

LAMPIRAN

Lampiran 1: Program dengan S-PLUS 2000 untuk Pemilihan Variabel

Menggunakan Metode CV-I

```

> crossvalidation <- function()
(
  y <- c(0.871, 1.22, 0.975, 1.021, 1.002, 0.89, 1.213, 0.918, 1.014,
        0.914, 1.17, 0.952, 0.946, 1.096, 0.999, 1.093)
  x1 <- c(1.287, 1.281, 0.787, 0.796, 1.392, 0.893, 1.4, 0.721, 1.032,
        0.658, 1.291, 1.17, 0.817, 1.231, 1.086, 1.001)
  x2 <- c(0.984, 1.078, 1.061, 1.013, 1.028, 0.969, 1.057, 1.001, 0.996,
        0.972, 1.046, 1.004, 1.002, 1.049, 1.023, 1.035)
  x3 <- c(0.987, 1.064, 1.007, 1.012, 1.029, 0.993, 1.047, 1.024, 1.003,
        0.993, 1.027, 1.001, 1.014, 1.032, 1.02, 1.053)
  x4 <- c(1.046, 1.081, 1.051, 1.046, 1.036, 1.02, 1.057, 1.034, 1.014,
        1.013, 1.037, 1.007, 1.008, 1.024, 1.03, 1.029)
  C <- rep(1, 16)
  b1 <- matrix(0, 2 * 16, nrow = 2)
  b2 <- matrix(0, 2 * 16, nrow = 2)
  b3 <- matrix(0, 2 * 16, nrow = 2)
  b4 <- matrix(0, 2 * 16, nrow = 2)
  b12 <- matrix(0, 3 * 16, nrow = 3)
  b13 <- matrix(0, 3 * 16, nrow = 3)
  b14 <- matrix(0, 3 * 16, nrow = 3)
  b23 <- matrix(0, 3 * 16, nrow = 3)
  b24 <- matrix(0, 3 * 16, nrow = 3)
  b34 <- matrix(0, 3 * 16, nrow = 3)
  b123 <- matrix(0, 4 * 16, nrow = 4)
  b124 <- matrix(0, 4 * 16, nrow = 4)
  b134 <- matrix(0, 4 * 16, nrow = 4)
  b234 <- matrix(0, 4 * 16, nrow = 4)
  b1234 <- matrix(0, 5 * 16, nrow = 5)
  yy <- rep(0, 15)
  xx1 <- rep(0, 15)
  xx2 <- rep(0, 15)
  xx3 <- rep(0, 15)
  xx4 <- rep(0, 15)
  for(j in 1:16) {
    for(i in 1:16) {
      yy <- y[ - c(i)]
      xx1 <- x1[ - c(i)]
      xx2 <- x2[ - c(i)]
      xx3 <- x3[ - c(i)]
      xx4 <- x4[ - c(i)]
      b1[, j] <- glm(yy ~ xx1)$coef
      X1 <- cbind(C, x1)
      s1 <- mean((y - (X1 %*% b1[, j]))^2)
      b2[, j] <- glm(yy ~ xx2)$coef
      X2 <- cbind(C, x2)
      s2 <- mean((y - (X2 %*% b2[, j]))^2)
      b3[, j] <- glm(yy ~ xx3)$coef
      X3 <- cbind(C, x3)
      s3 <- mean((y - (X3 %*% b3[, j]))^2)
      b4[, j] <- glm(yy ~ xx4)$coef
      X4 <- cbind(C, x4)
      s4 <- mean((y - (X4 %*% b4[, j]))^2)
    }
  }
)

```

```

b12[, j] <- glm(yy ~ xx1 + xx2)$coef
X12 <- cbind(C, x1, x2)
s12 <- mean((y - (X12 %*% b12[, j]))^2)
b13[, j] <- glm(yy ~ xx1 + xx3)$coef
X13 <- cbind(C, x1, x3)
s13 <- mean((y - (X13 %*% b13[, j]))^2)
b14[, j] <- glm(yy ~ xx1 + xx4)$coef
X14 <- cbind(C, x1, x4)
s14 <- mean((y - (X14 %*% b14[, j]))^2)
b23[, j] <- glm(yy ~ xx2 + xx3)$coef
X23 <- cbind(C, x2, x3)
s23 <- mean((y - (X23 %*% b23[, j]))^2)
b24[, j] <- glm(yy ~ xx2 + xx4)$coef
X24 <- cbind(C, x2, x4)
s24 <- mean((y - (X24 %*% b24[, j]))^2)
b34[, j] <- glm(yy ~ xx3 + xx4)$coef
X34 <- cbind(C, x3, x4)
s34 <- mean((y - (X34 %*% b34[, j]))^2)
b123[, j] <- glm(yy ~ xx1 + xx2 + xx3)$coef
X123 <- cbind(C, x1, x2, x3)
s123 <- mean((y - (X123 %*% b123[, j]))^2)
b124[, j] <- glm(yy ~ xx1 + xx2 + xx4)$coef
X124 <- cbind(C, x1, x2, x4)
s124 <- mean((y - (X124 %*% b124[, j]))^2)
b134[, j] <- glm(yy ~ xx1 + xx3 + xx4)$coef
X134 <- cbind(C, x1, x3, x4)
s134 <- mean((y - (X134 %*% b134[, j]))^2)
b234[, j] <- glm(yy ~ xx2 + xx3 + xx4)$coef
X234 <- cbind(C, x2, x3, x4)
s234 <- mean((y - (X234 %*% b234[, j]))^2)
b1234[, j] <- glm(yy ~ xx1 + xx2 + xx3 + xx4)$coef
X1234 <- cbind(C, x1, x2, x3, x4)
s1234 <- mean((y - (X1234 %*% b1234[, j]))^2)
}
cat("Cv-1.1 =", s1, "Cv-1.2 =", s2, "\n", "Cv-1.3 =", s3,
    "Cv-1.4 =", s4, "\n", "Cv-1.12 =", s12, "Cv-1.13 =",
    s13, "\n", "Cv-1.14 =", s14, "Cv-1.23 =", s23, "\n",
    "Cv-1.24 =", s24, "Cv-1.34 =", s34, "\n", "Cv-1.123 =",
    s123, "Cv-1.124 =", s124, "\n", "Cv-1.134 =", s134,
    "Cv-1.234 =", s234, "\n", "Cv-1.1234 =", s1234, "\n")
}

```

```
> crossvalidation()
```

```
Cv-1.1      = 0.00788982770457561    Cv-1.2      = 0.00346015363478507
Cv-1.3      = 0.00336252414627040    Cv-1.4      = 0.00791206470298014

Cv-1.12     = 0.0030570007753937     Cv-1.13     = 0.00273523968308372
Cv-1.14     = 0.0062275597782718     Cv-1.23     = 0.00249519603619072
Cv-1.24     = 0.00346291284596465     Cv-1.34     = 0.00322838437474524

Cv-1.123    = 0.00215861978778482     Cv-1.124    = 0.00305708997983935
Cv-1.134    = 0.0026735190330534     Cv-1.234    = 0.00250783374354927

Cv-1.1234   = 0.00216109787689116
```

Lampiran 2 : Program dengan S-PLUS 2000 untuk Pemilihan Variabel

Menggunakan Metode Cp

```

> statistik.Cp <- function()
{
  y <- c(0.871, 1.22, 0.975, 1.021, 1.002, 0.89, 1.213, 0.918, 1.014,
        0.914, 1.17, 0.952, 0.946, 1.096, 0.999, 1.093)
  x1 <- c(1.287, 1.281, 0.787, 0.796, 1.392, 0.893, 1.4, 0.721, 1.032,
        0.658, 1.291, 1.17, 0.817, 1.231, 1.086, 1.001)
  x2 <- c(0.984, 1.078, 1.061, 1.013, 1.028, 0.969, 1.057, 1.001, 0.996,
        0.972, 1.046, 1.004, 1.002, 1.049, 1.023, 1.035)
  x3 <- c(0.987, 1.064, 1.007, 1.012, 1.029, 0.993, 1.047, 1.024, 1.003,
        0.993, 1.027, 1.001, 1.014, 1.032, 1.02, 1.053)
  x4 <- c(1.046, 1.081, 1.051, 1.046, 1.036, 1.02, 1.057, 1.034, 1.014,
        1.013, 1.037, 1.007, 1.008, 1.024, 1.03, 1.029)
  n <- c(16)
  C <- rep(1, 16)
  b1 <- matrix(0, 2 * 16, nrow = 2)
  b2 <- matrix(0, 2 * 16, nrow = 2)
  b3 <- matrix(0, 2 * 16, nrow = 2)
  b4 <- matrix(0, 2 * 16, nrow = 2)
  b12 <- matrix(0, 3 * 16, nrow = 3)
  b13 <- matrix(0, 3 * 16, nrow = 3)
  b14 <- matrix(0, 3 * 16, nrow = 3)
  b23 <- matrix(0, 3 * 16, nrow = 3)
  b24 <- matrix(0, 3 * 16, nrow = 3)
  b34 <- matrix(0, 3 * 16, nrow = 3)
  b123 <- matrix(0, 4 * 16, nrow = 4)
  b124 <- matrix(0, 4 * 16, nrow = 4)
  b134 <- matrix(0, 4 * 16, nrow = 4)
  b234 <- matrix(0, 4 * 16, nrow = 4)
  b1234 <- matrix(0, 5 * 16, nrow = 5)
  B1234 <- glm(y ~ x1 + x2 + x3 + x4)$coef
  X1234 <- cbind(C, x1, x2, x3, x4)
  total1234 <- sum((y - (X1234 %*% B1234))^2)
  s2 <- total1234/(n - 5)
  Cp1234 <- total1234/s2 + (2 * 5) - n
  B234 <- glm(y ~ x2 + x3 + x4)$coef
  X234 <- cbind(C, x2, x3, x4)
  total234 <- sum((y - (X234 %*% B234))^2)
  Cp234 <- total234/s2 + (2 * 4) - n
  B134 <- glm(y ~ x1 + x3 + x4)$coef
  X134 <- cbind(C, x1, x3, x4)
  total134 <- sum((y - (X134 %*% B134))^2)
  Cp134 <- total134/s2 + (2 * 4) - n
  B124 <- glm(y ~ x1 + x2 + x4)$coef
  X124 <- cbind(C, x1, x2, x4)
  total124 <- sum((y - (X124 %*% B124))^2)
  Cp124 <- total124/s2 + (2 * 4) - n
  B123 <- glm(y ~ x1 + x2 + x3)$coef
  X123 <- cbind(C, x1, x2, x3)
  total123 <- sum((y - (X123 %*% B123))^2)
  Cp123 <- total123/s2 + (2 * 4) - n
  B34 <- glm(y ~ x3 + x4)$coef
  X34 <- cbind(C, x3, x4)
}

```

```

total34 <- sum((y - (X34 %*% B34))^2)
Cp34 <- total34/s2 + (2 * 3) - n
B24 <- glm(y ~ x2 + x4)$coef
X24 <- cbind(C, x2, x4)
total24 <- sum((y - (X24 %*% B24))^2)
Cp24 <- total24/s2 + (2 * 3) - n
B23 <- glm(y ~ x2 + x3)$coef
X23 <- cbind(C, x2, x3)
total23 <- sum((y - (X23 %*% B23))^2)
Cp23 <- total23/s2 + (2 * 3) - n
B14 <- glm(y ~ x1 + x4)$coef
X14 <- cbind(C, x1, x4)
total14 <- sum((y - (X14 %*% B14))^2)
Cp14 <- total14/s2 + (2 * 3) - n
B13 <- glm(y ~ x1 + x3)$coef
X13 <- cbind(C, x1, x3)
total13 <- sum((y - (X13 %*% B13))^2)
Cp13 <- total13/s2 + (2 * 3) - n
B12 <- glm(y ~ x1 + x2)$coef
X12 <- cbind(C, x1, x2)
total12 <- sum((y - (X12 %*% B12))^2)
Cp12 <- total12/s2 + (2 * 3) - n
B4 <- glm(y ~ x4)$coef
X4 <- cbind(C, x4)
total4 <- sum((y - (X4 %*% B4))^2)
Cp4 <- total4/s2 + (2 * 2) - n
B3 <- glm(y ~ x3)$coef
X3 <- cbind(C, x3)
total3 <- sum((y - (X3 %*% B3))^2)
Cp3 <- total3/s2 + (2 * 2) - n
B2 <- glm(y ~ x2)$coef
X2 <- cbind(C, x2)
total2 <- sum((y - (X2 %*% B2))^2)
Cp2 <- total2/s2 + (2 * 2) - n
B1 <- glm(y ~ x1)$coef
X1 <- cbind(C, x1)
total1 <- sum((y - (X1 %*% B1))^2)
Cp1 <- total1/s2 + (2 * 2) - n
cat("cp.1 =", Cp1, "cp.2 =", Cp2, "\n", "cp.3 =", Cp3, "cp.4 =", Cp4,
    "\n", "cp.12 =", Cp12, "cp.13 =", Cp13, "\n", "cp.14 =", Cp14,
    "cp.23 =", Cp23, "\n", "cp.24 =", Cp24, "cp.34 =", Cp34, "\n",
    "cp.123 =", Cp123, "cp.124 =", Cp124, "\n", "cp.134 =", Cp134,
    "cp.234 =", Cp234, "\n", "cp.1234 =", Cp1234, "\n")
}

```

```
> statistik.Cp()
```

```
cp.1    = 28.4900195330542    cp.2    = 5.80934169100699
cp.3    = 4.81838089910483    cp.4    = 28.6012139753627

cp.12   = 5.69661992409758    cp.13   = 3.77489869798895
cp.14   = 21.8867927227562    cp.23   = 2.65122530610067
cp.24   = 7.80813332361763    cp.34   = 6.04137604155219

cp.123  = 3.03301896213986    cp.124  = 7.6755490932816
cp.134  = 5.44467320436644    cp.234  = 4.64365427692481

cp.1234 = 5
```

Lampiran 3: Program dengan S-PLUS 2000 untuk Pemilihan Variabel

Menggunakan Metode AIC

```

> akaike <- function()
{
  y <- c(0.871, 1.22, 0.975, 1.021, 1.002, 0.89, 1.213, 0.918, 1.014,
        0.914, 1.17, 0.952, 0.946, 1.096, 0.999, 1.093)
  x1 <- c(1.287, 1.281, 0.787, 0.796, 1.392, 0.893, 1.4, 0.721, 1.032,
        0.658, 1.291, 1.17, 0.817, 1.231, 1.086, 1.001)
  x2 <- c(0.984, 1.078, 1.061, 1.013, 1.028, 0.969, 1.057, 1.001, 0.996,
        0.972, 1.046, 1.004, 1.002, 1.049, 1.023, 1.035)
  x3 <- c(0.987, 1.064, 1.007, 1.012, 1.029, 0.993, 1.047, 1.024, 1.003,
        0.993, 1.027, 1.001, 1.014, 1.032, 1.02, 1.053)
  x4 <- c(1.046, 1.081, 1.051, 1.046, 1.036, 1.02, 1.057, 1.034, 1.014,
        1.013, 1.037, 1.007, 1.008, 1.024, 1.03, 1.029)
  n <- c(16)
  C <- rep(1, 16)
  b1 <- matrix(0, 2 * 16, nrow = 2)
  b2 <- matrix(0, 2 * 16, nrow = 2)
  b3 <- matrix(0, 2 * 16, nrow = 2)
  b4 <- matrix(0, 2 * 16, nrow = 2)
  b12 <- matrix(0, 3 * 16, nrow = 3)
  b13 <- matrix(0, 3 * 16, nrow = 3)
  b14 <- matrix(0, 3 * 16, nrow = 3)
  b23 <- matrix(0, 3 * 16, nrow = 3)
  b24 <- matrix(0, 3 * 16, nrow = 3)
  b34 <- matrix(0, 3 * 16, nrow = 3)
  b123 <- matrix(0, 4 * 16, nrow = 4)
  b124 <- matrix(0, 4 * 16, nrow = 4)
  b134 <- matrix(0, 4 * 16, nrow = 4)
  b234 <- matrix(0, 4 * 16, nrow = 4)
  b1234 <- matrix(0, 5 * 16, nrow = 5)
  B1234 <- glm(y ~ x1 + x2 + x3 + x4)$coef
  X1234 <- cbind(C, x1, x2, x3, x4)
  total1234 <- sum((y - (X1234 %*% B1234))^2)
  s1234 <- total1234/(n - 5)
  aic1234 <- s1234 * (1 + (5/n))
  B234 <- glm(y ~ x2 + x3 + x4)$coef
  X234 <- cbind(C, x2, x3, x4)
  total234 <- sum((y - (X234 %*% B234))^2)
  s234 <- total234/(n - 4)
  aic234 <- s234 * (1 + (4/n))
  B134 <- glm(y ~ x1 + x3 + x4)$coef
  X134 <- cbind(C, x1, x3, x4)
  total134 <- sum((y - (X134 %*% B134))^2)
  s134 <- total134/(n - 4)
  aic134 <- s134 * (1 + (4/n))
  B124 <- glm(y ~ x1 + x2 + x4)$coef
  X124 <- cbind(C, x1, x2, x4)
  total124 <- sum((y - (X124 %*% B124))^2)
  s124 <- total124/(n - 4)
  aic124 <- s124 * (1 + (4/n))
  B123 <- glm(y ~ x1 + x2 + x3)$coef
  X123 <- cbind(C, x1, x2, x3)
  total123 <- sum((y - (X123 %*% B123))^2)
}

```



```

s123 <- total123/(n - 4)
aic123 <- s123 * (1 + (4/n))
B34 <- glm(y ~ x3 + x4)$coef
X34 <- cbind(C, x3, x4)
total34 <- sum((y - (X34 %*% B34))^2)
s34 <- total34/(n - 3)
aic34 <- s34 * (1 + (3/n))
B24 <- glm(y ~ x2 + x4)$coef
-X24 <- cbind(C, x2, x4)
total24 <- sum((y - (X24 %*% B24))^2)
s24 <- total24/(n - 3)
aic24 <- s24 * (1 + (3/n))
B23 <- glm(y ~ x2 + x3)$coef
X23 <- cbind(C, x2, x3)
total23 <- sum((y - (X23 %*% B23))^2)
s23 <- total23/(n - 3)
aic23 <- s23 * (1 + (3/n))
B14 <- glm(y ~ x1 + x4)$coef
X14 <- cbind(C, x1, x4)
total14 <- sum((y - (X14 %*% B14))^2)
s14 <- total14/(n - 3)
aic14 <- s14 * (1 + (3/n))
B13 <- glm(y ~ x1 + x3)$coef
X13 <- cbind(C, x1, x3)
total13 <- sum((y - (X13 %*% B13))^2)
s13 <- total13/(n - 3)
aic13 <- s13 * (1 + (3/n))
B12 <- glm(y ~ x1 + x2)$coef
X12 <- cbind(C, x1, x2)
total12 <- sum((y - (X12 %*% B12))^2)
s12 <- total12/(n - 3)
aic12 <- s12 * (1 + (3/n))
B4 <- glm(y ~ x4)$coef
X4 <- cbind(C, x4)
total4 <- sum((y - (X4 %*% B4))^2)
s4 <- total4/(n - 2)
aic4 <- s4 * (1 + (2/n))
B3 <- glm(y ~ x3)$coef
X3 <- cbind(C, x3)
total3 <- sum((y - (X3 %*% B3))^2)
s3 <- total3/(n - 2)
aic3 <- s3 * (1 + (2/n))
B2 <- glm(y ~ x2)$coef
X2 <- cbind(C, x2)
total2 <- sum((y - (X2 %*% B2))^2)
s2 <- total2/(n - 2)
aic2 <- s2 * (1 + (2/n))
B1 <- glm(y ~ x1)$coef
X1 <- cbind(C, x1)
total1 <- sum((y - (X1 %*% B1))^2)
s1 <- total1/(n - 2)
aic1 <- s1 * (1 + (2/n))

cat("aic.1 =", aic1, "aic.2 =", aic2, "\n", "aic.3 =", aic3, "aic.4 =",
    aic4, "\n", "aic.12 =", aic12, "aic.13 =", aic13, "\n",
    "aic.14 =", aic14, "aic.23 =", aic23, "\n", "aic.24 =", aic24,

```

```
"aic.34 =", aic34, "\n", "aic.123 =", aic123, "aic.124 =",  
"aic124, "\n", "aic.134 =", aic134, "aic.234 =", aic234, "\n",  
"aic.1234 =", aic1234, "\n")  
}  
  
> akaike()  
  
aic.1 = 0.0100979177014377    aic.2 = 0.00444152086826635  
aic.3 = 0.00419438242186944    aic.4 = 0.0101256487902403  
  
aic.12 = 0.00444995646550371   aic.13 = 0.00390515281756105  
aic.14 = 0.0090398340615337   aic.23 = 0.00358659393676206  
aic.24 = 0.00504856576799227   aic.34 = 0.00454769404985676  
  
aic.123 = 0.0035668306126008   aic.124 = 0.00506769983511379  
aic.134 = 0.00434648686151147   aic.234 = 0.00408752792729087  
  
aic.1234 = 0.00407341507097832
```