รายการอ้างอิง

ภาษาไทย

ทองดี แย้มสรวล. การศึกษาลักษณะการแจกแจง การควบคุมความคลาดเคลื่อนประเภทที่ 1 และอำนาจของสถิติทดสอบสำหรับค่าสัมประสิทธิ์สหสัมพันธ์ แบบสเปียร์แมน เคนดอลเทา และเครมเมอร์วี . วิทยานิพนธ์ปริญญามหาบัณฑิต ภาควิชาวิจัยการศึกษา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย , 2530

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ภาคผนวก

โปรแกรมคอมพิวเตอร์

โปรแกรม A

```
C*************************************************************************
C  THE COMPUTER PROGRAM.USED IN THIS STUDY IS WRITTEN IN FORTRAN 77.*
C  THIS PROGRAM IS DESIGNED TO TEST BIVARITE NORMAL AND CORRELATION *
C  COEFFICIENT OF POPULATION WHEN THE VALUE OF RHO ARE 0.0(0.1)0.9  *
C                      AND 10,000 PAIRS OF DATA.                    *
C*************************************************************************
C         DECRIPTION OF IMPORTANT VARIABLES :
C              N   -  NUMBER OF POPULATION
C              EX  -  MEAN OF POPULATION
C              STD -  STANDARD DEVIATION  OF POPULATION
C              RXY -  PEARSON PRODUCT MOMENT CORRELATION COEFFICIENT
C              RHO -  CORRELATION COEFFICIENT OF POPPULATION
      DIMENSION X(10000) ,W(10000) ,Y(10000)
      COMMON/SEED/IX,KK
      KK=0
      DATA EX,STD,N/0.,1.,10000/
      DO 10 I=1,10
      RHO=(I-1)*0.1
      IX = 65539
      SX = 0.
      SY = 0.
      SXX = 0.
      SYY = 0.
      SXY = 0.
```

```
C*************************************************************************
C            GENERATE  BIVARLATE  NORMAL  POPULATION                    *
C*************************************************************************
      DO 20 J = 1,N
      CALL NORMAL(EX,STD,Y1)
      CALL NORMAL(EX,STD,Y2)
      X(J)     = Y1
      W(J)     = Y2
      Y(J)     = W(J)*SQRT(1.0-RHO**2)+X(J)*RHO
C ------------ COMPUTE SUM ,SUM OF SQURE AND CROSSPRODUCT -----------
C---------------------  OF VARIABLES X AND Y ----------------------
C
      SX       = SX+X(J)
      SY       = SY+Y(J)
      SXX      = SXX+X(J)**2
      SYY      = SYY+Y(J)**2
      SXY      = SXY+X(J)*Y(J)
 20   CONTINUE
C*******COMPUTE PEARSON PRODUCT MOMENT CORRELATION COFFICIENT*******
C
      A        = N*SXY-SX*SY
      B        = (N*SXX-SX**2)*(N*SYY-SY**2)
      RXY      = A/SQRT(B)
C************ COMPUTE MEAN,VARIANCE,SKEWNESS AND KURTOSIS***************
C                          OF VARIABLES X AND Y
C
     XMEAN     = SX/N
```

```
      YMEAN    = SY/N
      CALL VAR  (X,N,XMEAN,VRX)
      CALL VAR  (Y,N,YMEAN,VRY)
      SDX      = SQRT (VRX)
      SDY      = SQRT (VRY)
      CALL SKEW  (X,N,XMEAN,SDX,SKX)
      CALL SKEW  (Y,N,YMEAN,SDY,SKY)
      CALL KURTO (X,N,XMEAN,SDX,SKX)
      CALL KURTO (Y,N,YMEAN,SDY,SKY)
      WRITE  (6,100) RHO,RXY
  100 FORMAT (////35X,'RHO (',F3.1,') = ',F7.4/
     *           35X,'__________________')
      WRITE  (6,200)
      WRITE  (6,300) XMEAN,VRX,SKX,RKX
      WRITE  (6,300) YMEAN,VRY,SKY,RKY
  200 FORMAT (//15X,'MEAN',12X,'VARINCE',10X,'SKEWNESS',
     *          10X,'KURTOSIS'//)
  300 FORMAT (10X,F10.4,3(8X,F10.4))
  10  CONTINUE
      STOP
      END
C********************** SUBROUTINE  VARIANCE *************************
C
      SUBROUTINE VAR (X,N,AMEAN,VR)
      DIMENSION  X(N)
      SA       =  0
      DO 10 I =  1,N
```

```
 10   SA       =   SA+(X(I)-AMEAN)**2
      VR       =   SA/N
      RETURN
      END
C************************ SUBROUTINE  SKEWNESS **********************
C
      SUBROUTINE SKEW (X,N,AMEAN,SD,SK)
      DIMENSION  X(N)
      SA       =   0.
      DO 20 I  =   1,N
 20   SA       =   SA+(X(I)- AMEAN)**3
      B        =   SD**3
      SK       =   SA/(N*B)
      RETURN
      END
C
C************************ SUBROUTINE  KURTOSIS **********************
C
     SUBROUTINE KURTO (X,N,AMEAN,SD,RK)
      DIMENSION  X(N)
      SA       =   0
      DO 30 I  =   1,N
 30   SA       =   SA+(X(I)- AMEAN)**4
      B        =   SD**4
      RK       =   SA/(N*B)
      RETURN
      END
```

```
C************************ SUBROUTINE  NORMAL ****************************
C
      SUBROUTINE NORMAL (RMEAN,SD,EX)
      COMMON/SEED/IX,KK
      S=SQRT(SD)
      PI=3.1415926
      IF(KK.EQ.1) GOTO 10
      RONE=RAND(IX)
      RTWO=RAND(IX)
      ZONE=SQRT(-2*ALOG(RONE))*COS(2*PI*RTWO)
      ZTWO=SQRT(-2*ALOG(RONE))*SIN(2*PI*RTWO)
      EX=ZONE*S+RMEAN
      KK=1
      GO TO 15
   10 EX=ZTWO*S+RMEAN
      KK=0
   15 RETURN
      END
C***************************  FUNTION RANDOM ************************
C
      FUNCTION RAND(IX)
      IX = IX*16807
      IF (IX.LT.0) IX = IX+2147483647+1
      RAND  = IX
      RAND  = RAND*0.465661E-9
      RETURN
      END
```

โปรแกรม B

```
**************************************************************************
C                          MAIN PROGRAM                                   *
C THE COMPUTER PROGRAM. USED IN THIS STUDY IS  WRITTEN IN FORTRAN 77.*
C   IT IS DESIGNED TO COMPUTE  THE MEDIAN , THE MEAN SQUARE ERROR ,  *
C        THE KOLMOGOROV - SIMIRNOV TEST , THE MEDIAN TEST            *
C              WHEN RHO ARE  0.0(0.1 0.9 AND N = 200                 *
C**************************************************************************
C         DECRIPTION OF IMPORTANT VARIABLES :
C              NS  -   NUMBER OF TIMES TO SIMULATE
C              N   -   SAMPLE SIZE
C              MCC -   THE SMALLER OF THE NUMBERS OF ROWS OR COLUMNS
C              A   -   CELL FREQUENCIES
C              SR  -   MARGINAL FREQUENCIES OF ROW
C              SC  -   MARGINAL FREQUENCIES OF COLUMNS
C
      DIMENSION X(10000), W(10000), Y(10000), A(5,5), E(5,5), SR(5)
     *, SC(5), A1(5,5), V1(4000), V11(4000), V(8000), VU1(8000)
     *, VU2(8000), SRR(5)
      COMMON/SEED/IX,KK
      KK = 0
      DATA SX,SY,EX,STD,N/3*0.,1.,200/
      IX = 65539
      RHO=0.0
      WRITE (6,100)RHO
 10   FORMAT (//35X,'RHO =     ,'F4.1/35X,'------------'//)
      WRITE (6,101)
```

```
  101 FORMAT (//8X,' V1< V11 ',4X,' V1 = V11 ', 3X,' V1 > V11',
     *7X,'NS',11X,'NSS')
C*************************************************************************
C                          CHECK CONDITION PROGRAM
C*************************************************************************
      N1 = 0
      N2 = 0
      N3 = 0
      NS = 0
      NSS = 0
      L = 3
      M = 0
 111   IF(NS.GT.4000) THEN
         GO TO 112
       ELSE
       DO 10 J = 1, N
     CALL NORMAL(EX,STD,Y1)
     CALL NORMAL(EX,STD,Y2)
       X(J) = Y1
       W(J) = Y2
       Y(J) = W(J)*SQRT(1.0-RHO**2+X(J)*RHO
  10 CONTINUE
C-------------------------------------------------------------------
      CALL CONTIN (X,Y,N,A)
      MR = 5
      MC = 5
C-------------------------------------------------------------------
```

```
      DO 1 I=1,MR
      S=0
      DO 2 J=1,MC
      S=S+A(I,J)
    2 CONTINUE
      SR(I) = S
C     PRINT,SR(I)
    1 CONTINUE
      DO 3 J=1,MC
      S=0
      DO 4 I=1,MR
      S=S+S+A(I,J)
    4 CONTONUE
      SC(J)=S
C     PRINT,SC(J)
    3 CONTINUE
      DO 25 I = 1,MR
      DO 25 J = 1,MC
      E(I,J) = SR(I)*SC(J)/N
   25 CONTINUE
C     DO 26 I=1,MR
C  26 PRINT,SR(I)
C     DO 27 J=1,MC
C  27 PRINT,SC(J)
C     PRINT ,MC,MR,N
C     DO 52 I=1,MR
C  52 WRITE(6,53) (A(I,J),J=1,MC),(E(I,J),J=1,MC)
```

```
C  53 FORMAT(10F7.2)
      L11 = MC-L+1
      DO 50 I = 1,MR
      SS=0
      DO 60 J = L11,MC
      SS = SS+E(I,J)
   60 CONTINUE
      SRR(I)=SS
   50 CONTINUE
      L1=MC-L
C     DO 69 I=1,MR
C     DO 70 J=1,L1
C      IF (E(I,J).LE.5) THEN
C          NSS=NSS+1
C          NS=NS-1
C          GOTO 111
C      ENDIF
C  70 CONTINUE
C  69 COTINUE
      DO 71 I=1,MR
      IF(SRR(I).LE.5) THEN
         NS=NS+1
         NSS=NSS+1
C        GOTO 111
      ENDIF
  71  CONTINUE
      GOTO 111
```

```
 51   M=M+1
      IF (M.LE.4000) THEN
      MC1=MC-L
      CALL CRMERV (A,E,MR,MC,N,CHI1,V1(M))
      DO 11 I=1,MR
      DO 12 J=1,MC1
      IF(J.EQ.MC1) THEN
         A1(I,J) = A(I,J)+A(I,J+1)+A(I,J+2)+A(I,J+3)
      ELSE
         A1(I,J) = A(I,J)
      END IF
 12   CONTINUE
 11   CONTINUE
      CALL CRMERV (A1,E,MR,MC1,N,CHI11,V11(M))
C*************************************************************************
C                    PRINT VALUE OF V1 AND V11
C               COMPAIR VALUE OF V1 AND V11 PROGRAM
C*************************************************************************
         IF(V1(M).LT.V11(M)) THEN
             N1 = N1+1
             ELSE IF(V1(M).EQ.V11(M)) THEN
             N2 = N2+1
             ELSE
          ENDIF
      ENDIF
      GOTO 111
      ENDIF
```

```
C*************************************************************************
C                  PRINT VALUE OF N1,N2,N3,NS,NSS
C*************************************************************************
  112 WRITE(6,*) N1,N2,N3,NS,NSS
C     WRITE(6,201)
C 201 FORMAT(//7X,'COMPAIR CONDIION ',5X,'INCOMPLETE CONDITION')
C 112 WRITE(6,*)
C*************************************************************************
C             THE KOLMOGOROV - SIMIRNOV TEST  (KS) PROGRAM
C*************************************************************************
      M = M-NSS
      CALL SORT(V1,M,AVER1)
      CALL SORT(V11,M,AVER11)
      DO 13 I = 1,M
      V(I) = V1(I)
   13 CONTINUE
      DO 14 I = 1,M
      V(M+I) = V11(I)
   14 CONTINUE
      CALL SORT1(V,2*M,AVER)
      NU1=0
      NU11=0
      MM=2*M
      DO 210 I=1,MM
      DO 220 J=1,M
          IF(V(I).EQ.V1(J)) THEN
             NU1=NU1+1
```

```
          ENDIF
          IF(V(I).EQ.V11(J)) THEN
             NU11=NU11+1
        ENDIF
  220 CONTINUE
      VU1(I)=FLOAT(NU1)/M
      VU11(I)=FLOAT(NU11)/M
  210 CONTINUE
      DO 230 I=1,MM
      VV(I) = VU1(I)-VU11(I)
C*******************************************************************************
C             PRINT VALUE OF V(I),VU1(I),VU11(I),VV(I)
C*******************************************************************************
C     WRITE(6,*) V(I),VU1(I),VU11(I),VV(I)
  230 CONTINUE
      CALL SORT1(VV,MM,AVER3)
C*******************************************************************************
C              PRINT VALUE OF MEDIAN V1,V11,V_TOTAL
C*******************************************************************************
      WRITE(6,102)
  102 FORMAT(//11X,'MEDIAN V1',10X,'MEDIAN V11',3X,' MEDIAN TOTAL ')
      WRITE(6,1002) AVER1,AVER11,AVER
 1002 FORMAT(3F10.5)
C*******************************************************************************
C                 FIND VALUE OF MSE_ V1 AND MSE_V11
C*******************************************************************************
  103 FORMAT(//11X,' MSE OF V1 ',10X,' MSE OF V11 ')
```

```
 1003 FORMAT(2F10.5)
C*******************************************************************************
C           PRINT VALUE OF KS-TEST AND TEST SIGNIFICANCE
C*******************************************************************************
      WRITE(6,103)
  114 FORMAT(///5X,'THE KOMOLMOGOROV-SIMINOV TEST')
      WRITE(6,1114) VV(MM)
 1114 FORMAT(1F10.5)
      IF (VV(MM).GT.0.0364) THEN
      GO TO 140
      ENDIF
      IF (VV(MM).GT.0.0304) THEN
      GO TO 150
      ENDIF
  140 WRITE(6,*) 'SIGNIFICANCE = .01
  150 WRITE(6,*) 'SIGNIFICANCE = .05
C*******************************************************************************
C                      THE  MIDIAN TEST PROGRAM
C*******************************************************************************
      NT = MM
      NA = 0
      NB = 0
      NC = 0
      ND = 0
      DO 110 I =1,M
      IF (V1(I).GT.AVER) THEN
```

```
            NA = NA+1
      ELSE
            NC = NC+1
      END IF
      IF (V11(I).GT.AVER) THEN
            NB = NB+1
      ELSE
            ND = ND+1
      END IF
  110 CONTINUE
      WRITE(6,*) NT,NA,NC,NB,ND
      CHISQ = FLOAT(NT)*(ABS()FLOAT(NA)*FLOAT(ND))-(FLOAT(NB)*
     * FLOAT(NC)))-FLOAT(NT)/2)**2/((FLOAT(NA)+FLOAT(NB))*(FLOAT(NC)
     * +FLOAT(ND))*(FLOAT(NA)FLOAT(NC))*(FLOAT(NB)+FLOAT(ND)))
C*************************************************************************
C        PRINT VALUE OF THE  MIDIAN TEST  AND TEST SIGNIFICANCE
C*************************************************************************
      WRITE(6,115)
  115 FORMAT(///5X,'CHI-SQURE OF MEDIAN  TEST')
      WRITE(6,*) CHI-SQURE
      IF (CHI-SQURE.GT.6.64) THEN
      GO TO 120
      ENDIF
      IF (CHI-SQURE.GT.0.84) THEN
      GO TO 130
      ENDIF
  120 WRITE(6,*) 'SIGNIFICANCE = .01
```

```
  130 WRITE(6,*) 'SIGNIFICANCE = .05
      STOP
      END
C*******************************************************************************
C                        SUBROUTINE  CRMERV
C*******************************************************************************
      SUBROUTINE  CRMERV (AA,E,IR,IC,N,CHI,CRMV)
      DIMENSION AA(5,5),E(5,5),SR(10),SC(10)
C     DO 52 I=1,IR
C  52 WRITE(6,53) (AA(I,J),J=1,IC),(E(I,J),J=1,IC)
C  53 FORMAT(10F7.2)
      CHI = 0.
      DO 20 I = 1,IR
      DO 30 I = 1,IC
      SS=E(I,J)
      IF (SS.EQ.0) THEN
             CHI=CHI+SS
      ELSE
             CHI=CHI+(AA(I,J)-SS)**2/SS
      ENDIF
   30 CONTINUE
   20 CONTINUE
      IF(IR.LT.IC) THEN
             MCC=IR
      ELSE
             MCC=IC
      ENDIF
```

```
      CRMV = SQRT(CHI/(N*(MCC-1)))
      RETURN
      END
C*************************************************************************
C                    SUBROUTINE  CONTIN
C*************************************************************************
      SUBROUTINE CONTIN (X,Y,N,A)
      DIMENSION X(200),Y(200),A(5,5)
      DO 5 I = 1,5
      DO 6 J = 1,5
      A(I,J) = 0.
    6 CONTINUE
    5 CONTINUE
      DO 20 K = 1,N
      IF (X(K).LT.-0.8416) THEN
         IF(Y(K).LT)-0.0753) THEN
             A(1,1) = A(1,1)+1.
         ELSE IF(Y(K).GE.-0.0753.AND.Y(K).LT.1.5548) THEN
             A(1,2) = A(1,2)+1.
         ELSE IF(Y(K).GE.1.5548.AND.Y(K).LT.1.7507) THEN
             A(1,3) = A(1,3)+1.
         ELSE IF(Y(K).GE.1.7507.AND.Y(K).LT.2.0537) THEN
             A(1,4) = A(1,4)+1.
         ELSE IF(Y(K).GE.2.0537) THEN
             A(1,5) = A(1,5)+1.
         END IF
```

```
ELSE IF(X(K).GE.-0.8416.AND.X(K).LT.-0.2533) THEN
   IF(Y(K).LT>-0.0753) THEN
       A(2,1) = A(2,1)+1.
   ELSE IF(Y(K).GE.-0.0753.AND.Y(K).LT.1.5548) THEN
       A(2,2) = A(2,2)+1.
   ELSE IF(Y(K).GE.1.5548.AND.Y(K).LT.1.7507) THEN
       A(2,3) = A(2,3)+1.
   ELSE IF(Y(K).GE.1.7507.AND.Y(K).LT.2.0537) THEN
       A(2,4) = A(2,4)+1.
   ELSE IF(Y(K).GE.2.0537) THEN
       A(2,5) = A(2,5)+1.
   END IF
ELSE IF(X(K).GE.-0.2533.AND.X(K).LT.0.2533) THEN
   IF(Y(K).LT>-0.0753) THEN
       A(3,1) = A(3,1)+1.
   ELSE IF(Y(K).GE.-0.0753.AND.Y(K).LT.1.5548) THEN
       A(3,2) = A(3,2)+1.
   ELSE IF(Y(K).GE.1.5548.AND.Y(K).LT.1.7507) THEN
       A(3,3) = A(3,3)+1.
   ELSE IF(Y(K).GE.1.7507.AND.Y(K).LT.2.0537) THEN
       A(3,4) = A(3,4)+1.
   ELSE IF(Y(K).GE.2.0537) THEN
       A(3,5) = A(3,5)+1.
   END IF
ELSE IF(X(K).GE.0.2533.AND.X(K).LT.0.8416) THEN
   IF(Y(K).LT>-0.0753) THEN
       A(4,1) = A(4,1)+1.
```

```
      ELSE IF(Y(K).GE.-0.0753.AND.Y(K).LT.1.5548) THEN
          A(4,2) = A(4,2)+1.
      ELSE IF(Y(K).GE.1.5548.AND.Y(K).LT.1.7507) THEN
          A(4,3) = A(4,3)+1.
      ELSE IF(Y(K).GE.1.7507.AND.Y(K).LT.2.0537) THEN
          A(4,4) = A(4,4)+1.
      ELSE IF(Y(K).GE.2.0537) THEN
          A(4,5) = A(4,5)+1.
      END IF
   ELSE IF(X(K).GE.0.8416) THEN
      IF(Y(K).LT>-0.0753) THEN
          A(5,1) = A(5,1)+1.
      ELSE IF(Y(K).GE.-0.0753.AND.Y(K).LT.1.5548) THEN
          A(5,2) = A(5,2)+1.
      ELSE IF(Y(K).GE.1.5548.AND.Y(K).LT.1.7507) THEN
          A(5,3) = A(5,3)+1.
      ELSE IF(Y(K).GE.1.7507.AND.Y(K).LT.2.0537) THEN
          A(5,4) = A(5,4)+1.
      ELSE IF(Y(K).GE.2.0537) THEN
          A(5,5) = A(5,5)+1.
      END IF
   END IF
20 CONTINUE
   RETURN
   END
```

```
C*******************************************************************************
C********** SUBROUTINE  NORMAL ************
C*******************************************************************************
      SUBROUTINE NORMAL (RMEAN,SD,EX)
      COMMON/SEED/IX,KK
      S=SQRT(SD)
      PI=3.1415926
      IF(KK.Eq.1) GOTO 10
      RONE=RAND(IX)
      RTWO=RAND(IX)
      ZONE=SQRT(-2*ALOG(RONE))*COS(2*PI*RTWO)
      ZTWO=SQRT(-2*ALOG(RTWO))*SIN(2*PI*RTWO)
      EX=ZONE*S+RMEAN
      KK=1
      GO TO 15
   10 EX=ZTWO*S+RMEAN
      KK=0
   15 RETURN
      END
C*******************************************************************************
C                            FUNTION RANDOM
C*******************************************************************************
      FUNCTION RAND(IX)
      IX = IX*16807
      IF (IX.LT.0) IX = IX+2147483647+1
      RAND  = IX
      RAND  = RAND*0.465661E-9
```

```
      RETURN
      END
C*******************************************************************************
C                          SUBROUTINE  SORT
C*******************************************************************************
      SUBROUTINE  SORT(EM,IS,AMED)
      DIMENSION  EM(4000)
      K=IS-1
      DO 5 I=1,K
      K1=I+1
      DO 5 J=K1,IS
      IF(EM(I).LE.EM(J)) GOTO 5
      S=EM(I)
      EM(I)=EM(J)
      EM(J)=S
    5 CONTINUE
      ME=IS/2
      DD=MOD(IS,2)
      IF (DD.GT.0) THEN
         ME=ME+1
         AMED=EM(ME)
      ELSE
         ME=ME+1
         AMED=(EM(ME)+EM(ME1))/2
      ENDIF
      RETURN
      END
```

```
C*****************************************************************************
C                        SUBROUTINE  SORT1
C*****************************************************************************
      SUBROUTINE  SORT1(EM1,IIS,AAMED)
      DIMENSION  EM1(8000)
      K=IIS-1
      DO 5 I=1,K
      K1=I+1
      DO 5 J=K1,IIS
      IF(EM1(I).LE.EM1(J)) GOTO 5
      S=EM1(I)
      EM1(I)=EM1(J)
      EM1(J)=S
    5 CONTINUE
      ME=IIS/2
      DD=MOD(IIS,2)
      IF (DD.GT.0) THEN
         ME=ME+1
         AAMED=EM1(ME)
      ELSE
         ME1=ME+1
         AAMED=(EM1(ME)+EM1(ME1))/2
      ENDIF
      RETURN
      END
```

หอสมุดกลาง สถาบันวิทยบริการ จุฬาลงกรณ์มหาวิทยาลัย

ประวัติผู้เขียน

นางสาวกรรณิการ์ อินทราย เกิดเมื่อวันที่ 12 กรกฎาคม 2505 ที่จังหวัดลำปาง สำเร็จการศึกษาปริญญาศึกษาศาสตรบัณฑิต จากมหาวิทยาลัยรามคำแหง เมื่อปีการศึกษา 2527 เข้าศึกษาต่อในหลักสูตรครุศาสตรมหาบัณฑิต สาขาสถิติการศึกษา ภาควิชาวิจัยการศึกษา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2532 ปัจจุบันรับราชการที่ศูนย์การศึกษานอกโรงเรียนจังหวัดอุดรธานี สังกัดกรมการศึกษานอกโรงเรียน