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set matastrict off
mata:
mata clear
mata mlib create libbayes , dir(PERSONAL) replace
/*---------------------------------------------
* Single categorical observation
* P = probabilities of each cell (sum to 1)
* returns selected cell number
*---------------------------------------------*/
real scalar rCategorical(real vector P)
{
   real scalar k,u,h,sumP

   k=length(P)
   u=runiform(1,1)
   h=1
   sumP=P[1]
   while( u > sumP & h < k ) {
      h++
      sumP=sumP+P[h]
   }
   return(h)
}
mata mlib add libbayes rCategorical()
/*---------------------------------------------
* Single Dirichlet distribution - parameter alpha
*---------------------------------------------*/
real colvector rDirichlet(real vector alpha)
{
   real scalar h,sP
   real colvector P

   h=length(alpha)
   P=J(h,1,0)
   sP=0
   for(i=1;i<=h;i++) {
      P[i]=rgamma(1,1,alpha[i],1)
      sP=sP+P[i]
   }
   return(P/sP)
}
mata mlib add libbayes rDirichlet()
/*---------------------------------------------
* Single random multivariate normal variable* M = mean
* L = cholesky(V), V=variance matrix
*---------------------------------------------*/
real rowvector rMNormal(real rowvector M,real matrix L)
{
   return(M+L*rnormal(rows(L),1,0,1))
}
mata mlib add libbayes rMNormal()
/*---------------------------------------------
* Single Wishart matrix
* L = cholesky(invsym(R)), where R = k*variance matrix
* k = degree of freedom
*---------------------------------------------*/
real matrix rWishart(real matrix L,real scalar k )
{
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    p = rows(L)
    B = J(p,p,0)
    for(i=2;i<=p;i++) {
       for(j=1;j<i;j++) {
          B[i,j] = rnormal(1,1,0,1)
       }
    }
    for(i=1;i<=p;i++) B[i,i] = sqrt(rchi2(1,1,k-i+1))
    return(L*B*B'*L')
}
mata mlib add libbayes rWishart()
mata mlib index
end
```