

Package ‘EPGLM’

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Type Package

Title Gaussian Approximation of Bayesian Binary Regression Models

Version 1.0

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Description The main functions compute the expectation propagation approximation of a Bayesian probit/logit models with Gaussian prior. More information can be found in Chopin and Ridgway (2015). More models and priors should follow.

License GPL (>= 2)

Depends Rcpp, MASS

LinkingTo Rcpp, RcppArmadillo, BH

RcppModules EPprobitCxx, EPlogitCxx

NeedsCompilation yes

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EPGLM-package

The package computes a Gaussian approximation of a Bayesian probit/logit using expectation propagation (EP).

Description

The package computes a Gaussian approximation of a Bayesian probit/logit using expectation propagation (EP). For the moment the only available prior is a Gaussian.

Details

Package: EPGLM
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Version: 1.0
Date: 2015-07-29
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Author(s)

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References

N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. arxiv:1506.08640.

EPlogit

Compute the EP approximation of a logit regression.

Description

The function computes the EP approximation of a logit regression with Gaussian prior.

Usage

```
EPlogit(X, Y, s)
```

Arguments

X Design matrix. Should include a constant column if a bias is to be considered.
Y Response vector, should take values 0 and 1.
s Prior variance

Details

The implementation is based on the remarks of Chopin and Ridgway (2015) and computes a Gaussian approximation to the Bayesian logit model. The approximation can serve as a very efficient estimation or as the starting point to Monte Carlo algorithms.

Value

m	Mean of the Gaussian approximation
V	Variance matrix of the Gaussian approximation
Z	Approximated log marginal likelihood

Note

More priors and models should be available shortly.

Author(s)

James Ridgway

References

N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. arxiv:1506.08640

Examples

```
data(Pima.tr)
Y<-as.matrix(as.numeric(Pima.tr[,8]))-1
X<-cbind(1,data.matrix(Pima.tr[,1:7]))
Sol<-EPlogit(X,Y,100)
```

EPlogitCxx	<i>C++ internal function to compute the EP approximation (use EPlogit instead).</i>
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Description

The function is the C++ internal function used by EPlogit

Usage

```
EPlogitCxx(...)
```

Arguments

... See arguments of EPlogit

Value

m	Mean of the Gaussian approximation
V	Variance matrix of the Gaussian approximation
Z	Approximated log marginal likelihood

Note

More priors and models should be available shortly.

Author(s)

James Ridgway

References

N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. arxiv:1506.08640.

EPprobit

Compute the EP approximation of a probit regression.

Description

The function computes the EP approximation of a probit regression with Gaussian prior.

Usage

EPprobit(X, Y, s)

Arguments

X	Design matrix. Should include a constant column if a bias is to be considered.
Y	Response vector, should take values 0 and 1
s	Prior variance

Details

The implementation is based on the remarks of Chopin and Ridgway (2015) and computes a Gaussian approximation to the Bayesian probit model. The approximation can serve as a very efficient estimation or as the starting point to Monte Carlo algorithms.

Value

m	Mean of the Gaussian approximation
V	Variance matrix of the Gaussian approximation
Z	Approximated log marginal likelihood

Note

More priors and models should be available shortly.

Author(s)

James Ridgway

References

N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. arxiv:1506.08640.

Examples

```
library(MASS)
data(Pima.tr)
Y<-as.matrix(as.numeric(Pima.tr[,8]))-1
X<-cbind(1,data.matrix(Pima.tr[,1:7]))
Sol<-EPprobit(X,Y,100)
```

EPprobitCxx	<i>C++ internal function to compute the EP approximation (use EPprobit instead).</i>
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Description

The function is the C++ internal function used by EPprobit

Usage

```
EPprobitCxx(...)
```

Arguments

... See arguments of EPprobit

Value

m	Mean of the Gaussian approximation
V	Variance matrix of the Gaussian approximation
Z	Approximated log marginal likelihood

Note

More prior and model should be available shortly.

Author(s)

James Ridgway

References

N. Chopin and J. Ridgway. Leave Pima Indians alone: binary regression as a benchmark for Bayesian computation. arxiv:1506.08640

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