ANOVADDP package

Help pages for package `anovaddp' version 1.0

ANOVADDP package

Description

An ANOVA Model for Dependent Random Measures.

Details

Package:	anovaddp
Type:	Package
Version:	0.1-0
Date:	2006-09-15
License:	See COPYING for license information

For a complete list of functions, use `library(help="matlab")`. For a high-level summary of the changes for each revision, use `file.show(system.file("NEWS", package="matlab"))`.

Author(s)

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References

:TODO: ~~ Literature or other references for background information ~~

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ANOVA model for dependent random measures

Description

The function implements Bayesian inference for the ANOVA DDP model described in De Iorio et al (2004). The ANOVA DDP model is a model for repeated measurements data. The random effects distribution includes a regression on subject-specific covariates. The description of the arguments below includes references to the parameters used in Mueller et al. (2004), henceforth referred to as MRDM.

Usage

```
ans <- anovaddp(t, y, S, theta, C, nki, D, Dpred, a0, mp)
```

Arguments

`t`
numeric vector specifying all observation times for all patients. In MRDM this is the vector (t[kij], k=1...3, i=1..I[k], j=1..n[ki]).

`y`
numeric vector specifying the observations for all patients. In MRDM this is the vector (y[kij], k=1...3, i=1..I[k], j=1..n[ki]).

`S`
numeric (p x p) matrix specifying the prior mean for the covariance matrix of the multivariate normal kernel in the DP mixture. In MRDM this is *Phi_0^{-1}* and the initial value for S.

`theta`

`C`
numeric (p*q x p*q) matrix specifying the variance-covariance matrix for the base measure of the DP prior. In MRDM this is C in equation (8).

`nki`
numeric vector of length I. The i-th element specifies the number of observations for the i-th patient. All patients are listed, starting with the first patient in the first study, through the last patient in the last study. In MRDM this is the vector (n[ki], k=1..3, i=1..I[k]).

`D`
numeric (I x q) matrix specifying the design vectors for the random effects regression. The i-th row specifies the design vector for the i-th patient. In MRDM this is the matrix with rows d[ki], k=1..3, i=1..I[k].

`Dpred`
numeric (patpred x q) matrix specifyying the design vectors for hypothetical future patients. Future patients, without observed data, are included to allow posterior predictive inference.

`a0`
numeric (p*q x 1) vector specifying the prior mean for the base measure of the DP. In MRDM this is the vector α in equation (8). Note that a0 includes all random effects, including the (p-p1) random effects that are not subject to the semiparametric prior. In MRDM this is the random effect z[1ki].

`mp`
named list specifying model parameters with components:

N
: integer scalar specifying total number of observations regardless of study or individuals

q
: integer scalar specifying number of anova effects (including a common intercept).

W
: integer scalar specifying MCMC iterations

skip
: integer scalar specifying MCMC burn-in

nu0
: integer scalar specifying the degrees of freedom for Wishart prior for *S^{-1}*. In MRDM this is *nu*.

alpha0
: numeric scalar. alpha0/2 is the shape parameter for the inverse Gamma prior on the residual variance σ*^2*. In MRDM this is *a_*σ.

beta0
: numeric scalar. beta0/2 is the scale parameter for the inverse gamma prior on the residual variance σ*^2*. In MRDM this is *ba_*σ.

I
: integer scalar specifying total number of patients. In MRDM, I is the sum of the I[k].

I0
: integer scalar specifying the number of hypothetical future patients, i.e., the number of rows in Dpred.

p
: integer scalar specifying the dimension of the random effects vector. In MRDM this is p, the dimension of *(z_{1ki},theta_{ki})*.

p1
: integer scalar specifying the dimension of the subvector of the random effects vector that is subject to the semiparametric random effects distribution. In MRDM this is *p_1*, the dimension of *theta_{ki}*.

alpM
: numeric scalar specifying the shape parameter of the Gamma prior on the DP total mass parameter. In MRDM this is *a_M*.

betM
: numeric scalar specifying the scale parameter of the Gamma prior on the DP total mass parameter. In MRDM this is *b_M*.

T0
: integer scalar specifying the size of the time scale grid to report posterior and posterior predictive inference. The grid is all integers 0 through T0.

ns
: integer scalar specifying the number of studies

Value

Let W0 = W-skip, and let Y denote the observed data. Returns a list with components:

`m` numeric (W0 x T0) matrix of posterior simulations for the mean function f(t; theta) corresponding to a hypothetical patient with design vector d = (1,0...0). Assuming that the first column in the matrix of ANOVA effects is a common baseline, and the remaining columns are offsets for different ANOVA factors, this provides posterior inference for the mean response of a baseline subject.

`A0` numeric (I0 x T0) matrix of the posterior mean E(a0 | Y), for offsets selected by input Dpred.

`A02` numeric (I0 x T0) matrix of the posterior mean E(a0^2 | Y), for offsets selected by input Dpred.

`f0` numeric (I0 x T0) matrix specifying the predicted profile E(f(t; theta[i]) | Y) for a future patient i=1...patpred, evaluated for a grid t=0..T0.

`f02` numeric (I0 x T0) matrix specifying the predicted profile E(f(t; theta[i])^2 | Y) for a future patient i=1...patpred, evaluated for a grid t=0..T0.

Author(s)

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References

Mueller, P., Rosner, G., De Iorio, M., and MacEachern, S. (2005). ``A Nonparametric Bayesian Model for Inference in Related Studies.'' emph {Applied Statistics}, 54 (3), 611-626.

De Iorio, M., Mueller, P., Rosner, G., and Maceachern, S. (2004). ``An ANOVA Model for Dependent Random Measures,'' emph {Journal of the American Statistical Association}, 99(465), 205–215.

Examples

```
Analysis of the dataset described in Mueller(2005) is implemented as a demo which can be invoked by typing:
demo(anovaddp)
Data for this demo is stored in $R_LIBRARY\anovaddp\data\Rdata.zip (Windows version only).  These data files need to be extracted to the
data directory before running the demo.
This dataset is described in detail online at http://www.blackwellpublishing.com/rss and has been reformatted
for this example and included under the data directory in the library/anovaddp as files time.txt, dati.txt, npat.txt.
A design matrix with the seven ANOVA effects described in the paper is stored in dnew.txt.  dprednew.txt gives the
design matrix for the 10 predicted patients to be generated by this example.  covmu.txt, start.txt, and var.txt give
starting values for C, theta, and S respectively.  Plots are generated for outputs mean(m) columns, A0, A02, f0, and f02.
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ANOVA model for dependent random measures

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