

【相関係数 Correlation coefficient】

x_j, x_k の相関係数

$$r_{jk} = \frac{(x_j - \bar{x}_j, x_k - \bar{x}_k)}{\|x_j - \bar{x}_j\| \cdot \|x_k - \bar{x}_k\|}$$

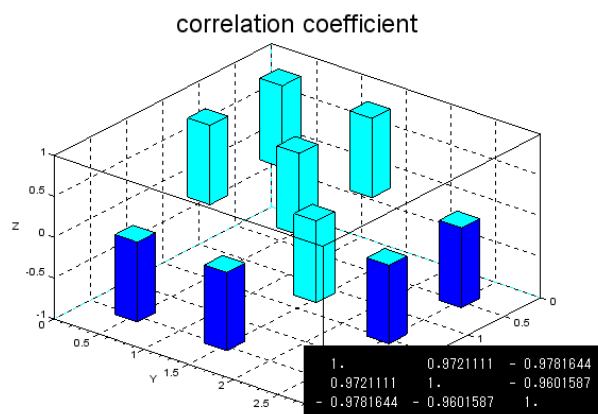


Figure 1: Scilab 実行結果

Source Code 1: Scilab

```
////////////////////////////////////
//      相関係数
//      Correlation coefficient
//
//                               M.Tsutsui
////////////////////////////////////

clear;

funcprot(0);
function[r]=corr_coe(x,y,z);//3データベクトルの相関係数を算出

    d_vec=[x;y;z];//データベクトル ※xyzデータを行方向に連結

[d_size1,d_size2]=size(d_vec);//データサイズ

r=[];//相関係数

for j=1:1:d_size1;
    for k=1:1:d_size1;

        norm_c=norm(d_vec(j,:)-mean(d_vec(j,:))*ones(1,d_size2))*norm(d_vec(k,:)-mean(d_vec(k,:))*ones(1,d_size2));//ノルム計算
        r(j,k)=(d_vec(j,:)-mean(d_vec(j,:))*ones(1,d_size2))*(d_vec(k,:)-mean(d_vec(k,:))*ones(1,d_size2))'/norm_c;

    end
end

endfunction

//ex)
x1=[12 20 24 26 33];//データ1
x2=[3 6 7 10 14];//データ2
x3=[22 16 14 10 8];//データ3
```

```

hist3d(corr_coe(x1,x2,x3));
xgrid ();
title("correlation_coefficient", 'fontsize',5);

```

Source Code 2: Python

```

#-----
# Module Name:correlation coefficient
# Author:m.tsutsui
#-----
#Library_Import-----
from numpy import*
import math, numpy as np
import matplotlib.pyplot as plt
#-----

def corr_coe(d_size1,d_size2):

    r=np.zeros([d_size1,d_size1])

    for j in np.arange(0,d_size1,1):
        for k in np.arange(0,d_size1,1):

            norm_c=np.linalg.norm(d_vec[j,:]-np.mean(d_vec[j,:])*ones(d_size2))*np.linalg.norm(d_vec[k,:]-np.mean(d_vec[k,:])*
                ones(d_size2)) #ノルム計算

            r[j,k]=matrix(d_vec[j,:]-np.mean(d_vec[j,:])*ones(d_size2))*matrix(d_vec[k,:]-np.mean(d_vec[k,:])*ones(d_size2)).T/
                norm_c

    return r

if __name__ == '__main__':

#ex)
    x1=array([12 ,20, 24, 26, 33]) #data 1
    x2=array([3, 6, 7, 10, 14]) #data 2
    x3=array([22, 16, 14, 10, 8]) #data 3

    d_vec=np.c_[x1,x2,x3].T #data vector

    d_size1,d_size2=d_vec.shape #data size

    print(corr_coe(d_size1,d_size2))

```