probability of 0.999
> model.code(bayes.cor.test(digit_ratio, grip_strength))
## Bayesian First Aid model code ##
require(rjags)
# Setting up the data
x <- digit_ratio
y <- grip_strength
xy <- cbind(x, y)
# The model string written in the JAGS language
model_string <- "model {
for(i in 1:n) {
  xy[i,1:2] ~ dmtr(mu[], prec[ , ], nu)
}
}
```

```
> plot(bayes.cor.test(digit_ratio, grip_strength))

```

References


1 The BayesianFirstAid development can be followed at https://github.com/rasmusab/bayesian_first_aid