Code appendix and data results

DATA EXTRACTION

a = xlsread("Nor.xlsx",'A2:A42');

b = xlsread("Nor.xlsx",'B2:B42');

c = xlsread("Nor.xlsx",'C2:C42');

d = xlsread("Nor.xlsx",'D2:D42');

e = xlsread("Nor.xlsx",'E2:E42');

f = xlsread("Nor.xlsx",'F2:F42');

g = xlsread("Nor.xlsx",'G2:G42');

h = xlsread("Nor.xlsx",'H2:H42');

i = xlsread("Nor.xlsx",'I2:I42');

j = xlsread("Nor.xlsx",'J2:J42');

k = xlsread("Nor.xlsx",'K2:K42');

NORMALITY TESTING

[H, pValue, W] = swtest(a)

H =

[**logical**](about:blank)

0

pValue =

0.1554

W =

0.9615

[H, pValue, W] = swtest(d)

H =

[**logical**](about:blank)

0

pValue =

0.0582

W =

0.9477

[H, pValue, W] = swtest(j)

H =

[**logical**](about:blank)

0

pValue =

0.0780

W =

0.9513

[H, pValue, W] = swtest(k)

H =

[**logical**](about:blank)

0

pValue =

0.0595

W =

0.9480

f1 = boxcox(f);

[H, pValue, W] = swtest(f1)

H =

[**logical**](about:blank)

0

pValue =

0.5822

W =

0.9775

if min(e) <= 0

c = abs(min(e)) + 1;

else

c = 0;

end

e\_log10 = log10(e + c);

[H, pValue, W] = swtest(e\_log10)

H =

[**logical**](about:blank)

0

pValue =

0.2088

W =

0.9635

PYTHON TRASFORMATION FOR C VARIABLE

import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

import scipy.stats as stats

from sklearn.preprocessing import PowerTransformer

# Dati della sottoscala "Confusione Tristezza"

confusione\_tristezza = np.array([

2, 4, 5, 2, 2, 4, 4, 1, 2, 1,

2, 2, 0, 6, 1, 4, 10, 7, 6, 1,

1, 9, 2, 4, 2, 0, 3, 3, 2, 6,

8, 1, 2, 3, 8, 2, 2, 8, 7, 2, 6

]).reshape(-1, 1)

# Trasformazione Yeo-Johnson

pt = PowerTransformer(method='yeo-johnson', standardize=True)

tristezza\_trasformata = pt.fit\_transform(confusione\_tristezza)

shapiro\_test = stats.shapiro(tristezza\_trasformata)

print("Shapiro-Wilk p-value:", shapiro\_test.pvalue)

print("Lambda stimato (Yeo-Johnson):", pt.lambdas\_[0])

p-value ≈ 0.051

Confusione\_Tristezza\_Trasformata

‘-0.4726911489036446

0.3970797422732352

0.7218399345735924

-0.4726911489036446

-0.4726911489036446

0.3970797422732352

0.3970797422732352

-1.1229150695872063

-0.4726911489036446

-1.1229150695872063

-0.4726911489036446

-0.4726911489036446

-2.1577416279072374

1.0025203956146063

-1.1229150695872063

0.3970797422732352

1.8588505117068463

1.2502678041287465

1.0025203956146063

-1.1229150695872063

-1.1229150695872063

1.6740453574762544

-0.4726911489036446

0.3970797422732352

-0.4726911489036446

-2.1577416279072374

0.009989549999147654

0.009989549999147654

-0.4726911489036446

1.0025203956146063

1.4724127510829539

-1.1229150695872063

-0.4726911489036446

0.009989549999147654

1.4724127510829539

-0.4726911489036446

-0.4726911489036446

1.4724127510829539

1.2502678041287465

-0.4726911489036446

1.0025203956146063’

c1 = [

-0.4726911489036446;

0.3970797422732352;

0.7218399345735924;

-0.4726911489036446;

-0.4726911489036446;

0.3970797422732352;

0.3970797422732352;

-1.1229150695872063;

-0.4726911489036446;

-1.1229150695872063;

-0.4726911489036446;

-0.4726911489036446;

-2.1577416279072374;

1.0025203956146063;

-1.1229150695872063;

0.3970797422732352;

1.8588505117068463;

1.2502678041287465;

1.0025203956146063;

-1.1229150695872063;

-1.1229150695872063;

1.6740453574762544;

-0.4726911489036446;

0.3970797422732352;

-0.4726911489036446;

-2.1577416279072374;

0.009989549999147654;

0.009989549999147654;

-0.4726911489036446;

1.0025203956146063;

1.4724127510829539;

-1.1229150695872063;

-0.4726911489036446;

0.009989549999147654;

1.4724127510829539;

-0.4726911489036446;

-0.4726911489036446;

1.4724127510829539;

1.2502678041287465;

-0.4726911489036446;

1.0025203956146063

];

DATA EXTRATION WITH TRASFORMED VALUE

data = [a b c1 d e\_log10 f1 g h i j k];

DATA EXTRATION FOR DESCRIPTIVE

data\_x = [a b c d e f g h i j k];

DESCRIPTIVE

[valori\_unici, ~, idx] = unique(data\_x);

frequenze = accumarray(idx, 1);

disp('Frequenze:');

disp(table(valori\_unici, frequenze, 'VariableNames', {'Valore', 'Frequenza'}));

min\_val = min(data\_x);

max\_val = max(data\_x);

media = mean(data\_x);

dev\_std = std(data\_x);

asimmetria = skewness(data\_x);

kurt = kurtosis(data\_x);

fprintf('\nStatistiche descrittive:\n');

fprintf('Minimo: %.2f\n', min\_val);

fprintf('Massimo: %.2f\n', max\_val);

fprintf('Media: %.2f\n', media);

fprintf('Deviazione standard: %.2f\n', dev\_std);

fprintf('Asimmetria (Skewness): %.2f\n', asimmetria);

fprintf('Curtosi (Kurtosis): %.2f\n', kurt);

Frequenze:

**Valore** **Frequenza**

**\_\_\_\_\_\_** **\_\_\_\_\_\_\_\_\_**

0 60

1 60

2 70

3 37

4 24

5 22

6 25

7 12

8 7

9 13

10 9

11 12

12 7

13 2

14 5

15 12

16 7

17 3

18 5

19 6

20 6

21 2

22 5

23 2

24 1

25 4

26 3

27 1

28 1

29 3

30 7

31 2

32 2

33 3

35 2

38 1

40 1

41 1

43 1

44 1

45 2

52 1

53 1

Statistiche descrittive:

Minimo: 5.00

Minimo: 0.00

Minimo: 0.00

Minimo: 2.00

Minimo: 0.00

Minimo: 7.00

Minimo: 0.00

Minimo: 0.00

Minimo: 0.00

Minimo: 16.00

Minimo: 0.00

Massimo: 29.00

Massimo: 8.00

Massimo: 10.00

Massimo: 11.00

Massimo: 12.00

Massimo: 30.00

Massimo: 3.00

Massimo: 8.00

Massimo: 5.00

Massimo: 53.00

Massimo: 9.00

Media: 14.61

Media: 1.15

Media: 3.59

Media: 5.61

Media: 4.27

Media: 15.93

Media: 0.73

Media: 2.49

Media: 1.59

Media: 30.66

Media: 3.32

Deviazione standard: 5.48

Deviazione standard: 1.48

Deviazione standard: 2.64

Deviazione standard: 2.49

Deviazione standard: 3.14

Deviazione standard: 5.62

Deviazione standard: 0.98

Deviazione standard: 2.09

Deviazione standard: 1.22

Deviazione standard: 9.13

Deviazione standard: 2.03

Asimmetria (Skewness): 0.63

Asimmetria (Skewness): 2.58

Asimmetria (Skewness): 0.79

Asimmetria (Skewness): 0.26

Asimmetria (Skewness): 0.98

Asimmetria (Skewness): 0.90

Asimmetria (Skewness): 0.88

Asimmetria (Skewness): 0.92

Asimmetria (Skewness): 0.75

Asimmetria (Skewness): 0.65

Asimmetria (Skewness): 0.32

Curtosi (Kurtosis): 3.12

Curtosi (Kurtosis): 12.34

Curtosi (Kurtosis): 2.54

Curtosi (Kurtosis): 2.22

Curtosi (Kurtosis): 3.24

Curtosi (Kurtosis): 3.55

Curtosi (Kurtosis): 2.35

Curtosi (Kurtosis): 2.94

Curtosi (Kurtosis): 3.40

Curtosi (Kurtosis): 2.87

Curtosi (Kurtosis): 2.83

CORRELATIONAL ANALYSIS

R =

1.0000 0.3781 0.6577 0.4595 0.6692 0.3004 0.3260 0.5022 0.4484 0.8149 0.5483

0.3781 1.0000 0.0798 -0.0998 0.1137 -0.1029 0.3059 0.2603 0.1866 0.1579 0.0592

0.6577 0.0798 1.0000 0.2078 0.2644 0.5179 0.4208 0.0627 0.2635 0.7306 0.4727

0.4595 -0.0998 0.2078 1.0000 -0.0340 0.1698 -0.1369 0.2878 -0.0462 0.3903 0.3319

0.6692 0.1137 0.2644 -0.0340 1.0000 0.0757 0.2630 0.3682 0.4893 0.4748 0.3121

0.3004 -0.1029 0.5179 0.1698 0.0757 1.0000 0.1305 -0.2379 0.2288 0.7833 0.1602

0.3260 0.3059 0.4208 -0.1369 0.2630 0.1305 1.0000 0.0905 -0.0117 0.2619 0.1829

0.5022 0.2603 0.0627 0.2878 0.3682 -0.2379 0.0905 1.0000 0.1594 0.1809 0.2989

0.4484 0.1866 0.2635 -0.0462 0.4893 0.2288 -0.0117 0.1594 1.0000 0.4278 -0.0967

0.8149 0.1579 0.7306 0.3903 0.4748 0.7833 0.2619 0.1809 0.4278 1.0000 0.4337

0.5483 0.0592 0.4727 0.3319 0.3121 0.1602 0.1829 0.2989 -0.0967 0.4337 1.0000

P =

1.0000 0.0148 0.0000 0.0025 0.0000 0.0563 0.0375 0.0008 0.0033 0.0000 0.0002

0.0148 1.0000 0.6198 0.5348 0.4790 0.5219 0.0518 0.1002 0.2427 0.3242 0.7130

0.0000 0.6198 1.0000 0.1923 0.0948 0.0005 0.0061 0.6968 0.0960 0.0000 0.0018

0.0025 0.5348 0.1923 1.0000 0.8328 0.2886 0.3933 0.0680 0.7741 0.0117 0.0340

0.0000 0.4790 0.0948 0.8328 1.0000 0.6379 0.0966 0.0179 0.0012 0.0017 0.0470

0.0563 0.5219 0.0005 0.2886 0.6379 1.0000 0.4162 0.1342 0.1502 0.0000 0.3169

0.0375 0.0518 0.0061 0.3933 0.0966 0.4162 1.0000 0.5738 0.9419 0.0981 0.2523

0.0008 0.1002 0.6968 0.0680 0.0179 0.1342 0.5738 1.0000 0.3195 0.2577 0.0577

0.0033 0.2427 0.0960 0.7741 0.0012 0.1502 0.9419 0.3195 1.0000 0.0053 0.5477

0.0000 0.3242 0.0000 0.0117 0.0017 0.0000 0.0981 0.2577 0.0053 1.0000 0.0046

0.0002 0.7130 0.0018 0.0340 0.0470 0.3169 0.2523 0.0577 0.5477 0.0046 1.0000

PCA

>> data2 = [b c1 d e\_log10];

>> coeff = pca(data2)

coeff =

-0.0859 0.9875 -0.1311 -0.0154

0.0969 0.1376 0.9826 -0.0791

0.9916 0.0722 -0.1071 0.0096

-0.0032 0.0255 0.0770 0.9967

wcoeff =

0.4113 -0.8813 1.0945 0.1852

0.7044 0.1926 0.0090 -0.7012

0.6979 1.8072 0.9883 1.2100

0.1631 -0.0769 -0.1471 0.1409

latent =

1.3436

1.1497

0.8646

0.6420

explained =

33.5912

28.7430

21.6160

16.0497

[coeff,score,latent] = pca(data2)

coeff =

-0.0859 0.9875 -0.1311 -0.0154

0.0969 0.1376 0.9826 -0.0791

0.9916 0.0722 -0.1071 0.0096

-0.0032 0.0255 0.0770 0.9967

score =

1.4306 -1.0917 -0.4476 0.2682

-2.5369 -0.2768 0.6930 0.0000

-1.4273 -1.1531 1.0190 -0.2218

1.3464 -0.1180 -0.6206 -0.2895

0.4397 -1.1700 -0.3592 0.0164

2.4217 0.0783 0.1405 -0.1732

-1.7171 1.7704 0.3237 -0.0212

0.2894 -0.2598 -1.0925 0.5280

3.3296 0.0263 -0.8348 -0.2703

-2.7713 0.5121 -0.8996 0.5185

-0.5518 -1.2422 -0.2522 0.0068

-0.5524 -1.2377 -0.2386 0.1823

-0.9717 1.4808 -2.3243 -0.2062

0.4109 1.0080 0.8281 -0.1311

3.3519 -1.0462 -1.3290 -0.0279

5.4823 -0.6927 -0.0497 -0.1290

-1.4038 -0.0035 2.0222 -0.1060

-2.4540 -0.1619 1.5238 -0.1640

0.4968 0.0205 0.9592 -0.1157

1.3683 -1.1873 -1.1052 0.0774

0.3772 -1.2627 -1.0077 -0.0567

4.6137 -0.5835 1.3292 -0.0185

4.4061 -0.8814 -0.7876 0.0548

0.4391 -0.0705 0.3411 -0.3678

-0.7241 0.7374 -0.5008 0.1515

-3.9455 1.2567 -2.0262 -0.5350

-3.6519 0.5853 0.2886 0.0056

-2.4863 -1.3354 0.3899 -0.6506

3.2431 1.0183 -0.9523 -0.1102

-0.4948 -0.0516 1.0662 -0.1253

1.6188 -0.8225 1.4680 0.1722

-3.5903 -1.5419 -0.5511 0.2718

-3.5275 -1.4510 0.0923 0.2781

-2.5757 -0.3195 0.3446 0.4443

3.5158 0.3118 1.1302 0.2725

-2.5340 -1.3942 -0.0612 -0.3124

-3.6986 0.5189 -0.1856 0.0438

0.9320 7.0762 0.4149 -0.0090

0.4336 1.0523 1.1021 0.2459

0.1809 1.8027 -0.7219 0.3668

1.4876 0.0989 0.8708 0.1361

latent =

6.2769

2.1691

0.9577

0.0673

Xcentered = score\*coeff'

Xcentered =

-1.1463 -0.4727 1.3902 0.2005

-0.1463 0.3971 -2.6098 0.0544

-1.1463 0.7218 -1.6098 -0.1675

-0.1463 -0.4727 1.3902 -0.3436

-1.1463 -0.4727 0.3902 -0.0425

-0.1463 0.3971 2.3902 -0.1675

1.8537 0.3971 -1.6098 0.0544

-0.1463 -1.1229 0.3902 0.4346

-0.1463 -0.4727 3.3902 -0.3436

0.8537 -1.1229 -2.6098 0.4694

-1.1463 -0.4727 -0.6098 -0.0425

-1.1463 -0.4727 -0.6098 0.1336

1.8537 -2.1577 -0.6098 -0.3436

0.8537 1.0025 0.3902 -0.0425

-1.1463 -1.1229 3.3902 -0.1675

-1.1463 0.3971 5.3902 -0.1675

-0.1463 1.8589 -1.6098 0.0544

-0.1463 1.2503 -2.6098 -0.0425

-0.1463 1.0025 0.3902 -0.0425

-1.1463 -1.1229 1.3902 -0.0425

-1.1463 -1.1229 0.3902 -0.1675

-1.1463 1.6740 4.3902 0.0544

-1.1463 -0.4727 4.3902 -0.0425

-0.1463 0.3971 0.3902 -0.3436

0.8537 -0.4727 -0.6098 0.1336

1.8537 -2.1577 -3.6098 -0.6446

0.8537 0.0100 -3.6098 0.0544

-1.1463 0.0100 -2.6098 -0.6446

0.8537 -0.4727 3.3902 -0.1675

-0.1463 1.0025 -0.6098 -0.0425

-1.1463 1.4724 1.3902 0.2585

-1.1463 -1.1229 -3.6098 0.2005

-1.1463 -0.4727 -3.6098 0.2585

-0.1463 0.0100 -2.6098 0.4694

-0.1463 1.4724 3.3902 0.3554

-1.1463 -0.4727 -2.6098 -0.3436

0.8537 -0.4727 -3.6098 0.0544

6.8537 1.4724 1.3902 0.2005

0.8537 1.2503 0.3902 0.3554

1.8537 -0.4727 0.3902 0.3554

-0.1463 1.0025 1.3902 0.2005

>> biplot(coeff(:,1:2),'scores',score(:,1:2),'varlabels',{'C\_H','C\_S','C\_A','C\_F'});

Immagine che contiene testo, linea, diagramma, Diagramma

Descrizione generata automaticamente

MANOVA/ANOVA

>> a = xlsread("Anova DANVA\_SDQ.xlsx",'A2:A41');

b = xlsread("Anova DANVA\_SDQ.xlsx",'B2:B41');

c = xlsread("Anova DANVA\_SDQ.xlsx",'C2:C41');

Y = [b c];

>> [p, tbl, stats] = manova1(Y, a)

p =

1

tbl =

3.2340e-07

stats =

[**struct**](about:blank) with fields:

W: [2x2 double]

B: [2x2 double]

T: [2x2 double]

dfW: 38

dfB: 1

dfT: 39

lambda: 0.4458

chisq: 29.8887

chisqdf: 2

eigenval: [2x1 double]

eigenvec: [2x2 double]

canon: [40x2 double]

mdist: [40x1 double]

gmdist: [2x2 double]

gnames: {2x1 cell}

Immagine che contiene testo, schermata, diagramma, linea

Descrizione generata automaticamente

Immagine che contiene testo, schermata, ricevuta, Carattere

Descrizione generata automaticamenteImmagine che contiene testo, ricevuta, Carattere, schermata

Descrizione generata automaticamente

Immagine che contiene diagramma, testo, linea, Diagramma

Descrizione generata automaticamente

Immagine che contiene testo, diagramma, linea, Diagramma

Descrizione generata automaticamente

Data including paralanguage scale and normality test

> swtest(e)

ans =

[**logical**](about:blank)

0

>> f1 = boxcox(f);

>> swtest(f1)

ans =

[**logical**](about:blank)

0

>> swtest(g)

ans =

[**logical**](about:blank)

1

>> g1 = boxcox(g);

>> swtest(g)

ans =

[**logical**](about:blank)

1

>> data = [a b c d e f g h i j k l m n];

>> [R,P] = corrcoef(data)

R =

a1.0000 0.3781 0.6893 0.4595 0.6253 -0.1102 -0.0125 -0.1656 0.3259 0.3260 0.5022 0.4484 0.8149 0.5483

0.3781 b1.0000 0.1445 -0.0998 0.1478 0.2983 0.1123 0.2535 -0.1222 0.3059 0.2603 0.1866 0.1579 0.0592

0.6893 0.1445 c1.0000 0.2034 0.1346 -0.2911 -0.1205 -0.2798 0.5460 0.3835 0.0786 0.2940 0.7599 0.4409

0.4595 -0.0998 0.2034 d1.0000 -0.1143 -0.2072 -0.0767 -0.1599 0.1819 -0.1369 0.2878 -0.0462 0.3903 0.3319

0.6253 0.1478 0.1346 -0.1143 e1.0000 0.0761 0.0875 -0.0466 0.0238 0.2119 0.4604 0.4851 0.4013 0.2963

-0.1102 0.2983 -0.2911 -0.2072 0.0761 f1.0000 0.5638 0.6563 -0.3311 -0.0258 0.0542 -0.1130 -0.2688 -0.1239

-0.0125 0.1123 -0.1205 -0.0767 0.0875 0.5638 g1.0000 -0.1216 -0.0085 -0.0661 -0.0010 -0.0450 -0.0066 0.0705

-0.1656 0.2535 -0.2798 -0.1599 -0.0466 0.6563 -0.1216 h1.0000 -0.3519 -0.0191 0.0587 -0.1126 -0.3207 -0.1583

0.3259 -0.1222 0.5460 0.1819 0.0238 -0.3311 -0.0085 -0.3519 i1.0000 0.0921 -0.1992 0.2388 0.8126 0.1598

0.3260 0.3059 0.3835 -0.1369 0.2119 -0.0258 -0.0661 -0.0191 0.0921 j1.0000 0.0905 -0.0117 0.2619 0.1829

0.5022 0.2603 0.0786 0.2878 0.4604 0.0542 -0.0010 0.0587 -0.1992 0.0905 k1.0000 0.1594 0.1809 0.2989

0.4484 0.1866 0.2940 -0.0462 0.4851 -0.1130 -0.0450 -0.1126 0.2388 -0.0117 0.1594 1.0000 0.4278 -0.0967

0.8149 0.1579 0.7599 0.3903 0.4013 -0.2688 -0.0066 -0.3207 0.8126 0.2619 0.1809 0.4278 1.0000 0.4337

0.5483 0.0592 0.4409 0.3319 0.2963 -0.1239 0.0705 -0.1583 0.1598 0.1829 0.2989 -0.0967 0.4337 1.0000

P =

1.0000 0.0148 0.0000 0.0025 0.0000 0.4930 0.9383 0.3008 0.0376 0.0375 0.0008 0.0033 0.0000 0.0002

0.0148 1.0000 0.3674 0.5348 0.3563 0.0582 0.4847 0.1098 0.4466 0.0518 0.1002 0.2427 0.3242 0.7130

0.0000 0.3674 1.0000 0.2022 0.4013 0.0648 0.4529 0.0764 0.0002 0.0133 0.6253 0.0621 0.0000 0.0039

0.0025 0.5348 0.2022 1.0000 0.4768 0.1936 0.6336 0.3181 0.2550 0.3933 0.0680 0.7741 0.0117 0.0340

0.0000 0.3563 0.4013 0.4768 1.0000 0.6361 0.5865 0.7723 0.8826 0.1834 0.0025 0.0013 0.0093 0.0600

0.4930 0.0582 0.0648 0.1936 0.6361 1.0000 0.0001 0.0000 0.0345 0.8728 0.7362 0.4817 0.0893 0.4402

0.9383 0.4847 0.4529 0.6336 0.5865 0.0001 1.0000 0.4487 0.9579 0.6813 0.9949 0.7800 0.9676 0.6616

0.3008 0.1098 0.0764 0.3181 0.7723 0.0000 0.4487 1.0000 0.0241 0.9055 0.7155 0.4833 0.0409 0.3228

0.0376 0.4466 0.0002 0.2550 0.8826 0.0345 0.9579 0.0241 1.0000 0.5670 0.2117 0.1327 0.0000 0.3184

0.0375 0.0518 0.0133 0.3933 0.1834 0.8728 0.6813 0.9055 0.5670 1.0000 0.5738 0.9419 0.0981 0.2523

0.0008 0.1002 0.6253 0.0680 0.0025 0.7362 0.9949 0.7155 0.2117 0.5738 1.0000 0.3195 0.2577 0.0577

0.0033 0.2427 0.0621 0.7741 0.0013 0.4817 0.7800 0.4833 0.1327 0.9419 0.3195 1.0000 0.0053 0.5477

0.0000 0.3242 0.0000 0.0117 0.0093 0.0893 0.9676 0.0409 0.0000 0.0981 0.2577 0.0053 1.0000 0.0046

0.0002 0.7130 0.0039 0.0340 0.0600 0.4402 0.6616 0.3228 0.3184 0.2523 0.0577 0.5477 0.0046 1.0000