



fitdistrplus and mc2d, Two Packages for Risk Assessment in R

Régis Pouillot
CFSAN

Marie Laure Delignette-Muller
Université de Lyon

Jean-Baptiste Denis
INRA

Abstract

This is the abstract of the article.

Keywords: keyword 1, keyword 2, **fitdistrplus**, **mc2d**, R.

1. Introduction

1.1. Variability and uncertainty in the risk assessment framework

According to international recommendations, a quantitative risk assessment (QRA) should reflect the “variability” in the risk and calculate the “uncertainty” associated with the risk estimate. The variability represents temporal, geographical and/or individual heterogeneity of the risk for a given population. The “uncertainty” is understood as stemming from a lack of perfect knowledge about the QRA model structure and associated parameters.

In order to estimate the natural “variability” of the risk, a Monte-Carlo simulation approach may be useful: the empirical distribution of the risk within the population may be estimated from the mathematical combination of distributions reflecting the variability of parameters across the population.

A two-dimensional (or second-order) Monte-Carlo simulation was proposed to estimate the “uncertainty” in the risk estimates stemming from parameter uncertainty [Cullen and Frey 1999](#). A two-dimensional Monte-Carlo simulation is a Monte-Carlo simulation where the distributions reflecting “variability” and the distributions representing “uncertainty” are sampled

separately in the simulation, so that "variability" and "uncertainty" in the output may be estimated separately.

1.2. The need for a package for risk assessment

Integrated

2. An example

Escherichia coli O157:H7 in ground beef.

2.1. Using *ftdistrplus*

To evaluate the intake distribution

2.2. Using *mc2d*

To derive the risk

3. Conclusions

4. To be discarded

R for the names of programming languages, **foo** for software packages, and **some code** or **some code** for code; E for expectations, VAR for variances, COV for covariances, and P for probabilities.

Writing several lines of code:

```
first line of code
second line of code
third line of code
```

Alternatively, you can distinguish between input and output code:

```
R> library(mc2d)
R> ndvar(1001)
```

```
[1] 1001
```

```
ndunc(1001)
```

```
[1] 1001
```

Or

```
library(mc2d)
ndvar(1001)
```

[1] 1001

```
ndunc(1001)
```

[1] 1001

Acknowledgments

Here you can write some acknowledgments.

References

Cullen A, Frey H (1999). *Probabilistic techniques in Exposure assessment*. Plenum Press, New York.

Affiliation:

Régis Pouillot
Center for Food Safety and Applied Nutrition
FDA/HHS
College Park, USA
E-mail: rpouillot@yahoo.fr
URL: <http://www.lyx.org>