1. Matlab code for the BRL method with the gold standard

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% Given information x, m observations from nondiseased group
%                    y, n observations from disease group
%                 grid, the length of even interval of FPF
%                NSCAN, an integer of MCMC iteration
%               burnin, an integer of burn-in
%                  gap, an integer of lag
%                    a, initial value of normal mean
%                    b, initial value of normal standard deviation
%                  gib, vector of MCMC samples
% Help function--generate size=nsample random variables from
% truncated normal with  non-truncated  normal mean a, standard
% deviation b and corresponding truncation region (kc1,kc2)
function [TN2] =TN2(nsample,a,b,kc1,kc2)
xq=ones(nsample,1);
din= normcdf(kc2,a,b)- normcdf(kc1,a,b);% CDF
for i= 1:nsample
u=rand(1,1);
xq(i)=norminv(din*u+normcdf(kc1,a,b),a,b);
end;
TN2=xq;


%%%%%%%%%%%%%%%%%%%%start the main codes
 z=[x;y];%(m+n)*1 matrix
 idd=[zeros(m,1);ones(n,1)];
 [temp, index]=sortrows(z);
 id=idd(index);%labels of combined ordered statistics denoted as id
 orid=1:(m+n);
  %%%%%%%%%%%%%%%%%%start to get the iniatial values  R=order(Z,W)
 Rtemp=zeros(m+n,1);
 Rtemp(id==1)=sort(normrnd(a0,b0,n,1));%fill in W initial values
 indexy=orid(id==1);%get the  indices of W's initial denoted as indexy
 if (indexy(1)>1) %fill in Z initial values
 Rtemp(1:(indexy(1)-1))=sort(TN2((indexy(1)-1),0,1,-100,Rtemp(indexy(1))));
 end;
 gum=ones(size(indexy,2),2);
 gum(:,2)= [diff(indexy) -1]-1;
 gum(:,1)=indexy;
 for i=1:n
 if (gum(i,2)>0)
 Rtemp((gum(i,1)+1):(gum(i+1,1)-1))
 =sort(TN2(gum(i,2),0,1, Rtemp(gum(i,1)), Rtemp(gum(i+1,1))));
 end;
 end;
 R=Rtemp;
  %%%%%%%%%%%%%%%%%%start Gibbs sampling
  for j=1:NSCAN
  %%%%%%%%%%%%%%%%%%update R based on current values  a(j) and b(j)
  i=1;
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  if (id(i)==0)
  R(i)=TN2(1,0,1,-100,R(2));
  else
  R(i)=TN2(1,a(j),b(j),-100,R(2));
  end;
for i=2:(m+n-1)
  if (id(i)==0)
  R(i)=TN2(1,0,1,R(i-1),R(i+1));
  else
  R(i)=TN2(1,a(j),b(j),R(i-1),R(i+1));
  end;
end;
  i=(m+n);
  if (id(i)==0)
  R(i)=TN2(1,0,1,R(m+n-1),100);
  else
  R(i)=TN2(1,a(j),b(j),R(m+n-1),100);
  end;
  %%%%%%%%%%%%%%%%%%%update Z, W values based on R
  Z=R(id==0);
  W=R(id==1);
  vrate=var(W)*(n-1)/2;
  %%%%%%%%%%%%%%%%%%%update a and b by (Z,W)
  b(j+1)=sqrt(1/gamrnd((n-1)/2, 1/vrate));
  a(j+1)=normrnd(mean(W), b(j+1)/sqrt(n),1,1);
  end;
  %%%%%%%%%%%%%%%%%%%end of  Gibbs sampling

  %%%%BRL estimate of intercept and slope in the binormal model for ROC
  BRLintercept=mean(a(gib)./b(gib));
  BRLslope=mean(1./b(gib));
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Other sampling error information and BRL estimate of ROC can be obtained easily.