ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ΜΕΤΑΠΤΥΧΙΑΚΟ ΔΙΠΛΩΜΑ ΒΙΟΣΤΑΤΙΣΤΙΚΗΣ

ΜΑΘΗΜΑ: ΜΠΕΫΖΙΑΝΗ ΣΥΜΠΕΡΑΣΜΑΤΟΛΟΓΙΑ

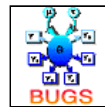**ΔΙΔΑΣΚΟΝΤΕΣ: Ι. Ντζούφρας, Π. Τσιαμυρτζής**

ΔΙΔΑΚΤΙΚΟ ΥΛΙΚΟ ΓΙΑ ΤΟ ΜΑΘΗΜΑ

ΜΠΕΫΖΙΑΝΗ ΣΥΜΠΕΡΑΣΜΑΤΟΛΟΓΙΑ:

Βιοστατιστική κατά Bayes με τη χρήση του Λογισμικού BUGS

ΙΩΑΝΝΗΣ ΝΤΖΟΥΦΡΑΣ

Χίος, Μάιος 2004
Αθήνα, Ιανουάριος 2006

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ΜΑΘΗΜΑ: ΜΠΕΫΖΙΑΝΗ ΣΥΜΠΕΡΑΣΜΑΤΟΛΟΓΙΑ

ΔΙΔΑΣΚΟΝΤΕΣ: Ι. Ντζούφρας, Π. Τσιαμυρτζής

ΜΕΡΟΣ II: Βιοστατιστική κατά Bayes με τη χρήση του Λογισμικού BUGS

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Ιστοσελίδα Μαθήματος (Μέρος II):

http://stat-athens.aueb.gr/~jbn/courses/bugs2/home.html

Προγράμματα/MCMC Software

1. ***Classic BUGS 0.6,***
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/classic/bugs06/prog06.exe`

2. ***WINBUGS 1.4***
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/WinBUGS14.exe`
   Registration page `http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/register.shtml`

3. ***CODA***
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/classic/coda04/cdaprg04.exe`

Εγχειρίδια/Manuals

1. Spiegelhalter, D., Thomas, A., Best, N. and Gilks, W. (1996). *BUGS 0.5: Bayesian Inference Using Gibbs Sampling Manual*. MRC Biostatistics Unit, Institute of Public health, Cambridge, UK.
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/documentation/Download/manual05.pdf`

2. Spiegelhalter, D., Thomas, A., Best, N. and Gilks, W. (1996). *BUGS 0.5: Examples Volume 1*. MRC Biostatistics Unit, Institute of Public health, Cambridge, UK.
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/documentation/Download/eg05vol1.pdf`

3. Spiegelhalter, D., Thomas, A., Best, N. and Gilks, W.(1996). *BUGS 0.5: Examples Volume 2*. MRC Biostatistics Unit, Institute of Public health, Cambridge, UK.
   available at `http://www.mrc-bsu.cam.ac.uk/bugs/documentation/Download/eg05vol2.pdf`

4. Spiegelhalter, D., Thomas, A., Best, N. and Lunn, D. (2003). *WinBUGS User Manual, Version 1.4*, MRC Biostatistics Unit, Institute of Public Health and

Department of Epidemiology & Public Health, Imperial College School of Medicine.
available at `http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/manual14.pdf` .

5. Additional documentation and manuals for BUGS/CODA available at http://www.mrc-bsu.cam.ac.uk/bugs/documentation/contents.shtml .

6. New examples for WinBUGS available at
http://www.mrc-bsu.cam.ac.uk/bugs/winbugs/examples.shtml

7. Additional electronic material (tutorial, courses papers) for WINBUGS available at http://www.mrc-bsu.cam.ac.uk/bugs/weblinks/webresource.shtml .

Βιβλιογραφία/Bibliography

1. Scollnik D.P.M. (2000). Actuarial modeling with MCMC and BUGS: Additional Worked Examples. *Actuarial Research Clearing House*, **2000.2**, 433-585, available at http://www.math.ucalgary.ca/~scollnik/abcd .

2. Scollnik, D.P.M (2001). Actuarial modeling with MCMC and BUGS. *North American Actuarial Journal*, **5(2)**, 96-125, available at http://www.math.ucalgary.ca/~scollnik/abcd .

3. Congdon, P. (2001). *Bayesian Statistical Modelling*. Willey and Sons, ISBN: 0-471-49600-6 .

4. Jackman, S. (2004). *Estimation and inference via MCMC: a Resource for Social Scientists*; available at http://tamarama.stanford.edu/mcmc/ .

5. Ibrahim, J.G., Chen, M.-H. and Sinha, D. (2001). *Bayesian Survival Analysis*, examples are available at http://merlot.stat.uconn.edu/~mhchen/survbook/.

Επιπλέον Πηγές/ Additional Resources

1. **Social science:** Simon Jackman's MCMC Resource for Social Scientists features a wide range of models concerned with ordered outcomes, missing data, random coefficients, generalized link functions, latent autoregressive structure and so on. WinBUGS code and Splus data files are provided, as well as tutorial papers on MCMC for social scientists.
   o Web-page: http://tamarama.stanford.edu/mcmc/ .

2. **Pharmacokinetics:** David Lunn's PKBugs Page contains details of an `add-on' to WinBUGS for pharmokinetic modelling, developed by David Lunn at Imperial College. This can be run using WinBUGS 1.3.
   o Web-page: http://www.med.ic.ac.uk/divisions/60/pkbugs_web/home.html .

3. **Actuarial science:** Actuarial Modelling with MCMC and BUGS has been provided by David Scollnik in Calgary, and has a range of worked examples designed for an actuarial context but using models of much wider applicability.

An excellent tutorial paper on WinBUGS can also be downloaded - better than the WinBUGS documentation!

   o   Web-page: http://www.math.ucalgary.ca/~scollnik/abcd/ .

4. **Population genetics:** Kent Holsinger's Population Genetics course (http://darwin.eeb.uconn.edu/eeb348/) has a whole set of examples using WinBUGS for estimating inbreeding coefficients, selfing rates, analysing variability selection and so on. Kent also has a set of notes and WinBUGS code (http://darwin.eeb.uconn.edu/summer-institute/summer-institute.html) from the Summer Institute for Statistical Genetics at NC State, which form an introduction to using WinBUGS in population genetics.

5. **Cost-effectiveness analysis:** Tony O'Hagan's Research Page contains draft papers and WinBUGS code for running Bayesian cost-effectiveness analysis.

   o   Web-page: http://www.shef.ac.uk/~st1ao/res.html .

6. **Programs for analysing imperfect diagnostic tests:** The Epidemiologic Diagnostics group at UC Davis provide WinBUGS code and examples for analyzing data derived from imperfect diagnostic test.

   o   Web-page: http://www.epi.ucdavis.edu/diagnostictests/downloads.html.

7. **Complex epidemiological modelling:** Tom Smith at the Swiss Tropical Institute (http://www.sti.ch/biomet.htm) has models and documentation for 1) A latent class model for non-parametric resolution of a two component mixture, with a training set available for one component: 2) Two-state Hidden Markov Model with covariates 3) A non-linear regression model with Poisson errors in both x and y. Brad Carlin's software page also has a variety of examples for longitudinal and spatial models (http://www.biostat.umn.edu/~brad/software.html).

8. **Educational testing:** Dan Segall's site concerns an item-response model for test compromise, and includes a manuscript and related WinBUGS programs.

   o   Web-page: http://segalld.home.netcom.com/compromise.html .

9. **Archeology:** Andrew Millard's `WinBUGS and Bayesian tools for Archaeology' site shows how to use WinBUGS to analyse many Bayesian examples from the archeological literature.

   o   Web-page: http://www.dur.ac.uk/a.r.millard/BUGS4Arch.html .