รายการอ้างอิง

ภาษาไทย

กิ่งทอง ยงยุทธมีชัย . (1997). การเปรียบเทียบตัวสถิติทดสอบค่าเฉลี่ยของประชากรที่มีความแปรปรวนไม่เท่ากัน กรณีศึกษาสำหรับแผนการทดลองแบบสุ่มตลอด วิทยานิพนธ์หลักสูตรปริญญาสถิติศาสตรมหาบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย

สุชาดา กีระนันทน์ . (1995) . ทฤษฎีและวิธีการสำรวจตัวอย่าง . พิมพ์ครั้งที่ 1 . กรุงเทพฯ: โรงพิมพ์จุฬาลงกรณ์มหาวิทยาลัย.

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ภาคผนวก

ภาคผนวก

ตัวอย่างบางส่วนของลักษณะการทำงานทางด้านโปรแกรมของการวิจัย โดยใช้ภาษาฟอร์แทรน 77 (FORTRAN77) ในการประมวลผลข้อมูล กรณีแผนการเลือกตัวอย่างของ Vasantha kumar ,E. , Srivenkataramana ,T. และ Srinath ,K.P. เมื่อขนาดตัวอย่างเท่ากับ 6

```
 character fname * 20
INTEGER NSAMP, RECNO,COUNT,II
integer amount
real x, y, R, A
double precision SUMVX, SUMVR, SUMVA ,SUMY, SUMX, SUMR, SUMA
double precision YRES,XRES,ARES,RRES
double precision YY(76), XX(76), RR(76), AA(76)
double precision PROB1X(76), PROB1R(76), PROB1A(76)
double precision PROB2X(76, 76), PROB2R(76, 76), PROB2A(76, 76)
double precision VT1X, VT1R, VT1A, VT2X, VT2R, VT2A
double precision VTX(20), VTR(20), VTA(20), WXOPT(20), WROPT(20)
double precision WAOPT(20),REEFR(20), REEFA(20)
DOUBLE PRECISION V2OFR,tempr(10),tempa(10)
INTEGER COUNTTW,RJ05
DOUBLE PRECISION SBARX, SBARR, SBARA, SDX, SDR, SDA,DT05
double precision apex(600), apea(600), aper(600)
real stattx, stattr, statta
C
write(*,110) 'type read file: '
read(*,500) fname
write(*,110) 'type no. of record: '
read(*,510) amount
OPEN(1,FILE=fname)
C
sumy = 0!
SUMX = 0!
SUMR = 0!
SUMA = 0!
COUNT = 0
NSAMP = 6
```

```
      VT2X = 0!
      VT2R = 0!
      VT2A = 0!
      VT1X = 0!
      VT1R = 0!
      VT1A = 0!
      SUMVX = 0!
      SUMVR = 0!
      SUMVA = 0!
C
      DO 5 II=1,amount
      READ(1,100,END=10)X,Y,r,a
      COUNT = COUNT + 1
      SUMX = SUMX + x
      sumy = sumy + y
      SUMR = SUMR + R
      SUMA = SUMA + A
      XX(COUNT) = x
      yy(COUNT) = y
      RR(COUNT) = R
      AA(COUNT) = A
5     continue
10    endfile (unit = 1)
      write(*,110)'count= '
      write(*,160)count,sumy,sumx,sumr,suma
      DO 15 RECNO=1,COUNt
       YRES = sumy - yy(RECNO)
       XRES = SUMX - XX(RECNO)
       RRES = COUNT * (COUNT - 1) / 2
       ARES = SUMA - AA(RECNO)

       prob1x(RECNO) = XX(RECNO) / SUMX
       prob1r(RECNO) = RR(RECNO) / SUMR
       prob1a(RECNO) = AA(RECNO) / SUMA
```

```
      DO 12 II=1,COUNT
       IF (II.EQ.RECNO) THEN
         VT1X=VT1X+((((YY(II)/PROB1X(II))-SUMY)**2)*PROB1X(II))
         VT1R=VT1R+((((YY(II)/PROB1R(II))-SUMY)**2)*PROB1R(II))
         VT1A=VT1A+((((YY(II)/PROB1A(II))-SUMY)**2)*PROB1A(II))
       ELSE IF(II.NE.RECNO) THEN
         prob2x(RECNO, II) = XX(II) / XRES
         prob2a(RECNO, II) = AA(II) / ARES
         SUMVX=SUMVX+((YY(II)**2)/(PROB2X(RECNO,II)))
         SUMVA=SUMVA+((YY(II)**2)/(PROB2A(RECNO,II)))
         IF (RR(II).LT.RR(RECNO)) THEN
          PROB2R(RECNO, II) = RR(II) / RRES
         ELSE IF(RR(II).EQ.RR(RECNO)) THEN
          PROB2R(RECNO, II) = (RR(II) - .5) / RRES
         ELSE IF(RR(II).GT.RR(RECNO)) THEN
          PROB2R(RECNO, II) = (RR(II) - 1) / RRES
         END IF
         SUMVR=SUMVR+((YY(II)**2)/(PROB2R(RECNO,II)))
       ELSE
         WRITE(*,110)'LOOP COUNT ERROR'
         GOTO 900
       END IF
12     continue
C
      VT2X = VT2X + prob1x(RECNO) * (SUMVX - (YRES * YRES))
      VT2R = VT2R + (SUMVR-(YRES**2))*PROB1R(RECNO)
      VT2A = VT2A + (SUMVA-(YRES**2))*PROB1A(RECNO)
      SUMVX = 0!
      SUMVR = 0!
      SUMVA = 0!
      YRES = 0
15     continue
       CALL VOFRANK(II, RECNO, COUNT, sumy, RR, yy, prob1r, V2OFR)
```

```
      DO 20 II=1,6
       wxopt(II) = (VT2X / II) / (VT1X + (VT2X / II))
       wropt(II) = (VT2R / II) / (VT1R + (VT2R / II))
       waopt(II) = (VT2A / II) / (VT1A + (VT2A / II))
       VTX(II)=((WXOPT(II)**2)*VT1X)+(((1-WXOPT(II))**2)*(VT2X/II))
       VTR(II)=((WROPT(II)**2)*VT1R)+(((1-WROPT(II))**2)*(VT2R/II))
       VTA(II)=((WAOPT(II)**2)*VT1A)+(((1-WAOPT(II))**2)*(VT2A/II))
       REEFR(II) = (VTX(II) / VTR(II))
       REEFA(II) = (VTX(II) / VTA(II))
       tempr(II) = VTR(II) / VTX(II)
       tempa(II) = VTA(II) / VTX(II)
20     continue
       WRITE(*,110)'WXOPT= '
       WRITE(*,120)WXOPT(5),WROPT(5),WAOPT(5)
C
       call estmn6(AMOUNT,yy,prob1r, prob1x, prob1a,sumy,
     *prob2x, prob2a,PROB2R,wxopt,wropt,waopt,apex,aper,apea,counttw)
       CALL SORT(COUNTTW, apex, aper, apea, SBARX, SBARR, SBARA, SDX,
     *SDR, SDA)
       call KOLMO(apex,aper,apea,RJ05,COUNTTW,SBARX,SBARR,SBARA,
     *SDX,SDR,SDA,DT05)
       stattx = (SBARX - 0) / SDX
       stattr = (SBARR - 0) / SDR
       statta = (SBARA - 0) / SDA

      write(*,110) 'stat t: '
      write(*,180) stattx,stattr,statta
      write(*,110) '---end program srsix2 -out.lis--- '
      write(*,500) fname
100     format (f10.2,f10.2,F7.2,F7.2)
110     FORMAT (T8,A\)
120     FORMAT (F16.15,2X,F16.15,2X,F16.15)
130     FORMAT (F20.2,2X,F20.2,2X,F20.2)
140     FORMAT (f16.10,2X,f16.10,2X,F8.4,2X,F8.4)
150     format (F20.2,2X,F20.2,2x,F20.2)
```

```
160     format (I3,2X,F11.2,2X,F11.2,2X,F11.2,2X,F11.2)
170     format (F20.2)
180     format (f20.6,2x,f20.6,2x,f20.6)
300     FORMAT (F20.2,F20.2,F16.15)
500     format (A)
510     format (i3)
900     STOP
      END
C-------------------------------------------------------------------------C
c----------------find estimator for n = 6 -------------------------------C
C-------------------------------------------------------------------------C
    subroutine estmn6(AMOUNT,yy, prob1r, prob1x, prob1a,sumy,
   *prob2x, prob2a,PROB2R,wxopt,wropt,waopt,apex,aper,apea,counttw)
    integer        recno,COUNTTW,AMOUNT,TN2,DELAY,i
    double precision yy(76), prob1r(76), prob1a(76)
    double precision prob1x(76)
    double precision prob2x(76,76),prob2a(76,76),PROB2R(76,76),sumy
    double precision wxopt(20), wropt(20), waopt(20)
    double precision tx(5),tr(5),ta(5),T1X,T1R,T1A
    double precision twx, twr, twa
    real difxbr(600), difxba(600)
    double precision apex(600), aper(600), apea(600)
    double precision sumapex, sumaper, sumapea
    real sumxbr, sumxba, avrxbr, avrxba, srtemp, satemp
    real sdbarxbr, sdbarxba, ttestr, ttesta
    INTEGER HOUR,MIN,SEC,HUNSEC
    DOUBLE PRECISION X, SEED
    open(2,file='out.lis')
C
   counttw = 0
    TN2 = 1
    RECNO = 1
    sumapex = 0!
    sumaper = 0!
    sumapea = 0!
```

```
      DELAY = 300 * (TN2 + RECNO + 1)
35    do 36 i = 1,delay
      CALL GETTIM(HOUR, MIN, SEC, HUNSEC)
      SEED = HUNSEC
      X = (SEED+3.1415956)**5
      x = (x - AINT(x)) * AMOUNT
      RECNO = INT(x)
36    continue
C
40     IF (RECNO.GE.1.AND.RECNO.LE.AMOUNT.AND.COUNTTW.LT.100) THEN
       t1x = yy(RECNO) / prob1x(RECNO)
       t1r = yy(RECNO) / prob1r(RECNO)
       t1a = yy(RECNO) / prob1a(RECNO)
45      DO 60 I = 1,5
50       DELAY = 400 * (TN2 + RECNO + 1)
       DO 55 J = 1,DELAY
       CALL GETTIM(HOUR, MIN, SEC, HUNSEC)
       SEED = HUNSEC
       X = (SEED+3.1415956)**5
       x = (x - AINT(x)) * AMOUNT
       TN2 = INT(x)
55      continue
       IF (TN2.GE.1.AND.TN2.LE.AMOUNT.AND.TN2.NE.RECNO) THEN
        tx(i) = yy(TN2) / prob2x(RECNO, TN2)
        ta(i) = yy(TN2) / prob2a(RECNO, TN2)
        tr(i) = yy(TN2) / PROB2R(RECNO, TN2)
       ELSE
        GOTO 50
       END IF

60      continue
```

```
        counttw = counttw + 1
        twx = (wxopt(5) * t1x) + ((1 - wxopt(5)) *
     *   (yy(recno) + (tX(1) + tx(2) + tx(3) + tx(4) + tx(5)) / 5))
        twr = (wropt(5) * t1r) + ((1 - wropt(5)) *
     *   (yy(recno) + (tr(1) + tr(2) + tr(3) + tr(4) + tr(5)) / 5))
        twa = (waopt(5) * t1a) + ((1 - waopt(5)) *
     *   (yy(recno) + (ta(1) + ta(2) + ta(3) + ta(4) + ta(5)) / 5))
C
        apex(counttw) = ABS((twx - sumy) / sumy)
        aper(counttw) = ABS((twr - sumy) / sumy)
        apea(counttw) = ABS((twa - sumy) / sumy)
        IF (COUNTTW.GT.1) THEN
        DO 62 KK = 1,COUNTTW-1
          IF (apex(COUNTTW).EQ.apex(KK))  THEN
            counttw = counttw - 1
            GOTO 35
          END IF
62      continue
        END IF
        WRITE(*,100) 'COUNTTW,RECNO,TN2 i: '
        WRITE(*,150) COUNTTW, RECNO,TN2, i
        write(2,200) counttw,apex(counttw),aper(counttw),apea(counttw)
        sumapex = sumapex + apex(counttw)
        sumaper = sumaper + aper(counttw)
        sumapea = sumapea + apea(counttw)
        difxbr(counttw) = apex(counttw) - aper(counttw)
        difxba(counttw) = apex(counttw) - apea(counttw)
        sumxbr = sumxbr + difxbr(counttw)
        sumxba = sumxba + difxba(counttw)
        GOTO 35
      ELSE IF (RECNO.LT.1.OR.RECNO.GT.AMOUNT.AND.COUNTTW.LT.100) THEN
        GOTO 35
      ELSE
        GOTO 65
      END IF
```

```
65      sumapex = sumapex / counttw
        sumaper = sumaper / counttw
        sumapea = sumapea / counttw
        avrxbr = sumxbr / counttw
        avrxba = sumxba / counttw
        do 70 i = 1,counttw
          srtemp = srtemp+(difxbr(i)-avrxbr)**2
          satemp = satemp+(difxba(i)-avrxbr)**2
70      continue
        sdbarxbr = sqrt((srtemp / (counttw - 1)) / counttw)
        sdbarxba = sqrt((satemp / (counttw - 1)) / counttw)
        ttestr = avrxbr / sdbarxbr
        ttesta = avrxba / sdbarxba
      write(*,100)'counttw=    '
      write(*,120) counttw
      write(*,100)'mean error= '
      write(*,110) sumapex,sumaper
      write(*,100)'mean error= '
      write(*,130) sumapea
      write(*,100)'diftest; '
      write(*,140) ttestr,ttesta
100   format (t5,a\)
110   format (f25.15,2x,f25.15)
120   format (i10)
130   format (f25.15)
140   format (f8.4,2x,f8.4)
150   FORMAT (I5,2X,I5,2X,I5,2x,i5)
200   format (i5,2x,3f14.10)
      endfile (unit = 2)
      RETURN
      END
```

กรณีแผนการเลือกตัวอย่างของ Wright

```
      INTEGER NSAMP, GRP, TEMPG, NWG(6),LL,MM,KK,NN,OO,AMOUNT
      real X, Y, R
      DOUBLE PRECISION SUMX,SUMY,SUMR,TYX(6,35),TYR(6,35)
      DOUBLE PRECISION XX(6, 35), YY(6, 35), RR(6, 35)
      doUBLE PRECISION PTX, PTR
      DOUBLE PRECISION PROBX, PROBR ,T5X,T5R
      double precision T1X, T2X, T1R, T2R,T3X,T3R,T4X,T4R
      DOUBLE PRECISION MAPEX, MAPER,SAPEX, SAPER
      double precision APEX, APER
      DOUBLE PRECISION SUMYWG(6) , MEANYWG(6) ,REEF , REEF2
      DOUBLE PRECISION VARTYX ,VRPART1, VARTYR, VAROFR
      character FNAME * 20
       WRITE(*,210)'TYPE DATA FILE NAME: '
       READ(*,600) FNAME
       WRITE(*,210) 'TYPE NO. OF RECORD: '
       READ(*,620) AMOUNT
       OPEN (2, FILE=FNAME)
       OPEN (3, FILE='OUT.BAS')
C
     NSAMP = 6
       I = 1
       TEMPG = 1
     DO 1 J = 1, 6
1     nwg(J) = 0
C
      DO 10 J=1,AMOUNT
        READ(2,100) X,Y,R,GRP
        SUMY = SUMY + Y
        SUMX = SUMX + X
        SUMR = SUMR + R
        IF (GRP.NE.TEMPG) THEN
          TEMPG = GRP
        END IF
```

```
      SUMYWG(TEMPG) = SUMYWG(TEMPG) + Y
      nwg(TEMPG) = nwg(TEMPG) + 1
10    CONTINUE

     WRITE(*,210) 'SUM= '
     WRITE(*,700) SUMX,SUMY,SUMR
     WRITE(3,210) 'SUMYWG= '
     DO 11 J=1,6
       WRITE(3,630) SUMYWG(J)
       MEANYWG(J) = SUMYWG(J) / nwg(J)
11    CONTINUE
     WRITE(3,600) ' '
     TEMPG = 1
     REWIND (UNIT = 2)
     DO 20 J=1,AMOUNT
     READ(2,100,END=150) X,Y,R,GRP
     IF (GRP.NE.TEMPG) THEN
      WRITE(*,210) 'I1= '
      WRITE(*,300) TEMPG,NWG(TEMPG),MEANYWG(TEMPG)
      TEMPG = GRP
      I = 1
     END IF
      XX(TEMPG, I) = X
      YY(TEMPG, I) = Y
      RR(TEMPG, I) = R
      PROBX = XX(TEMPG, I) / SUMX
      PROBR = RR(TEMPG, I) / SUMR
      TYX(TEMPG, I) = YY(TEMPG, I) / (NSAMP * PROBX)
      TYR(TEMPG, I) = YY(TEMPG, I) / (NSAMP * PROBR)
C
     VRPART1 = VRPART1 + (YY(TEMPG,I)**2)/(NSAMP*PROBR)
     VARTYX = VARTYX + (TYX(TEMPG,I)-SUMYWG(TEMPG))**2 *(NSAMP*PROBX)
     VARTYR = VARTYR + (TYR(TEMPG,I)-SUMYWG(TEMPG))**2 *(NSAMP*PROBR)
     I = I + 1
20    CONTINUE
```

```
      WRITE(*,210) 'I2= '
      WRITE(*,300) GRP,NWG(TEMPG),MEANYWG(TEMPG)
      VAROFR = VRPART1 - ((AMOUNT/NSAMP)**2)*
      REEF = VARTYX / VARTYR
      REEF2 = VARTYR / VARTYX
      WRITE(*,210) 'VAROFR:      '
      WRITE(*,710) VAROFR
      WRITE(3,210) 'CUM SQRT/F X,R: '
      WRITE(3,720) VARTYX,VARTYR
      WRITE(3,210) 'REEF:        '
      WRITE(3,730) REEF , REEF2
      REEF = VARTYX / VAROFR
      REEF2 = VAROFR / VARTYX
      WRITE(*,210) 'WRIGHT REEF: '
      WRITE(*,730) REEF , REEF2
      ENDFILE (UNIT = 2)
C
100   FORMAT(F10.2,F10.2,f7.2,I3)
C
150   KK = 1
      SAPEX = 0!
      SAPER = 0!
      DO 160 I=1,nwg(1)
        T1X = TYX(1, I)
        T1R = TYR(1, I)
        DO 160  J=1,nwg(2)
          T2X = TYX(2, J)
          T2R = TYR(2, J)
            DO 160  MM=1,nwg(3)
              T3X = TYX(3, MM)
              T3R = TYR(3, MM)
            DO 160 NN=1,NWG(4)
              T4X = TYX(4, NN)
              T4R = TYR(4, NN)
```

```
      DO 160 OO=1,NWG(5)
        T5X = TYX(5, OO)
        T5R = TYR(5, OO)
      do 160 LL = 1,nwg(6)
        PTX = T1X + T2X + T3X + T4X + T5X + TYX(6, LL)
        PTR = T1R + T2R + T3R + T4R + T5R + TYR(6, LL)
        APEX = ABS((PTX - SUMY) / SUMY)
        APER = ABS((PTR - SUMY) / SUMY)
        SAPEX = SAPEX + APEX
        SAPER = SAPER + APER
        KK = KK + 1
160   CONTINUE
      KK = KK - 1
      MAPEX = (SAPEX / KK)
      MAPER = (SAPER / KK)

200   FORMAT (F25.15)
210   FORMAT (T8,A\)
300   FORMAT (2i4,F16.4)
320   FORMAT (I10)
400   FORMAT (F16.14,A\)
600   FORMAT (A)
610   FORMAT (F15.2)
620   FORMAT (I3)
630   FORMAT (F12.2,2X\)
700   format (f12.2,2x,f12.2,2x,f8.2)
710   FORMAT (F25.6)
720   FORMAT (F25.6,2X,F25.6)
730   FORMAT (F12.6,2X,F12.6)
      STOP
      END
```

ประวัติผู้วิจัย

นางสาวอภิญญา เพ็ญพร เกิดวันที่ 12 มกราคม พ.ศ. 2515 ที่จังหวัดนนทบุรี สำเร็จการศึกษาปริญญาตรีวิทยาศาสตร์บัณฑิต สาขาสถิติ ภาควิชาสถิติ คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่ จังหวัดเชียงใหม่ ในปีการศึกษา 2536 และเข้าศึกษาต่อในหลักสูตรปริญญาสถิติศาสตรมหาบัณฑิต ที่จุฬาลงกรณ์มหาวิทยาลัย เมื่อ พ.ศ. 2539