元器件生存时间模拟分析-代码

Miao Cai

2019-03-25

# 数据模拟生成

set.seed(123)  
  
alpha = matrix(c(0.001, 0.05, 0.0001, 0.08), ncol = 2, byrow = TRUE)  
w = c(45, 55)  
t = matrix(seq(10, 40, 10), ncol = 2, byrow = TRUE)  
K = c(10, 50, 100)  
  
  
lambda = function(r = 1:2, j = 1:2) {  
 alpha\_r0 = alpha[r, 1]  
 alpha\_r1 = alpha[r, 2]  
 return(alpha\_r0\*exp(alpha\_r1\*w[j]))  
}  
  
p = function(i = 1:2, j = 1:2){  
 lam1j = lambda(1, j) # failure due to factor 1  
 lam2j = lambda(2, j) # failure due to factor 2  
   
 p0 = exp(-(lam1j + lam2j)\*t[i, j])  
 p1 = (lam1j/(lam1j + lam2j))\*(1 - p0)  
 p2 = (lam2j/(lam1j + lam2j))\*(1 - p0)  
   
 return(c(p0, p1, p2))  
}  
  
Tmatrxi = t(rmultinom(100, K[3], prob = p(1, 1)))

# Stan代码

reliab = "  
data {  
 int<lower=0> n;  
 int DAT[n, 3];  
 vector[2] W;  
 vector[4] Tim;  
}  
parameters{  
 real<lower=0, upper=0.5> a10;   
 real<lower=0, upper=0.5> a11;  
 real<lower=0, upper=0.5> a20;   
 real<lower=0, upper=0.5> a21;  
}  
transformed parameters{  
 real<lower=0, upper=1> p0;   
 real<lower=0, upper=1> p1;   
 real<lower=0, upper=1> p2;  
 vector<lower=0, upper=1>[3] p;  
   
 p0 = exp(-(a10\*exp(a11\*W[1]) + a20\*exp(a21\*W[2]))\*Tim[1]);  
 p1 = (a10\*exp(a11\*W[1]))/(a10\*exp(a11\*W[1]) + a20\*exp(a21\*W[2]))\*(1 - p0);  
 p2 = 1-p0-p1;  
 p = [p0, p1, p2]';  
}  
model{  
 for (i in 1:n){  
 //target += multinomial\_lpmf(DAT[i,] | p);  
 DAT[i,] ~ multinomial(p);  
 //DAT[i,] ~ multi\_log(p0, p1, p2);  
 }  
 a10 ~ gamma(1, 1);  
 a11 ~ gamma(1, 1);  
 a20 ~ gamma(1, 1);  
 a21 ~ gamma(1, 1);  
}  
"

# Stan抽样

library(rstan)  
rstan\_options(auto\_write = TRUE)  
  
stan\_dat = list(  
 n = nrow(Tmatrxi),  
 DAT = Tmatrxi,  
 W = w,  
 Tim = seq(10, 40, 10)  
)  
  
fit <- stan(  
 model\_code = reliab, data = stan\_dat, #init\_r = 0.1, init = 0.001,   
 warmup = 1000, iter = 2000, chains = 1, cores = 1, seed = 3)  
  
summary(fit)