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Anexo

```
%Simulador escores da satisfacao – Rotina Principal
%*******************************************************************
% Esta rotina calcula os escores da satisfacao segundo a metodologia
% de Joreskog e do PLS, com base no modelo do IASC/ACSI.
%*******************************************************************

clear;
clc;

% *** Inicializa globais
global gfiOLS gfiGLS gfiMV agfiOLS agfiGLS agfiMV

% *** Inicializa variaveis gerais do programa
fixarnd=0; % Fixa semente da funcao Randon do Matlab
qtdsim=20;  % Qtd de simulacoes para cada conjunto de relacoes

% *** Cria arquivo de resultados
FN=strcat('Informacao.txt');
delete(FN);
fid1 = fopen(FN,'w');
fprintf(fid1,'%s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s %s\n',...
        'Ga1','Ga2','Be1','Par_Sat','Simulacao', ...
        'corr_jkOLS','corr_jkGLS','corr_jkMV','corr_pls','corr_brt', ...
        'mutua_jkOLS','mutua_jkGLS','mutua_jkMV','mutua_pls','mutua_brt', ...
        'info_jkOLS','info_jkGLS','info_jkMV','info_pls','info_brt', ...
        'chi2OLS','chi2GLS','chi2MV', ...
        'gfiOLS','gfiGLS','gfiMV', ...
        'agfiOLS','agfiGLS','agfiMV', ...
        'convergiuOLS','convergiuGLS','convergiuMV');


% *** Processa simulacoes para diversos cenarios de simulacoes
for GAM1=0.2:0.2:0.8
    for GAM2=0.2:0.2:0.8
        for BET1=0.2:0.2:0.8
            for PE=0.5:0.3:0.8

                if fixarnd
                    randn('seed',23432);
                end;
                r_par=[];
                tam=1000;
                I=0;
                flag=1;

                % *** Inicializa loadings hx
                hx1=0.8;
                hx2=0.8;
                hx3=0.8;
                % *** Inicializa loadings hy
                hy1=0.8;
                hy2=0.8;
                hy3=0.8;
                hy4=0.8;
                hy5=PE;
                hy6=0.8;
                % *** Inicializa gamma
                ga1=GAM1;
                ga2=GAM2;
                % *** Inicializa ksi
                mksi=0;
                vksi=1;
                % *** Inicializa erros epsilon
                mdy1=0; vdy1=1-(hy1^2);
                mdy2=0; vdy2=1-(hy2^2);
                mdy3=0; vdy3=1-(hy3^2);
                mdy4=0; vdy4=1-(hy4^2);
                mdy5=0; vdy5=1-(hy5^2);
```

```
mdy6=0; vdy6=1-(hy6^2);
% *** Inicializa erros delta
mdx1=0; vdx1=1-(hx1^2);
mdx2=0; vdx2=1-(hx2^2);
mdx3=0; vdx3=1-(hx3^2);
% *** Inicializa beta
be1=BET1;
% *** Inicializa eta
meta1=0; veta1=1-(GAM1^2);
meta2=0; veta2=1-((BET1*GAM1)+GAM2)^2+((GAM1^2)-1)*(BET1^2);

% *** Variancias dos disturbios positiva?
if and(veta1>0,veta2>0)

  % *** Cria vetor de parametros para a funcao de otimizacao
  par=[hy1;hy2;hy3;hy4;hy5;hy6;hx1;hx2;hx3;ga1;ga2;vksi; ...
    vdy1;vdy2;vdy3;vdy4;vdy5;vdy6;vdx1;vdx2;vdx3;be1; ...
    veta1;veta2];

  % *** Para cada conjunto executa diversas simulacoes
  for totsim=1:qtdsim
    I=I+1;

    % *** Inicializa variaveis
    dados=[];    %Vetor com os dados gerados
    S=[];        %Matriz de covariancia dos dados
    R=[];        %Matriz de correlacao dos dados
    lat=[];      %Vetor com n1,n2,ksi1
    dist=[];     %Vetor de disturbios
    q_ruido=1;   %Erros/Disturbios normais simetricos (1) ou assimetricos (2)
    v_ruido=1;
    s_ruido=1;
    z_ruido=1;
    ksi_ruido=2;

    % *** Gera erros das medidas e disturbios aleatorios
    if flag == 1
      dx1=gera_rnd(q_ruido,mdx1,vdx1,tam);
      dx2=gera_rnd(q_ruido,mdx2,vdx2,tam);
      dx3=gera_rnd(q_ruido,mdx3,vdx3,tam);
      ey1=gera_rnd(v_ruido,mdy1,vdy1,tam);
      ey2=gera_rnd(v_ruido,mdy2,vdy2,tam);
      ey3=gera_rnd(v_ruido,mdy3,vdy3,tam);
      ey4=gera_rnd(s_ruido,mdy4,vdy4,tam);
      ey5=gera_rnd(s_ruido,mdy5,vdy5,tam);
      ey6=gera_rnd(s_ruido,mdy6,vdy6,tam);
      zeta1=gera_rnd(z_ruido,meta1,veta1,tam);
      zeta2=gera_rnd(z_ruido,meta2,veta2,tam);
      ksi=gera_rnd(ksi_ruido,0,vksi,tam);
      mz1=mean(zeta1);
      mz2=mean(zeta2);
      flag=1;
      ksi_1=ksi+ones(tam,1)*mksi;
    else
      % *** Modifica media da latente exogena
      ksi_1=ksi+ones(tam,1)*mksi;
    end;

    % *** Parametros para os dados
    par1=[ga1 ga2 be1 hx1 hx2 hx3 hy1 hy2 hy3 hy4 hy5 hy6];
    dist=[dx1 dx2 dx3 ey1 ey2 ey3 ey4 ey5 ey6 zeta1 zeta2 ksi_1];

    % *** Gera dados para simulacao
    [dados,dadosdm,S,lat,R]=gerar_dados(par1,dist,mksi);
    scoresTRUE=lat;

    % *** Estimacao do modelo via PLS
    [wh1,wh2,wh3,latPLS,wh]=pls(dados);

    % *** Calculo do IASC via PLS e IASC bruto
    scoresPLS=[];
    scoresBRT=[];
    for N=1:tam
      scoresPLS(N)=[wh3(1) wh3(2) wh3(3)]*[dados(N,4);dados(N,5);dados(N,6)];
      scoresBRT(N)=[1 1 1]*[dados(N,4);dados(N,5);dados(N,6)];
    end;
```

```
% *** Calcula a funcao objetivo para os parametros inicializados
% *** Restricoes para a funcao objetivo
A= [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;            %Matriz de restricoes (A e b)
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 -par(13) 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 -par(14) 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(15) 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(16) 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(17) 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(18) 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(19) 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(20) 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(21) 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(23) 0;
   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 -par(24)];
b= [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]';

% *** Otimiza funcao objetivo para os metodos (1)OLS, (2)GLS e (3)MV
options = optimset('Display','off','TolFun',1e-4,'TolX',1e-4,'TolCon',5000,'MaxIter',50);

% *** (1) ULS
metodo=1;
flagOLS=1;
scoresJOLS=[];
gfiOLS=0;
agfiOLS=0;
[fmv,fval,EXITFLAG,OUTPUT] = fmincon('lisrel',par,A,b,[],[],[],[],[],options,R,metodo);
%[fmv,fval] = fminunc('lisrel1',par,options,S);

% *** Se a funcao convergir
if and(EXITFLAG > 0,fval>0)

   % *** Verifica qui2
   p_valueOLS=1-chi2cdf(fval*(tam-1),22);

   % *** Parametros estimados
   r_par(:,I,1)=fmv;

   % *** Calculo do IASC via Joreskog
   miOLS=[]; %interceptos das observadas
   [scoresJOLS,miOLS]=calc_scores(fmv,dados,mz1,mz2,dadosdm);
else
   % *** Metodo nao convergiu
   scoresJOLS=ones(tam,3);
   flagOLS=0;
   p_valueOLS=0;
end;

% *** (2) GLS
metodo=2;
flagGLS=1;
scoresJGLS=[];
gfiGLS=0;
agfiGLS=0;
[fmv,fval,EXITFLAG,OUTPUT] = fmincon('lisrel',par,A,b,[],[],[],[],[],options,R,metodo);
%[fmv,fval] = fminunc('lisrel1',par,options,S);

% *** Se a funcao convergir
if and(EXITFLAG > 0,fval>0)

   % *** Verifica qui2
   p_valueGLS=1-chi2cdf(fval*(tam-1),22);

   % *** Parametros estimados
```

```
    r_par(:,I,2)=fmv;

    % *** Calculo do IASC via Joreskog
    miGLS=[]; %interceptos das observadas
    [scoresJGLS,miGLS]=calc_scores(fmv,dados,mz1,mz2,dadosdm);
else
    % *** Metodo nao convergiu
    scoresJGLS=ones(tam,3);
    flagGLS=0;
    p_valueGLS=0;
end;

% *** (3) MV
metodo=3;
flagMV=1;
scoresJMV=[];
gfiMV=0;
agfiMV=0;
[fmv,fval,EXITFLAG,OUTPUT] = fmincon('lisrel',par,A,b,[],[],[],[],[],options,R,metodo);
%[fmv,fval] = fminunc('lisrel1',par,options,S);

% *** Se a funcao convergir
if and(EXITFLAG > 0,fval>0)

    % *** Verifica qui2
    p_valueMV=1-chi2cdf(fval*(tam-1),22);

    % *** Parametros estimados
    r_par(:,I,3)=fmv;

    % *** Calculo do IASC via Joreskog
    miMV=[]; %interceptos das observadas
    [scoresJMV,miMV]=calc_scores(fmv,dados,mz1,mz2,dadosdm);
else
    % *** Metodo nao convergiu
    scoresJMV=ones(tam,3);
    flagMV=0;
    p_valueMV=0;
end;

% *** Calculo da media dos escores
med_sat=mean(scoresTRUE(:,2));
if flagOLS==1
    med_satJOLS=mean(scoresJOLS(:,2));
else
    med_satJOLS=0;
end;
if flagGLS==1
    med_satJGLS=mean(scoresJGLS(:,2));
else
    med_satJGLS=0;
end;
if flagMV==1
    med_satJMV=mean(scoresJMV(:,2));
else
    med_satJMV=0;
end;
med_satPLS=mean(scoresPLS);
med_satBRT=mean(scoresBRT);

% *** Calculo da correlacao entre os escores
REcov=corrcoef([scoresTRUE(:,2) scoresJOLS(:,2) scoresJGLS(:,2) scoresJMV(:,2) scoresPLS' scoresBRT']);

% *** Calculo da informacao mutua entre os escores
if flagOLS==1
    REinfmut1=CalcInfMutua([scoresTRUE(:,2) scoresJOLS(:,2)]); %informacao mutua entre scores verdadeiro e joreskog
OLS
else
    REinfmut1=0;
end;
if flagGLS==1
    REinfmut2=CalcInfMutua([scoresTRUE(:,2) scoresJGLS(:,2)]); %informacao mutua entre scores verdadeiro e joreskog
GLS
else
    REinfmut2=0;
end;
```

```
                  if flagMV==1
                     REinfmut3=CalcInfMutua([scoresTRUE(:,2) scoresJMV(:,2)]); %informacao mutua entre scores verdadeiro e joreskog
MV
                  else
                     REinfmut3=0;
                  end;
                  REinfmut4=CalcInfMutua([scoresTRUE(:,2) scoresPLS']); %informacao mutua entre scores verdadeiro e pls
                  REinfmut5=CalcInfMutua([scoresTRUE(:,2) scoresBRT']); %informacao mutua entre scores verdadeiro e bruto

                  % *** Calcula funcao de informacao
                  grfscores=[scoresTRUE(:,2) scoresJOLS(:,2) scoresJGLS(:,2) scoresJMV(:,2) scoresPLS' scoresBRT'];
                  [info,info_s]=calc_info(grfscores);

                  % *** Imprime resultados no arquivo informacao
                  [GAM1,GAM2,BET1,PE,totsim, ...
                   REcov(1,2),REcov(1,3),REcov(1,4),REcov(1,5),REcov(1,6), ...
                   REinfmut1,REinfmut2,REinfmut3,REinfmut4,REinfmut5, ...
                   info_s(1),info_s(2),info_s(3),info_s(4),info_s(5), ...
                   p_valueOLS,p_valueGLS,p_valueMV, ...
                   gfiOLS,gfiGLS,gfiMV,agfiOLS,agfiGLS,agfiMV, ...
                   flagOLS,flagGLS,flagMV]
                  fprintf(fid1,'%6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f
%6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f %6.4f\n', ...
                        GAM1,GAM2,BET1,PE,totsim, ...
                        REcov(1,2),REcov(1,3),REcov(1,4),REcov(1,5),REcov(1,6), ...
                        REinfmut1,REinfmut2,REinfmut3,REinfmut4,REinfmut5, ...
                        info_s(1),info_s(2),info_s(3),info_s(4),info_s(5), ...
                        p_valueOLS,p_valueGLS,p_valueMV, ...
                        gfiOLS,gfiGLS,gfiMV,agfiOLS,agfiGLS,agfiMV, ...
                        flagOLS,flagGLS,flagMV);

               end;
            else
               % *** Inicializacao de parametros que gera variancia negativa
               fprintf(fid1,'%6.4f %6.4f %6.4f %6.4f %6.4f %6.4f\n', ...
                  GAM1,GAM2,BET1,PE,totsim,-99);
            end;
         end;
      end;
   end;
end;

% *** Fecha arquivo
fclose(fid1);
```