

cep2

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% cep2.m 11-nov-04
% for given 2x2 covariance and probability P,
% compute radius yielding P under bivariate normal
% syntax radius=cep2(P,cov);
% original in d:\classes\ce603_03\

function radius=cep2(P,cov)
sx2=cov(1,1);
sy2=cov(2,2);
sxy=cov(1,2);
sx=sqrt(sx2);
sy=sqrt(sy2);
long=max([sx sy]);
% numerical increment in radial direction
% 1/50 of longer std. deviation
dr=long/50;
t1=2*pi*sqrt(det(cov));
term1=1/t1;
covi=inv(cov);
X=zeros(2,1);
degrad=180/(pi);
% numerical increment in angle = 1 degree
dth=1/degrad;
% only accumulate over 180 degree region
% to get 1/2 desired probability
nth=180;
accumP=0;
rr=0;
while(accumP < 0.5*P)
    rp=rr + 0.5*dr;
    tt=0;
    for j=1:nth
        thp=tt + 0.5*dth;
        X(1)=rp*cos(thp);
        X(2)=rp*sin(thp);
        term2=-0.5*(X'*covi*X);
        f=term1*exp(term2);
        dens=f;
        %mu=[0 0];
        %XX=[X(1) X(2)];
        %dens=mvnpdf(XX,mu,cov);
        da=rp*dth*dr;
        accumP=accumP + da*dens;
        tt=tt + dth;
    end
    rr=rr + dr;
end
res=rr;
```