The lstbayes package

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1 Introduction

This package provides language drivers for the listings package for the several Bayesian modeling languages: BUGS, JAGS, and Stan.

2 Usage

See the documentation of the listings package.

3 Implementation

```
\RequirePackage{listings}
```

3.1 BUGS

Language driver for BUGS, including WinBUGS and OpenBUGS. The driver is based on OpenBUGS v. 3.2.3.

```
\lstdefinelanguage{BUGS}{
  morekeywords=[1]{for,in,model,T,I,C},%
  morecomment=[l]{\#},%
  sensitive=true,%
  alsoletter={.},%
  otherkeywords={<-,~},%
  literate={<-}{{$\leftarrow$}}1 {~}{{$\sim$}}1%
}
\lstalias[]{OpenBUGS}[]{BUGS}
\lstalias[]{WinBUGS}[]{BUGS}
```

3.2 JAGS

Language driver for JAGS. The driver is based on JAGS version 3.4.0 (Sept 4, 2013).

```
\lstdefinelanguage[]{JAGS}[]{BUGS}{
```

```
  morekeywords=[1]{data,var,const},%
  morecomment=[n]{/*}{*/}%
}
```

3.3 Stan

Language driver for Stan. The driver is based on Stan modeling language version 2.10.0.

```
\lstdefinelanguage{Stan}{
  morekeywords=[1]{functions,data,parameters,transformed,model,generated,quantities,%
    for,in,while,print,if,else,lower,upper,increment_log_prob,T,return,%
    reject,integrate_ode,integrate_ode_bdf,integrate_ode_rk45,target},%
  morekeywords=[2]{int,real,vector,%
    ordered,positive_ordered,simplex,unit_vector,%
    row_vector,matrix,%
    cholesky_factor_corr,cholesky_factor_cov,%
    coor_matrix,cov_matrix,%
    void},%
  morekeywords=[3]{%
    Phi,%
    Phi_approx,%
    abs,%
    acos,%
    acosh,%
    append_col,%
    append_row,%
    asin,%
    asinh,%
    atan,%
    atan2,%
    atanh,%
    bernoulli_ccdf_log,%
    bernoulli_cdf,%
    bernoulli_cdf_log,%
    bernoulli_lccdf,%
    bernoulli_lcdf,%
    bernoulli_log,%
    bernoulli_logit_log,%
    bernoulli_logit_lpmf,%
    bernoulli_logit_lpmf,%
    bernoulli_lpmf,%
    bernoulli_lpmf,%
    bernoulli_rng,%
    bessel_first_kind,%
    bessel_second_kind,%
    beta_binomial_ccdf_log,%
    beta_binomial_cdf,%
    beta_binomial_cdf_log,%
    beta_binomial_lccdf,%
```

```
    beta_binomial_lcdf,%
    beta_binomial_log,%
    beta_binomial_lpmf,%
    beta_binomial_lpmf,%
    beta_binomial_rng,%
    beta_ccdf_log,%
    beta_cdf,%
    beta_cdf_log,%
    beta_lccdf,%
    beta_lcdf,%
    beta_log,%
    beta_lpdf,%
    beta_lpdf,%
    beta_rng,%
    binary_log_loss,%
    binomial_ccdf_log,%
    binomial_cdf,%
    binomial_cdf_log,%
    binomial_coefficient_log,%
    binomial_lccdf,%
    binomial_lcdf,%
    binomial_log,%
    binomial_logit_log,%
    binomial_logit_lpmf,%
    binomial_logit_lpmf,%
    binomial_lpmf,%
    binomial_lpmf,%
    binomial_rng,%
    block,%
    categorical_log,%
    categorical_logit_log,%
    categorical_logit_lpmf,%
    categorical_logit_lpmf,%
    categorical_lpmf,%
    categorical_lpmf,%
    categorical_rng,%
    cauchy_ccdf_log,%
    cauchy_cdf,%
    cauchy_cdf_log,%
    cauchy_lccdf,%
    cauchy_lcdf,%
    cauchy_log,%
    cauchy_lpdf,%
    cauchy_lpdf,%
    cauchy_rng,%
    cbrt,%
    ceil,%
    chi_square_ccdf_log,%
    chi_square_cdf,%
    chi_square_cdf_log,%
```

```
    chi_square_lccdf,%
    chi_square_lcdf,%
    chi_square_log,%
    chi_square_lpdf,%
    chi_square_lpdf,%
    chi_square_rng,%
    cholesky_decompose,%
    col,%
    cols,%
    columns_dot_product,%
    columns_dot_self,%
    cos,%
    cosh,%
    crossprod,%
    csr_extract_u,%
    csr_extract_v,%
    csr_extract_w,%
    csr_matrix_times_vector,%
    csr_to_dense_matrix,%
    cumulative_sum,%
    determinant,%
    diag_matrix,%
    diag_post_multiply,%
    diag_pre_multiply,%
    diagonal,%
    digamma,%
    dims,%
    dirichlet_log,%
    dirichlet_lpdf,%
    dirichlet_lpdf,%
    dirichlet_rng,%
    distance,%
    dot_product,%
    dot_self,%
    double_exponential_ccdf_log,%
    double_exponential_cdf,%
    double_exponential_cdf_log,%
    double_exponential_lccdf,%
    double_exponential_lcdf,%
    double_exponential_log,%
    double_exponential_lpdf,%
    double_exponential_lpdf,%
    double_exponential_rng,%
    e,%
    eigenvalues_sym,%
    eigenvectors_sym,%
    erf,%
    erfc,%
    exp,%
    exp2,%
```

```
    exp_mod_normal_ccdf_log,%
    exp_mod_normal_cdf,%
    exp_mod_normal_cdf_log,%
    exp_mod_normal_lccdf,%
    exp_mod_normal_lcdf,%
    exp_mod_normal_log,%
    exp_mod_normal_lpdf,%
    exp_mod_normal_lpdf,%
    exp_mod_normal_rng,%
    expm1,%
    exponential_ccdf_log,%
    exponential_cdf,%
    exponential_cdf_log,%
    exponential_lccdf,%
    exponential_lcdf,%
    exponential_log,%
    exponential_lpdf,%
    exponential_lpdf,%
    exponential_rng,%
    fabs,%
    falling_factorial,%
    fdim,%
    floor,%
    fma,%
    fmax,%
    fmin,%
    fmod,%
    frechet_ccdf_log,%
    frechet_cdf,%
    frechet_cdf_log,%
    frechet_lccdf,%
    frechet_lcdf,%
    frechet_log,%
    frechet_lpdf,%
    frechet_lpdf,%
    frechet_rng,%
    gamma_ccdf_log,%
    gamma_cdf,%
    gamma_cdf_log,%
    gamma_lccdf,%
    gamma_lcdf,%
    gamma_log,%
    gamma_lpdf,%
    gamma_lpdf,%
    gamma_p,%
    gamma_q,%
    gamma_rng,%
    gaussian_dlm_obs_log,%
    gaussian_dlm_obs_lpdf,%
    gaussian_dlm_obs_lpdf,%
```

```
    get_lp,%
    gumbel_ccdf_log,%
    gumbel_cdf,%
    gumbel_cdf_log,%
    gumbel_lccdf,%
    gumbel_lcdf,%
    gumbel_log,%
    gumbel_lpdf,%
    gumbel_lpdf,%
    gumbel_rng,%
    head,%
    hypergeometric_log,%
    hypergeometric_lpmf,%
    hypergeometric_lpmf,%
    hypergeometric_rng,%
    hypot,%
    if_else,%
    inc_beta,%
    int_step,%
    inv,%
    inv_chi_square_ccdf_log,%
    inv_chi_square_cdf,%
    inv_chi_square_cdf_log,%
    inv_chi_square_lccdf,%
    inv_chi_square_lcdf,%
    inv_chi_square_log,%
    inv_chi_square_lpdf,%
    inv_chi_square_lpdf,%
    inv_chi_square_rng,%
    inv_cloglog,%
    inv_gamma_ccdf_log,%
    inv_gamma_cdf,%
    inv_gamma_cdf_log,%
    inv_gamma_lccdf,%
    inv_gamma_lcdf,%
    inv_gamma_log,%
    inv_gamma_lpdf,%
    inv_gamma_lpdf,%
    inv_gamma_rng,%
    inv_logit,%
    inv_phi,%
    inv_sqrt,%
    inv_square,%
    inv_wishart_log,%
    inv_wishart_lpdf,%
    inv_wishart_lpdf,%
    inv_wishart_rng,%
    inverse,%
    inverse_spd,%
    is_inf,%
```

```
    is_nan,%
    lbeta,%
    lchoose,%
    lgamma,%
    lkj_corr_cholesky_log,%
    lkj_corr_cholesky_lpdf,%
    lkj_corr_cholesky_lpdf,%
    lkj_corr_cholesky_rng,%
    lkj_corr_log,%
    lkj_corr_lpdf,%
    lkj_corr_lpdf,%
    lkj_corr_rng,%
    lmgamma,%
    lmultiply,%
    log,%
    log10,%
    log1m,%
    log1m_exp,%
    log1m_inv_logit,%
    log1p,%
    log1p_exp,%
    log2,%
    log_determinant,%
    log_diff_exp,%
    log_falling_factorial,%
    log_inv_logit,%
    log_mix,%
    log_rising_factorial,%
    log_softmax,%
    log_sum_exp,%
    logistic_ccdf_log,%
    logistic_cdf,%
    logistic_cdf_log,%
    logistic_lccdf,%
    logistic_lcdf,%
    logistic_log,%
    logistic_lpdf,%
    logistic_lpdf,%
    logistic_rng,%
    logit,%
    lognormal_ccdf_log,%
    lognormal_cdf,%
    lognormal_cdf_log,%
    lognormal_lccdf,%
    lognormal_lcdf,%
    lognormal_log,%
    lognormal_lpdf,%
    lognormal_lpdf,%
    lognormal_rng,%
    machine_precision,%
```

```
    max,%
    mdivide_left_tri_low,%
    mdivide_right_tri_low,%
    mean,%
    min,%
    modified_bessel_first_kind,%
    modified_bessel_second_kind,%
    multi_gp_cholesky_log,%
    multi_gp_cholesky_lpdf,%
    multi_gp_cholesky_lpdf,%
    multi_gp_log,%
    multi_gp_lpdf,%
    multi_gp_lpdf,%
    multi_normal_cholesky_log,%
    multi_normal_cholesky_lpdf,%
    multi_normal_cholesky_lpdf,%
    multi_normal_cholesky_rng,%
    multi_normal_log,%
    multi_normal_lpdf,%
    multi_normal_lpdf,%
    multi_normal_prec_log,%
    multi_normal_prec_lpdf,%
    multi_normal_prec_lpdf,%
    multi_normal_rng,%
    multi_student_t_log,%
    multi_student_t_lpdf,%
    multi_student_t_lpdf,%
    multi_student_t_rng,%
    multinomial_log,%
    multinomial_lpmf,%
    multinomial_lpmf,%
    multinomial_rng,%
    multiply_log,%
    multiply_lower_tri_self_transpose,%
    neg_binomial_2_ccdf_log,%
    neg_binomial_2_cdf,%
    neg_binomial_2_cdf_log,%
    neg_binomial_2_lccdf,%
    neg_binomial_2_lcdf,%
    neg_binomial_2_log,%
    neg_binomial_2_log_log,%
    neg_binomial_2_log_lpmf,%
    neg_binomial_2_log_lpmf,%
    neg_binomial_2_log_rng,%
    neg_binomial_2_lpmf,%
    neg_binomial_2_lpmf,%
    neg_binomial_2_rng,%
    neg_binomial_ccdf_log,%
    neg_binomial_cdf,%
    neg_binomial_cdf_log,%
```

```
    neg_binomial_lccdf,%
    neg_binomial_lcdf,%
    neg_binomial_log,%
    neg_binomial_lpmf,%
    neg_binomial_lpmf,%
    neg_binomial_rng,%
    negative_infinity,%
    normal_ccdf_log,%
    normal_cdf,%
    normal_cdf_log,%
    normal_lccdf,%
    normal_lcdf,%
    normal_log,%
    normal_lpdf,%
    normal_lpdf,%
    normal_rng,%
    not_a_number,%
    num_elements,%
    ordered_logistic_log,%
    ordered_logistic_lpmf,%
    ordered_logistic_lpmf,%
    ordered_logistic_rng,%
    owens_t,%
    pareto_ccdf_log,%
    pareto_cdf,%
    pareto_cdf_log,%
    pareto_lccdf,%
    pareto_lcdf,%
    pareto_log,%
    pareto_lpdf,%
    pareto_lpdf,%
    pareto_rng,%
    pareto_type_2_ccdf_log,%
    pareto_type_2_cdf,%
    pareto_type_2_cdf_log,%
    pareto_type_2_lccdf,%
    pareto_type_2_lcdf,%
    pareto_type_2_log,%
    pareto_type_2_lpdf,%
    pareto_type_2_lpdf,%
    pareto_type_2_rng,%
    pi,%
    poisson_ccdf_log,%
    poisson_cdf,%
    poisson_cdf_log,%
    poisson_lccdf,%
    poisson_lcdf,%
    poisson_log,%
    poisson_log_log,%
    poisson_log_lpmf,%
```

```
    poisson_log_lpmf,%
    poisson_log_rng,%
    poisson_lpmf,%
    poisson_lpmf,%
    poisson_rng,%
    positive_infinity,%
    pow,%
    prod,%
    qr_Q,%
    qr_R,%
    quad_form,%
    quad_form_diag,%
    quad_form_sym,%
    rank,%
    rayleigh_ccdf_log,%
    rayleigh_cdf,%
    rayleigh_cdf_log,%
    rayleigh_lccdf,%
    rayleigh_lcdf,%
    rayleigh_log,%
    rayleigh_lpdf,%
    rayleigh_lpdf,%
    rayleigh_rng,%
    rep_array,%
    rep_matrix,%
    rep_row_vector,%
    rep_vector,%
    rising_factorial,%
    round,%
    row,%
    rows,%
    rows_dot_product,%
    rows_dot_self,%
    scaled_inv_chi_square_ccdf_log,%
    scaled_inv_chi_square_cdf,%
    scaled_inv_chi_square_cdf_log,%
    scaled_inv_chi_square_lccdf,%
    scaled_inv_chi_square_lcdf,%
    scaled_inv_chi_square_log,%
    scaled_inv_chi_square_lpdf,%
    scaled_inv_chi_square_lpdf,%
    scaled_inv_chi_square_rng,%
    sd,%
    segment,%
    sin,%
    singular_values,%
    sinh,%
    size,%
    skew_normal_ccdf_log,%
    skew_normal_cdf,%
```

```
    skew_normal_cdf_log,%
    skew_normal_lccdf,%
    skew_normal_lcdf,%
    skew_normal_log,%
    skew_normal_lpdf,%
    skew_normal_lpdf,%
    skew_normal_rng,%
    softmax,%
    sort_asc,%
    sort_desc,%
    sort_indices_asc,%
    sort_indices_desc,%
    sqrt,%
    sqrt2,%
    square,%
    squared_distance,%
    step,%
    student_t_ccdf_log,%
    student_t_cdf,%
    student_t_cdf_log,%
    student_t_lccdf,%
    student_t_lcdf,%
    student_t_log,%
    student_t_lpdf,%
    student_t_lpdf,%
    student_t_rng,%
    sub_col,%
    sub_row,%
    sum,%
    tail,%
    tan,%
    tanh,%
    tcrossprod,%
    tgamma,%
    to_array_1d,%
    to_array_2d,%
    to_matrix,%
    to_row_vector,%
    to_vector,%
    trace,%
    trace_gen_quad_form,%
    trace_quad_form,%
    trigamma,%
    trunc,%
    uniform_ccdf_log,%
    uniform_cdf,%
    uniform_cdf_log,%
    uniform_lccdf,%
    uniform_lcdf,%
    uniform_log,%
```

```
    uniform_lpdf,%
    uniform_lpdf,%
    uniform_rng,%
    variance,%
    von_mises_log,%
    von_mises_lpdf,%
    von_mises_lpdf,%
    von_mises_rng,%
    weibull_ccdf_log,%
    weibull_cdf,%
    weibull_cdf_log,%
    weibull_lccdf,%
    weibull_lcdf,%
    weibull_log,%
    weibull_lpdf,%
    weibull_lpdf,%
    weibull_rng,%
    wiener_log,%
    wiener_lpdf,%
    wiener_lpdf,%
    wishart_log,%
    wishart_lpdf,%
    wishart_lpdf,%
    wishart_rng
  },%
  otherkeywords={<-,~,+=,=},%
  sensitive=true,%
  morecomment=[l]{\#},%
  morecomment=[l]{//},%
  morecomment=[n]{/*}{*/},%
  string=[d]"%,
  literate={<-}{{$\leftarrow$}}1 {~}{{$\sim$}}1%
}
```

Change History

2015-09-26
General: Converted to DTX file . . 1
2015-09-27
General: Fix README 1
2015-09-28
General: Fix README. Add keywords for all built-in functions that are in Stan v2.8.0. 1

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.

Symbols

\# 4, 534

L

\leftarrow 8, 538
\lstalias 10, 11
\lstdefinelanguage 2, 12, 16

R

\RequirePackage 1

S

\sim 8, 538