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## PROGRAM LIBRARY

DECUS NO.	8-316
TITLE	CORR (Compute Correlation Matrix)
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SOURCE LANGUAGE	FORTRAN D

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## CORR (COMPUTE CORRELATION MATRIX)

DECUS Program Library Write-up

DECUS No. 8-316

### ABSTRACT

This program computes the means and standard deviations, and the matrix of correlation coefficients, for multivariate data.

A separate version of the program transforms the data to their common logarithms before computing means, sums of squares, etc.

### TAPES REQUIRED

1. Form of program tape - The program is written in the PDP-8 FORTRAN-D language, and is in the source language.
2. Form of data tape - The data tape should contain the values of each variable, in a standard order, for each point (set). The data may be regarded as a matrix with the variables in the columns and the sets in the rows.

### OPERATING INSTRUCTIONS

.FORT	Source program in high-speed reader
*OUT-S:CORR	
*↑	
*IN-R:	
*	
↑	Data tape in high-speed reader
*READY	Switch on high-speed punch

The program will request the entry of the number of variables and the number of sets in the data matrix. These numbers should be entered in sequence on the teletype, and terminated by "Return." If an output tape is required, switch on the low-speed punch before typing "Return."

If the program has already been compiled onto the disk, it may be called into store as follows:

.FOSL	
*IN-S:CORR	
*	
*OPT-	
*↑	Data tape in high-speed reader
*READY	Switch on high-speed punch
↑	





The operation of the program then follows as usual.

## OUTPUT

The program prints the mean and standard deviation of each variable. The complete correlation matrix is punched on tape through the high-speed punch. This tape is suitable as input for the calculation of eigenvalues, etc.

## STORAGE

Normal for FORTRAN-D.

For the 4K version, the number of variables must not exceed 12. There is no limit on the number of sets.

## METHOD

The usual method of calculating arithmetic means and standard deviations has been used. The full matrix of correlation coefficients is calculated, so that the program does not make very economical use of the available space.

Transformation of the basic data to common logarithms is available by use of a separate version of the program.





\*OPT-

CORR  
(Log transformation)

\*R

\*L

```
C      PRINCIPAL COMPONENTS PROGRAM
      DIMENSION SX(12), SS(144), X(12)
      TYPE 501
501    FORMAT (/, "ENTER THE NO OF VARIABLES AND THE NO OF SETS",/)
      ACCEPT 5,M,N
5      FORMAT (I, I)
      MM=M*M
      DO 100 I=1, M
      SX(I)=0.0
      DO 100 J=1, M
      K=I+M*(J-1)
      SS(K)=0.0
100    CONTINUE
      DO 16 I=1, N
      DO 20 J=1, M
      READ 2,105,X(J)
      X(J)=LOGF(X(J)+1.0)*0.43429 4
      SX(J)=SX(J)+X(J)
20    CONTINUE
      N0=1
      DO 16 J=1, M
      DO 16 K=1, M
      SS(N0)=SS(N0)+X(J)*X(K)
      N0=N0+1
16    CONTINUE
      EN=N
      DO 30 I=1, M
      DO 30 J=1, M
      K=I+M*(J-1)
      SS(K)=(SS(K)-SX(I)*SX(J)/EN)/(EN-1.0)
30    CONTINUE
      DO 35 I=1, M
      K=I+M*(I-1)
      SX(I)=SX(I)/EN
      X(I)=SQTF(SS(K))
35    CONTINUE
      TYPE 101,M,N
101    FORMAT (/,/, "NO OF VARIABLES =", I, "NO OF SETS =", I)
      TYPE 102
102    FORMAT (/,/, "NO MEAN      STANDARD DEVIATION")
      DO 103 I=1, M
      TYPE 104, I, SX(I), X(I)
103    CONTINUE
```





```
104  FORMAT (/ , I, E, E)
      DO 60 I=1, M
      DO 60 J=1, M
      K=I+M*(J-1)
      SS(K)=SS(K)/(X(I)*X(J) )
      WRITE 2, 105, SS(K)
60    CONTINUE
105  FORMAT (E)
      END
```

\*





L C	PRINCIPAL COMPONENTS PROGRAM DIMENSION SX(12),SS(144 ),X(12) TYPE 501	CORR (No transformation)
501	FORMAT (/,"ENTER THE NO OF VARIABLES AND THE NO OF SETS",/) ACCEPT 5,M,N	
5	FORMAT (I,I) MM=M*M DO 100 I=1,M SX(I)=0.0 DO 100 J=1,M K=I+M*(J-1) SS(K)=0.0	
100	CONTINUE DO 16 I=1,N DO 20 J=1,M READ 2,105,X(J) SX(J)=SX(J)+X(J)	
20	CONTINUE N0=1 DO 16 J=1,M DO 16 K=1,M SS(N0)=SS(N0)+X(J)*X(K) N0=N0+1	
16	CONTINUE EN=N DO 30 I=1,M DO 30 J=1,M K=I+M*(J-1) SS(K)=(SS(K)-SX(I)*SX(J))/EN/(EN-1.0)	
30	CONTINUE DO 35 I=1,M K=I+M*(I-1) SX(I)=SX(I)/EN X(I)=SQRT(SS(K))	
35	CONTINUE TYPE 101,M,N	
101	FORMAT (/,/,"NO OF VARIABLES =",I,"NO OF SETS =",I) TYPE 102	
102	FORMAT (/,/,"NO MEAN        STANDARD DEVIATION") DO 103 I=1,M TYPE 104,I,SX(I),X(I)	
103	CONTINUE	





```
104  FORMAT (/ , I , E , E)
      DO 60 I=1 , M
      DO 60 J=1 , M
      K=I+M*(J-1)
      SS(K)=SS(K)/(X(I)*X(J) )
      WRITE 2, 105, SS(K)
60    CONTINUE
105   FORMAT (E)
      END
```

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