

The `lstbayes` package

Jeffrey B. Arnold
jeffrey.arnold@gmail.com

lstbayes from 2018/07/06

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

```
1 \RequirePackage{listings}
```

3.1 BUGS

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

```
2 \lstdefinlanguage{BUGS}{
3   morekeywords=[1]{for,in,model,T,I,C},%
4   morecomment=[1]{\#},%
5   sensitive=true,%
6   alsoletter={.},%
7   otherkeywords={<-,~},%
8   literate={<-}{\leftarrow}1 {~}{\sim}1%
9 }
10 \lstalias[] {OpenBUGS} [] {BUGS}
11 \lstalias[] {WinBUGS} [] {BUGS}
```

3.2 JAGS

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

```
12 \lstdefinlanguage[] {JAGS} [] {BUGS}{
```

```

13 morekeywords=[1]{data,var,const},%
14 morecomment=[n]{/*}{*/}%
15 }

```

3.3 Stan

Language driver for Stan. The driver is based on Stan modeling language version 2.17.0.

```

16 \lstdefinlanguage{Stan}{
17   morekeywords=[1]{%
18     functions,%
19     data,%
20     else,%
21     for,%
22     generated,%
23     if,%
24     in,%
25     increment_log_prob,%
26     integrate_ode_bdf,%
27     integrate_ode_rk45,%
28     integrate_ode,%
29     lower,%
30     model,%
31     parameters,%
32     print,%
33     quantities,%
34     reject,%
35     return,%
36     T,%
37     target,%
38     transformed,%
39     upper,%
40     while%
41   },%
42   morekeywords=[2]{%
43     cholesky_factor_corr,%
44     cholesky_factor_cov,%
45     corr_matrix,%
46     cov_matrix,%
47     int,%
48     matrix,%
49     ordered,%
50     positive_ordered,%
51     real,%
52     row_vector,%
53     simplex,%
54     unit_vector,%
55     vector,%
56     void%

```

```

57 },%
58 morekeywords=[3]{%
59   Phi,%
60   Phi_approx,%
61   abs,%
62   acos,%
63   acosh,%
64   algebra_solver,%
65   append_array,%
66   append_col,%
67   append_row,%
68   asin,%
69   asinh,%
70   atan,%
71   atan2,%
72   atanh,%
73   bernoulli,%
74   bernoulli_cdf,%
75   bernoulli_lccdf,%
76   bernoulli_lcdf,%
77   bernoulli_logit,%
78   bernoulli_logit_lpmf,%
79   bernoulli_logit_rng,%
80   bernoulli_lpmf,%
81   bernoulli_rng,%
82   bessel_first_kind,%
83   bessel_second_kind,%
84   beta,%
85   beta_binomial,%
86   beta_binomial_cdf,%
87   beta_binomial_lccdf,%
88   beta_binomial_lcdf,%
89   beta_binomial_lpmf,%
90   beta_binomial_rng,%
91   beta_cdf,%
92   beta_lccdf,%
93   beta_lcdf,%
94   beta_lpdf,%
95   beta_rng,%
96   binary_log_loss,%
97   binomial,%
98   binomial_cdf,%
99   binomial_coefficient_log,%
100  binomial_lccdf,%
101  binomial_lcdf,%
102  binomial_logit,%
103  binomial_logit_lpmf,%
104  binomial_lpmf,%
105  binomial_rng,%
106  block,%

```

107 categorical,%
108 categorical_logit,%
109 categorical_logit_lpmf,%
110 categorical_logit_rng,%
111 categorical_lpmf,%
112 categorical_rng,%
113 cauchy,%
114 cauchy_cdf,%
115 cauchy_lccdf,%
116 cauchy_lcdf,%
117 cauchy_lpdf,%
118 cauchy_rng,%
119 cbrt,%
120 ceil,%
121 chi_square,%
122 chi_square_cdf,%
123 chi_square_lccdf,%
124 chi_square_lcdf,%
125 chi_square_lpdf,%
126 chi_square_rng,%
127 cholesky_decompose,%
128 choose,%
129 col,%
130 cols,%
131 columns_dot_product,%
132 columns_dot_self,%
133 cos,%
134 cosh,%
135 cov_exp_quad,%
136 crossprod,%
137 csr_extract_u,%
138 csr_extract_v,%
139 csr_extract_w,%
140 csr_matrix_times_vector,%
141 csr_to_dense_matrix,%
142 cumulative_sum,%
143 determinant,%
144 diag_matrix,%
145 diag_post_multiply,%
146 diag_pre_multiply,%
147 diagonal,%
148 digamma,%
149 dims,%
150 dirichlet,%
151 dirichlet_lpdf,%
152 dirichlet_rng,%
153 distance,%
154 dot_product,%
155 dot_self,%
156 double_exponential,%

157 double_exponential_cdf,%
158 double_exponential_lccdf,%
159 double_exponential_lcdf,%
160 double_exponential_lpdf,%
161 double_exponential_rng,%
162 e,%
163 eigenvalues_sym,%
164 eigenvectors_sym,%
165 erf,%
166 erfc,%
167 exp,%
168 exp2,%
169 exp_mod_normal,%
170 exp_mod_normal_cdf,%
171 exp_mod_normal_lccdf,%
172 exp_mod_normal_lcdf,%
173 exp_mod_normal_lpdf,%
174 exp_mod_normal_rng,%
175 expm1,%
176 exponential,%
177 exponential_cdf,%
178 exponential_lccdf,%
179 exponential_lcdf,%
180 exponential_lpdf,%
181 exponential_rng,%
182 fabs,%
183 falling_factorial,%
184 fdim,%
185 floor,%
186 fma,%
187 fmax,%
188 fmin,%
189 fmod,%
190 frechet,%
191 frechet_cdf,%
192 frechet_lccdf,%
193 frechet_lcdf,%
194 frechet_lpdf,%
195 frechet_rng,%
196 gamma,%
197 gamma_cdf,%
198 gamma_lccdf,%
199 gamma_lcdf,%
200 gamma_lpdf,%
201 gamma_p,%
202 gamma_q,%
203 gamma_rng,%
204 gaussian_dlm_obs,%
205 gaussian_dlm_obs_lpdf,%
206 get_lp,%

207 gumbel,%
208 gumbel_cdf,%
209 gumbel_lccdf,%
210 gumbel_lcdf,%
211 gumbel_lpdf,%
212 gumbel_rng,%
213 head,%
214 hypergeometric,%
215 hypergeometric_lpmf,%
216 hypergeometric_rng,%
217 hypot,%
218 inc_beta,%
219 int_step,%
220 integrate_ode,%
221 integrate_ode_bdf,%
222 integrate_ode_rk45,%
223 inv,%
224 inv_Phi,%
225 inv_chi_square,%
226 inv_chi_square_cdf,%
227 inv_chi_square_lccdf,%
228 inv_chi_square_lcdf,%
229 inv_chi_square_lpdf,%
230 inv_chi_square_rng,%
231 inv_cloglog,%
232 inv_gamma,%
233 inv_gamma_cdf,%
234 inv_gamma_lccdf,%
235 inv_gamma_lcdf,%
236 inv_gamma_lpdf,%
237 inv_gamma_rng,%
238 inv_logit,%
239 inv_sqrt,%
240 inv_square,%
241 inv_wishart,%
242 inv_wishart_lpdf,%
243 inv_wishart_rng,%
244 inverse,%
245 inverse_spd,%
246 is_inf,%
247 is_nan,%
248 lbeta,%
249 lchoose,%
250 lgamma,%
251 lkj_corr,%
252 lkj_corr_cholesky,%
253 lkj_corr_cholesky_lpdf,%
254 lkj_corr_cholesky_rng,%
255 lkj_corr_lpdf,%
256 lkj_corr_rng,%

257 lmgamma,%
258 lmultiply,%
259 log,%
260 log10,%
261 log1m,%
262 log1m_exp,%
263 log1m_inv_logit,%
264 log1p,%
265 log1p_exp,%
266 log2,%
267 log_determinant,%
268 log_diff_exp,%
269 log_falling_factorial,%
270 log_inv_logit,%
271 log_mix,%
272 log_rising_factorial,%
273 log_softmax,%
274 log_sum_exp,%
275 logistic,%
276 logistic_cdf,%
277 logistic_lccdf,%
278 logistic_lcdf,%
279 logistic_lpdf,%
280 logistic_rng,%
281 logit,%
282 lognormal,%
283 lognormal_cdf,%
284 lognormal_lccdf,%
285 lognormal_lcdf,%
286 lognormal_lpdf,%
287 lognormal_rng,%
288 machine_precision,%
289 matrix_exp,%
290 max,%
291 mdivide_left_spd,%
292 mdivide_left_tri_low,%
293 mdivide_right_spd,%
294 mdivide_right_tri_low,%
295 mean,%
296 min,%
297 modified_bessel_first_kind,%
298 modified_bessel_second_kind,%
299 multi_gp,%
300 multi_gp_cholesky,%
301 multi_gp_cholesky_lpdf,%
302 multi_gp_lpdf,%
303 multi_normal,%
304 multi_normal_cholesky,%
305 multi_normal_cholesky_lpdf,%
306 multi_normal_cholesky_rng,%

307 multi_normal_lpdf,%
308 multi_normal_prec,%
309 multi_normal_prec_lpdf,%
310 multi_normal_rng,%
311 multi_student_t,%
312 multi_student_t_lpdf,%
313 multi_student_t_rng,%
314 multinomial,%
315 multinomial_lpmf,%
316 multinomial_rng,%
317 multiply_log,%
318 multiply_lower_tri_self_transpose,%
319 neg_binomial,%
320 neg_binomial_2,%
321 neg_binomial_2_cdf,%
322 neg_binomial_2_lccdf,%
323 neg_binomial_2_lcdf,%
324 neg_binomial_2_log,%
325 neg_binomial_2_log_lpmf,%
326 neg_binomial_2_log_rng,%
327 neg_binomial_2_lpmf,%
328 neg_binomial_2_rng,%
329 neg_binomial_cdf,%
330 neg_binomial_lccdf,%
331 neg_binomial_lcdf,%
332 neg_binomial_lpmf,%
333 neg_binomial_rng,%
334 negative_infinity,%
335 normal,%
336 normal_cdf,%
337 normal_lccdf,%
338 normal_lcdf,%
339 normal_lpdf,%
340 normal_rng,%
341 not_a_number,%
342 num_elements,%
343 ordered_logistic,%
344 ordered_logistic_lpmf,%
345 ordered_logistic_rng,%
346 owens_t,%
347 pareto,%
348 pareto_cdf,%
349 pareto_lccdf,%
350 pareto_lcdf,%
351 pareto_lpdf,%
352 pareto_rng,%
353 pareto_type_2,%
354 pareto_type_2_cdf,%
355 pareto_type_2_lccdf,%
356 pareto_type_2_lcdf,%

357 pareto_type_2_lpdf,%
358 pareto_type_2_rng,%
359 pi,%
360 poisson,%
361 poisson_cdf,%
362 poisson_lccdf,%
363 poisson_lcdf,%
364 poisson_log,%
365 poisson_log_lpmf,%
366 poisson_log_rng,%
367 poisson_lpmf,%
368 poisson_rng,%
369 positive_infinity,%
370 pow,%
371 print,%
372 prod,%
373 qr_Q,%
374 qr_R,%
375 quad_form,%
376 quad_form_diag,%
377 quad_form_sym,%
378 rank,%
379 rayleigh,%
380 rayleigh_cdf,%
381 rayleigh_lccdf,%
382 rayleigh_lcdf,%
383 rayleigh_lpdf,%
384 rayleigh_rng,%
385 reject,%
386 rep_array,%
387 rep_matrix,%
388 rep_row_vector,%
389 rep_vector,%
390 rising_factorial,%
391 round,%
392 row,%
393 rows,%
394 rows_dot_product,%
395 rows_dot_self,%
396 scaled_inv_chi_square,%
397 scaled_inv_chi_square_cdf,%
398 scaled_inv_chi_square_lccdf,%
399 scaled_inv_chi_square_lcdf,%
400 scaled_inv_chi_square_lpdf,%
401 scaled_inv_chi_square_rng,%
402 sd,%
403 segment,%
404 sin,%
405 singular_values,%
406 sinh,%

407 size,%
408 skew_normal,%
409 skew_normal_cdf,%
410 skew_normal_lccdf,%
411 skew_normal_lcdf,%
412 skew_normal_lpdf,%
413 skew_normal_rng,%
414 softmax,%
415 sort_asc,%
416 sort_desc,%
417 sort_indices_asc,%
418 sort_indices_desc,%
419 sqrt,%
420 sqrt2,%
421 square,%
422 squared_distance,%
423 step,%
424 student_t,%
425 student_t_cdf,%
426 student_t_lccdf,%
427 student_t_lcdf,%
428 student_t_lpdf,%
429 student_t_rng,%
430 sub_col,%
431 sub_row,%
432 sum,%
433 tail,%
434 tan,%
435 tanh,%
436 target,%
437 tcrossprod,%
438 tgamma,%
439 to_array_1d,%
440 to_array_2d,%
441 to_matrix,%
442 to_row_vector,%
443 to_vector,%
444 trace,%
445 trace_gen_quad_form,%
446 trace_quad_form,%
447 trigamma,%
448 trunc,%
449 uniform,%
450 uniform_cdf,%
451 uniform_lccdf,%
452 uniform_lcdf,%
453 uniform_lpdf,%
454 uniform_rng,%
455 variance,%
456 von_mises,%

```

457     von_mises_lpdf,%
458     von_mises_rng,%
459     weibull,%
460     weibull_cdf,%
461     weibull_lccdf,%
462     weibull_lcdf,%
463     weibull_lpdf,%
464     weibull_rng,%
465     wiener,%
466     wiener_lpdf,%
467     wishart,%
468     wishart_lpdf,%
469     wishart_rng
470 },%
471 otherkeywords={.,*=/,+=-,*=/,<-,~},%
472 sensitive=true,%
473 morecomment=[1]{\#},%
474 morecomment=[1]{//},%
475 morecomment=[n]{/*}{*/},%
476 string=[d]"%,
477 literate={<-}{\leftarrow$}1 {~}{\sim$}1%
478 }

```

Change History

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

Index

Numbers written in *italics* 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.

S	Symbols	<code>\lstalias</code> 10, 11	R
<code>\#</code> 4, 473			<code>\RequirePackage</code> 1
L	<code>\leftarrow</code> 8, 477	<code>\lstdefinlanguage</code> 2, 12, 16	S
			<code>\sim</code> 8, 477