

# Package ‘l1ball’

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**Type** Package

**Title** L1-Ball Prior for Sparse Regression

**Version** 0.1.0

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**Description** Provides function for the l1-ball prior on high-dimensional regression. The main function, `l1ball()`, yields posterior samples for linear regression, as introduced by Xu and Duan (2020) <arXiv:2006.01340>.

**License** GPL (>= 2)

**Depends** R (>= 3.1.0)

**Imports** VGAM, stats

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.0

**NeedsCompilation** no

**Repository** CRAN

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11ball

*Fit the L1 prior***Description**

This package provides an implementation of the Gibbs sampler, for using 11-ball prior with the regression likelihood  $y_i = X_i\theta + \epsilon_i$ ,  $\epsilon_i \sim N(0, \sigma^2)$ .

**Arguments**

y	A data vector, n by 1
X	A design matrix, n by p
b_w	The parameter in $Beta(1, p^{b_w})$ for w, default $b_w = 1$
step	Number of steps to run the Markov Chain Monte Carlo
burnin	Number of burn-ins
b_lam	The parameter in $\lambda_i \sim Inverse - Gamma(1, b_\lambda)$ , default $b_\lambda = 10^{-3}$ . To increase the level of shrinkage, use smaller $b_\lambda$ .

**Value**

The posterior sample collected from the Markov Chain:

- trace\_theta:  $\theta$
- trace\_NonZero: The non-zero indicator  $1(\theta_i \neq 0)$
- trace\_Lam:  $\lambda_i$
- trace\_Sigma:  $\sigma^2$

**Examples**

```
n = 60
p = 100
X <- matrix(rnorm(n*p), n, p)
d = 5
w0 <- c(rep(0, p-d), rnorm(d)*0.1+1)
y = X%% w0 + rnorm(n, 0, .1)
trace <- 11ball(y, X, steps=2000, burnin = 2000)
plot(colMeans(trace$trace_theta))
```

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