PROGRAM STUDI STATISTIKA
SK BAN-PT No. 1765/SK/BAN-PT/AK-PPJ/S/III/2022
FAKULTAS SAINS DAN TEKNOLOGI
UNIVERSITAS PGRI ADI BUANA SURABAYA

FORM F.SK05
BUKTI BIMBINGAN SKRIPSI

Nama Mahasiswa : Novi Rahmawati
NIM : 202400012
Judul Skripsi : Pemodelan Multivariate Geographically Weighted Regression (MGWR) pada faktor yg mempengaruhi Jumlah kasus TBC dan Pneumonia di Indonesia Tahun 2022
Dosen Pembimbing : Gangga Anuraga, S.Si.,M.Si.,Ph.D

Materi Pembimbingan Proposal	Tanda Tangan Dosen Pembimbing
1. Pemilihan pembobot kernel yg akan digunakan	
2. Hasil uji + Multivariate GWR	
3. Data yg distandarisasi	
4. Hasil uji + Multivariate GWR dg data yg distandarisasi	
5. Multivariat normal (bab 2)	
6. Revisi Rumus (bab 2)	
7. Revisi data (menggunakan data Asli)	
8. Bab 2, 4 & 5	

Catatan: *) Coret yang tidak sesuai

Lembar ini digunakan untuk mendaftar Seminar dan Ujian Skripsi
~~***(bimbingan skripsi minimal 8 kali)***~~

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FORM F.SK06
REKOMENDASI VALIDASI SKRIPSI MAHASISWA

Berdasarkan penilaian Tim Validasi Karya Ilmiah/Skripsi Mahasiswa Program Studi Statistika UNIPA Surabaya, maka mahasiswa berikut :

Nama	:	Novi Rahmawati
NIM	:	202400012
Judul Skripsi	:	Pemodelan *Multivariate Geographically Weighted Regression* (MGWR) Pada Faktor yang Mempengaruhi Jumlah Kasus TUBERKULOSIS (TBC) Dan Pneumonia Di Indonesia Tahun 2022

Dinyatakan **layak / tidak layak** mengikuti seminar hasil dan ujian skripsi. Demikian rekomendasi ini dibuat dapat dipergunakan sebagaimana mestinya.

Surabaya, 10 Juli 2024
Tim Validasi,
Prodi Statistika UNIPA Surabaya

Alfisyahrina Hapsery, S.Si., M.Si
NPP. 1804856/DY

Catatan: *) Coret yang tidak sesuai

Tim Validasi :
1. syarat multivariat hanya korelasi pd Y_1 dg Y_2. (sub bab 4.2)
2. merevisi nilai dg di bab 4 (hal 41)
3. nilai stat uji u/ Regresi multivariat ditambah sama dg parameter.

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FAKULTAS SAINS DAN TEKNOLOGI
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FORM F.SK08
PERBAIKAN/REVISI SEMINAR DAN UJIAN SKRIPSI

Nama Mahasiswa : Novi Rahmawati

NIM : 202400012

Judul Skripsi : Pemodelan Multivariate Geographically Weighted Regression (MGWR) pada faktor yg mempengaruhi jumlah kasus tuberculosis (TBC) & pneumonia di Indonesia Tahun 2022

Dosen Pembimbing : Gangga Anuraga, S.Si.,M.Si.,Ph.D

Materi Revisi Seminar dan Ujian Skripsi	Tanda Tangan Dosen Penguji
1. Justifikasi variabel dan pembahasan hasil yg tlh diperoleh	
2. Revisi kesimpulan dan abstrak	
3. Penjabaran rumus estimasi parameter dan Ukuran kebaikan Model	
4. Perbedaan AIC dan AICc	
5. Buku multivariat Jhonson terbaru	
6. Penulisan Struktur data	

Surabaya,.....
Dosen Pembimbing,

NIP/NPP :

*Catatan: *) Coret yang tidak sesuai*

Lembar ini digunakan untuk bukti perbaikan makalah/jurnal dan hasil ujian skripsi Batas waktu revisi proposal dua minggu terhitung dari waktu ujian proposal

LAMPIRAN

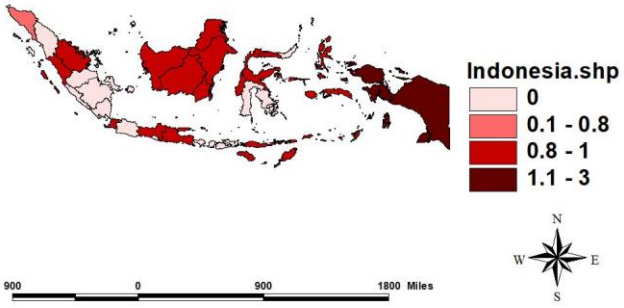
Lampiran 1 Data Kasus TB dan Pneumonia di Indonesia dan faktor-faktor yang mempengaruhinya.

Provinsi	TB	Pneumonia	X1	X2	X3	X4	X5
Aceh	12286	2080	1446	806,82	0,8	201752	4277
Sumatera Utara	41057	5098	286	1268,19	0	782425	9112
Sumatera Barat	14844	5591	2935	335,21	1	367416	4117
Riau	13654	2153	1021	485,03	1	356300	4778
Jambi	6048	1207	1533	279,37	0	211346	1917
Sumatera Selatan	21610	6651	2376	1044,69	0	605186	4266
Bengkulu	3523	425	924	297,23	0	109357	1066
Lampung	18511	5859	2825	1002,41	0	564547	3203
Kep. Bangka Belitung	2834	2676	946	66,78	0	103766	1011
Kepulauan Riau	5825	2964	835	151,68	0	140061	1922
DKI Jakarta	54025	25061	1397	502,04	0	462670	23788
Jawa Barat	184406	101967	21288	4070,98	0	3431652	23973
Jawa Tengah	77426	38348	13928	3831,44	1	1249077	18302
DI Yogyakarta	6206	1690	1997	454,76	0	168949	5259
Jawa Timur	78334	92118	13375	4181,29	1	2363576	23851
Banten	42429	29540	3155	814,02	1	872390	7712
Bali	4530	5269	1858	205,69	0	221596	6535
Nusa Tenggara Barat	9644	13852	3620	731,94	0	409565	1985
Nusa Tenggara Timur	8802	3091	5541	1131,62	1	394242	1935
Kalimantan Barat	12899	2115	5153	350,25	1	321854	1935
Kalimantan Tengah	4835	1598	1065	145,1	1	162604	1351
Kalimantan Selatan	8566	11466	4116	195,7	1	278321	2649
Kalimantan Timur	9190	3392	3876	236,25	1	204221	3307
Kalimantan Utara	1738	1342	618	49,46	1	47998	600
Sulawesi Utara	8784	209	635	185,14	0	65236	2903

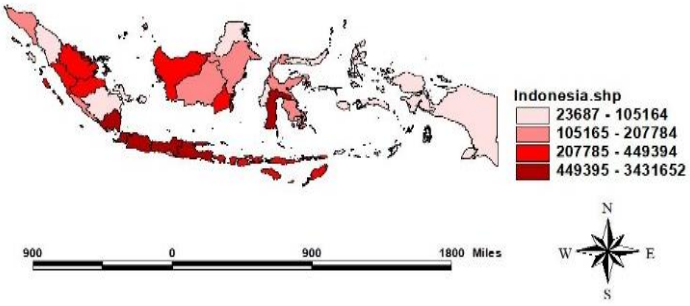
Sulawesi Tengah	6970	6273	2144	388,36	1	200183	1465
Sulawesi Selatan	24209	4872	6918	777,44	0	572648	6360
Sulawesi Tenggara	6192	1515	1272	309,79	0	143664	1370
Gorontalo	4786	1947	613	185,44	1	75801	572
Sulawesi Barat	2936	744	1487	165,72	1	98197	512
Maluku	4787	817	880	290,57	1	101846	1028
Maluku Utara	3208	741	107	79,88	1	69684	690
Papua Barat	3393	1063	384	218,78	3	23687	760
Papua	15822	2990	925	922,12	2	58223	1523

Lampiran 2 Statistika Deskriptif

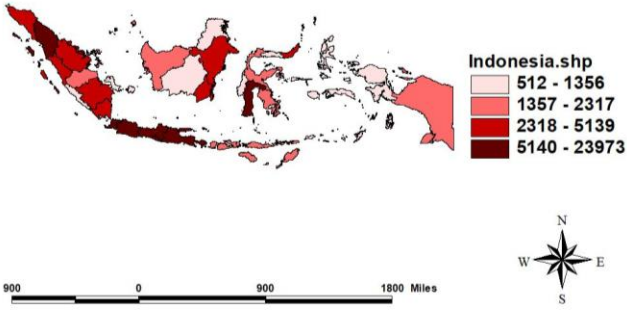
X_3



X_4



X_5



Statistika Deskriptif

```
data <- read_excel("C:/Users/PC001/Downloads/Skripsi Novi
/Data Skripsi1.xlsx")
```

```
TB = data$`TB Semua Tipe`
Pneumonia = data$`Penemuan Kasus Pneumonia`
X1 = data$BBLR
X2 = data$`Jumlah Penduduk Miskin`
X3 = data$`Persentase Gisi Buruk Balita 0-59 Bulan indeks
BB/TB`
X4 = data$`Balita diberi Vit A`
X5 = data$`Jumlah Tenaga Kesehatan (dokter)`
fix = data.frame("TB" = TB, "Pneumonia" = Pneumonia, "X1"
= X1, "X2" = X2, "X3" = X3, "X4" = X4, "X5" = X5)

summary(fix)
```

```
##       TB           Pneumonia            X1               X2
##  Min.   :  1738   Min.   :   209   Min.   :  107.0   Min.   :  49.46
##  1st Qu.:  4799   1st Qu.:  1536   1st Qu.:  924.2   1st Qu.: 198.20
##  Median :  8793   Median :  2977   Median : 1510.0   Median : 342.73
##  Mean   : 21303   Mean   : 11374   Mean   : 3278.8   Mean   : 769.45
##  3rd Qu.: 17839   3rd Qu.:  6170   3rd Qu.: 3503.8   3rd Qu.: 812.22
##  Max.   :184406   Max.   :101967   Max.   :21288.0   Max.   :4181.29
##       X3               X4               X5
##  Min.   :0.0000   Min.   :  23687   Min.   :  512
##  1st Qu.:0.0000   1st Qu.: 105164   1st Qu.: 1356
##  Median :1.0000   Median : 207784   Median : 2317
##  Mean   :0.6412   Mean   : 454119   Mean   : 5177
##  3rd Qu.:1.0000   3rd Qu.: 449394   3rd Qu.: 5139
##  Max.   :3.0000   Max.   :3431652   Max.   :23973
```

Lampiran 3 Analisis Korelasi

```
library(readxl)
library(car)

## Warning: package 'car' was built under R version 4.2.3

## Loading required package: carData

## Warning: package 'carData' was built under R version 4.2.3

library(lmtest)

## Loading required package: zoo

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

library(sp)
library(spData)

## To access larger datasets in this package, install the spData
Large
## package with: `install.packages('spDataLarge',
## repos='https://nowosad.github.io/drat/', type='source')`

library(spgwr)

## Warning: package 'spgwr' was built under R version 4.2.3

## NOTE: This package does not constitute approval of GWR
## as a method of spatial analysis; see example(gwr)

library(plm)

## Warning: package 'plm' was built under R version 4.2.3

library(lmtest)
library(pracma)

## Warning: package 'pracma' was built under R version 4.2.3
```

```
##
## Attaching package: 'pracma'

## The following object is masked from 'package:car':
##
##     logit
```

```
Corm <- cor(fix)
Corm
```

```
##                  TB   Pneumonia          X1          X2          X3          X4
## TB        1.0000000  0.91188039  0.87817664  0.85891864 -0.14784781  0.9537680
## Pneumonia  0.9118804  1.00000000  0.87998331  0.88662991 -0.06736272  0.9603157
## X1         0.8781766  0.87998331  1.00000000  0.89821180 -0.07115948  0.9125438
## X2         0.8589186  0.88662991  0.89821180  1.00000000 -0.03098965  0.9058389
## X3        -0.1478478 -0.06736272 -0.07115948 -0.03098965  1.00000000 -0.1524600
## X4         0.9537680  0.96031573  0.91254379  0.90583887 -0.15246002  1.0000000
## X5         0.8565164  0.85296628  0.73554078  0.80540786 -0.18929954  0.8180716
##                  X5
## TB        0.8565164
## Pneumonia  0.8529663
## X1         0.7355408
## X2         0.8054079
## X3        -0.1892995
## X4         0.8180716
## X5         1.0000000
```

```
cor.test(TB,Pneumonia,method = c("pearson"))
```

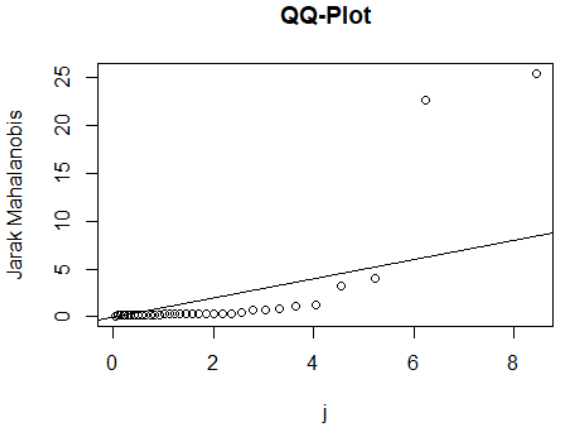
```
##
##  Pearson's product-moment correlation
##
## data:  TB and Pneumonia
## t = 12.567, df = 32, p-value = 6.427e-14
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.8295070 0.9554249
## sample estimates:
##       cor
## 0.9118804
```

Lampiran 4 Distribusi Multivariat Normal

```
Y = cbind(TB, Pneumonia)
#UJI NORMALITAS RESIDUAL
##QQ PLOT MAHALANOBIS
y<-as.matrix(Y)
z<-t(y)
mu<-colMeans(y)
n<-nrow(y)
p<-ncol(y)
cov<-cov(y)
d<-sort(mahalanobis(y,mu,cov))
d
```

```
##  [1]  0.07066752  0.12396979  0.13264506  0.16348116  0.18921371  0.19149779
##  [7]  0.19856571  0.20854682  0.22157878  0.22340792  0.22606842  0.22868842
## [13]  0.24190252  0.25941200  0.26130550  0.26211678  0.26757185  0.27061791
## [19]  0.27172145  0.28064139  0.29904760  0.31378891  0.35269899  0.35436639
## [25]  0.41732830  0.66465694  0.74934653  0.80555855  1.11106680  1.31088432
## [31]  3.16736676  3.96891279 22.72580120 25.46555542
```

```
j<-qchisq(ppoints(n),df=p)
qqplot(j,d,main="QQ-Plot",ylab="Jarak Mahalanobis")
abline(0,1)
```



Lampiran 5 Deteksi Multikolinieritas

```
#Uji Multikolinieritas
sy11 <- cov(TB,TB)
sy12 <- cov(TB,Pneumonia)
sy21 <- cov(Pneumonia,TB)
sy22 <- cov(Pneumonia,Pneumonia)

s11 <- cov(X1,X1)
s12 <- cov(X1,X2)
s13 <- cov(X1,X3)
s14 <- cov(X1,X4)
s15 <- cov(X1,X5)

s21 <- cov(X2,X1)
s22 <- cov(X2,X2)
s23 <- cov(X2,X3)
s24 <- cov(X2,X4)
s25 <- cov(X2,X5)

s31 <- cov(X3,X1)
s32 <- cov(X3,X2)
s33 <- cov(X3,X3)
s34 <- cov(X3,X4)
s35 <- cov(X3,X5)

s41 <- cov(X4,X1)
s42 <- cov(X4,X2)
s43 <- cov(X4,X3)
s44 <- cov(X4,X4)
s45 <- cov(X4,X5)

s51 <- cov(X5,X1)
s52 <- cov(X5,X2)
s53 <- cov(X5,X3)
s54 <- cov(X5,X4)
s55 <- cov(X5,X5)

###Untuk Y=Y1 dengan X=Y2
syy <- sy11
syx <- sy12
sxx <- matrix(sy22,nrow=1,ncol=1)
R<-syx%*%solve(sxx)%*%syx/syy
```

```
VIFY <- 1/(1-R)
VIFY
```

```
##          [,1]
## [1,] 5.935629
```

```
###Untuk Y=X1 dengan X=X2 X3 X4 X5
syy <- s11
syx <- c(s12,s13,s14,s15)
sxx <- matrix(c(s22,s23,s24,s25,
                s32,s33,s34,s35,
                s42,s43,s44,s45,
                s52,s53,s54,s55),nrow=4,ncol=4)
R<-syx%*%solve(sxx)%*%syx/syy
VIFX1 <- 1/(1-R)
VIFX1
```

```
##          [,1]
## [1,] 7.454854
```

```
###Untuk Y=X2 dengan X=X1 X3 X4 X5
syy <- s22
syx <- c(s21,s23,s24,s25)
sxx <- matrix(c(s11,s13,s14,s15,
                s31,s33,s34,s35,
                s41,s43,s44,s45,
                s51,s53,s54,s55),nrow=4,ncol=4)
R<-syx%*%solve(sxx)%*%syx/syy
VIFX2 <- 1/(1-R)
VIFX2
```

```
##          [,1]
## [1,] 7.961323
```

```
###Untuk Y=X3 dengan X=X1 X2 X4 X5
syy <- s33
syx <- c(s31,s32,s34,s35)
sxx <- matrix(c(s11,s12,s14,s15,
                s21,s22,s24,s25,
                s41,s42,s44,s45,
                s51,s52,s54,s55),nrow=4,ncol=4)
R<-syx%*%solve(sxx)%*%syx/syy
VIFX3 <- 1/(1-R)
VIFX3
```

```
##          [,1]
## [1,] 1.140132
```

```
###Untuk Y=X4 dengan X=X1 X2 X3 X5
syy <- s44
syx <- c(s41,s42,s43,s45)
sxx <- matrix(c(s11,s12,s13,s15,
                s21,s22,s23,s25,
                s31,s32,s33,s35,
                s51,s52,s53,s55),nrow=4,ncol=4)
R<-syx%*%solve(sxx)%*%syx/syy
VIFX4 <- 1/(1-R)
VIFX4
```

```
##          [,1]
## [1,] 9.524956
```

```
###Untuk Y=X5 dengan X=X1 X2 X3 X4
syy <- s55
syx <- c(s51,s52,s53,s54)
sxx <- matrix(c(s11,s12,s13,s14,
                s21,s22,s23,s24,
                s31,s32,s33,s34,
                s41,s42,s43,s44),nrow=4,ncol=4)
R<-syx%*%solve(sxx)%*%syx/syy
VIFX5 <- 1/(1-R)
VIFX5
```

```
##          [,1]
## [1,] 3.475073
```

```
HasilVif = c(VIFY,VIFX1,VIFX2,VIFX3,VIFX4,VIFX5)
Vif = c("VIFY","VIFX1","VIFX2","VIFX3","VIFX4","VIFX5")
MULTIKOLINIERITAS = data.frame(Vif,HasilVif)
MULTIKOLINIERITAS
```

```
##     Vif HasilVif
## 1  VIFY 5.935629
## 2 VIFX1 7.454854
## 3 VIFX2 7.961323
## 4 VIFX3 1.140132
## 5 VIFX4 9.524956
## 6 VIFX5 3.475073
```

Lampiran 6 Model Regresi Multivariat

```
TB = a$TB.Semua.Tipe
Pneumonia = a$Penemuan.Kasus.Pneumonia
X1 = a$BBLR
X2 = a$Jumlah.Penduduk.Miskin
X3 = a$Persentase.Gisi.Buruk.Balita.0.59.Bulan.indeks.BB.TB
X4 = a$Vit.A
X5 = a$Jumlah.Tenaga.Kesehatan..dokter.
fix = data.frame("TB" = TB, "Pneumonia" = Pneumonia, "X1" = X1,
"X2" = X2, "X3" = X3, "X4" = X4, "X5" = X5)

z0 = matrix(1, nrow = 34)
X = cbind(z0, X1, X2, X3, X4, X5)
Y = cbind(TB, Pneumonia)
XT = t(X)
XTX = XT%*%X
invXTX = solve(XTX)
XTY = XT%*%Y
Beta = invXTX%*%XTY
Beta
```

```
##              TB     Pneumonia
##    -3.639205e+03 -7.024227e+03
## X1  1.080371e+00  1.145860e-01
## X2 -6.488465e+00 -1.317422e+00
## X3  1.436577e+03  3.454898e+03
## X4  3.973476e-02  2.779209e-02
## X5  1.434527e+00  8.112710e-01
```

```
data = matrix(c(TB, Pneumonia, X1, X2, X3, X4, X5), ncol = 7, nr
ow = 34)
data = data.frame(data)
colnames(data) = c("TB", "Pneumonia", "X1", "X2", "X3", "X4", "X
5")
mult = lm(cbind(TB, Pneumonia) ~ X1 + X2 + X3 + X4 + X5, data =
data)
summary(mult)
```

```
## Response TB :
##
## Call:
## lm(formula = TB ~ X1 + X2 + X3 + X4 + X5, data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -34914  -3723    141   2696  20715 
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.639e+03  2.872e+03  -1.267  0.21550
## X1           1.080e+00  1.032e+00   1.047  0.30423
## X2          -6.488e+00  4.450e+00  -1.458  0.15597
## X3           1.437e+03  2.646e+03   0.543  0.59147
## X4           3.973e-02  7.650e-03   5.194 1.63e-05 ***
## X5           1.435e+00  4.672e-01   3.071  0.00471 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
1
##
## Residual standard error: 9807 on 28 degrees of freedom
## Multiple R-squared:  0.9331, Adjusted R-squared:  0.9211
## F-statistic: 78.05 on 5 and 28 DF,  p-value: 1.475e-15
##
##
## Response Pneumonia :
##
## Call:
## lm(formula = Pneumonia ~ X1 + X2 + X3 + X4 + X5, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -15377.3  -3972.0    942.8   3297.7  14624.9
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -7.024e+03  1.742e+03  -4.032 0.000385 ***
## X1           1.146e-01  6.262e-01   0.183 0.856116
## X2          -1.317e+00  2.699e+00  -0.488 0.629326
## X3           3.455e+03  1.605e+03   2.153 0.040111 *
## X4           2.779e-02  4.640e-03   5.989 1.88e-06 ***
## X5           8.113e-01  2.834e-01   2.863 0.007861 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '
1
##
## Residual standard error: 5949 on 28 degrees of freedom
## Multiple R-squared:  0.9452, Adjusted R-squared:  0.9354
## F-statistic:  96.6 on 5 and 28 DF,  p-value: < 2.2e-16
```

Lampiran 7 Uji Signifikansi Parameter Secara serentak

```
library(car)
lh.out = linearHypothesis(mult, hypothesis.matrix = c("X1 = 0", "X2 = 0"
, "X3 = 0", "X4 = 0", "X5 = 0"))
lh.out
```

```
##
## Sum of squares and products for the hypothesis:
##                   TB   Pneumonia
## TB       37533431962 25194591365
## Pneumonia 25194591365 17092009146
##
## Sum of squares and products for error:
##                   TB  Pneumonia
## TB       2692827715 -600791330
## Pneumonia -600791330  990798706
##
## Multivariate Tests:
##                  Df test stat  approx F num Df den Df     Pr(>F)
## Pillai            5   1.03629   6.02175     10     56 3.9134e-06 ***
## Wilks             5   0.01883  33.95636     10     54 < 2.22e-16 ***
## Hotelling-Lawley  5  49.19045 127.89518     10     52 < 2.22e-16 ***
## Roy               5  49.13087 275.13285      5     28 < 2.22e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Lampiran 8 Uji Parsial

```
X1T = t(X1)
X2T = t(X2)
X3T = t(X3)
X4T = t(X4)
X5T = t(X5)

X1TX1 = X1T%*%X1
X2TX2 = X2T%*%X2
X3TX3 = X3T%*%X3
X4TX4 = X4T%*%X4
X5TX5 = X5T%*%X5

invX1TX1 = solve(X1TX1)
invX2TX2 = solve(X2TX2)
invX3TX3 = solve(X3TX3)
invX4TX4 = solve(X4TX4)
invX5TX5 = solve(X5TX5)

X1TY = X1T%*%Y
X2TY = X2T%*%Y
X3TY = X3T%*%Y
X4TY = X4T%*%Y
X5TY = X5T%*%Y

Beta1 = invX1TX1%*%X1TY
Beta2 = invX2TX2%*%X2TY
Beta3 = invX3TX3%*%X3TY
Beta4 = invX4TX4%*%X4TY
Beta5 = invX5TX5%*%X5TY

EH1 = (t(Y)%*%Y)-(t(Beta1)%*%(t(X1)%*%Y))
EH2 = (t(Y)%*%Y)-(t(Beta2)%*%(t(X2)%*%Y))
EH3 = (t(Y)%*%Y)-(t(Beta3)%*%(t(X3)%*%Y))
EH4 = (t(Y)%*%Y)-(t(Beta4)%*%(t(X4)%*%Y))
EH5 = (t(Y)%*%Y)-(t(Beta5)%*%(t(X5)%*%Y))
E=(t(Y)%*%Y)-(t(Beta)%*%(t(X)%*%Y))

w1 = det(E)/det(EH1)
w1

## [1] 0.09013471
```

```
w2 = det(E)/det(EH2)
w2

## [1] 0.08529544

w3 = det(E)/det(EH3)
w3

## [1] 0.01437204

w4 = det(E)/det(EH4)
w4

## [1] 0.3757771

w5 = det(E)/det(EH5)
w5

## [1] 0.07379056
```

Lampiran 9 Uji Asumsi Residual

```
#ANALISIS RESIDU
prediksi=predict(mult)
prediksi

##            TB   Pneumonia
## 1    7989.2905   3919.3776
## 2   32602.0589  20475.3340
## 3   19298.3984   9876.6311
## 4   16764.9977   9687.2507
## 5    7352.0933    212.3399
## 6   22315.9369  12152.0002
## 7    1304.9720  -3405.8516
## 8   19935.6721  10267.3259
## 9    2522.9510  -3299.7363
## 10   4601.1867  -1676.5225
## 11  47121.2235  24631.5348
## 12 163691.1162 104873.2744
## 13  63871.1078  42541.3488
## 14   9824.9291   1567.4115
## 15 113248.2179  77493.0861
## 16  41651.4853  26221.8492
## 17  15213.2126   4377.9666
## 18  14644.0750   5419.3425
## 19  14882.1520   8101.3914
## 20  16656.5404   7074.5120
## 21   6405.5683   1976.6806
## 22  15833.4673   6528.6682
## 23  13310.6442   4922.1684
## 24    912.0272  -1742.9463
## 25   2602.1263  -3027.2072
## 26   7649.6331   2916.7267
## 27  30668.0342  13819.0330
## 28   3398.7227  -2182.4328
## 29   1088.9027  -1172.6743
## 30   2964.9274   -472.7912
## 31   2384.2657   -186.7958
## 32   1153.3741  -1165.8620
## 33   1697.2793   4371.1210
## 34  -1251.5899   1630.4457

Y1=as.matrix(data$TB)
Y2=as.matrix(data$Pneumonia)
```

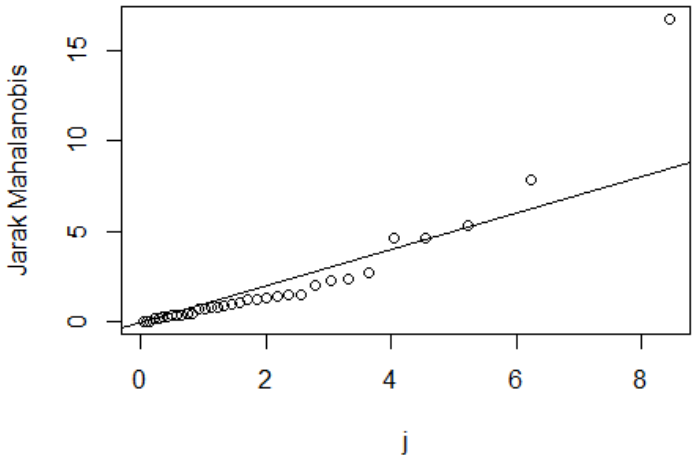
```
residu=Y-prediksi
residu
```

```
##                TB   Pneumonia
##  [1,]   4296.70955  -1839.3776
##  [2,]   8454.94108 -15377.3340
##  [3,]  -4454.39836  -4285.6311
##  [4,]  -3110.99767  -7534.2507
##  [5,]  -1304.09326    994.6601
##  [6,]   -705.93690  -5501.0002
##  [7,]   2218.02798   3830.8516
##  [8,]  -1424.67214  -4408.3259
##  [9,]    311.04902   5975.7363
## [10,]   1223.81329   4640.5225
## [11,]   6903.77648    429.4652
## [12,]  20714.88378  -2906.2744
## [13,]  13554.89216  -4193.3488
## [14,]  -3618.92912    122.5885
## [15,] -34914.21792  14624.9139
## [16,]    777.51466   3318.1508
## [17,] -10683.21260    891.0334
## [18,]  -5000.07500   8432.6575
## [19,]  -6080.15197  -5010.3914
## [20,]  -3757.54040  -4959.5120
## [21,]  -1570.56833   -378.6806
## [22,]  -7267.46734   4937.3318
## [23,]  -4120.64421  -1530.1684
## [24,]    825.97277   3084.9463
## [25,]   6181.87372   3236.2072
## [26,]   -679.63308   3356.2733
## [27,]  -6459.03421  -8947.0330
## [28,]   2793.27727   3697.4328
## [29,]   3697.09734   3119.6743
## [30,]    -28.92739   1216.7912
## [31,]   2402.73435   1003.7958
## [32,]   2054.62587   1906.8620
## [33,]   1695.72071  -3308.1210
## [34,]  17073.58989   1359.5543
```

```
library(lmtest)
bptest(lm(Y ~ X1 + X2 + X3 + X4 + X5, data = data))
```

```
##
##  studentized Breusch-Pagan test
```

```
##
## data:  lm(Y ~ X1 + X2 + X3 + X4 + X5, data = data)
## BP = 23.083, df = 5, p-value = 0.0003255

variabel = as.factor(rep(c("TB", "Pneumonia", "X1", "X2", "X3",
"X4", "X5"), each = ))
index = c(TB, Pneumonia, X1, X2, X3, X4, X5)
datax = data.frame(variabel, index)
bartlett.test(index ~ variabel, datax)

##
##  Bartlett test of homogeneity of variances
##
## data:  index by variabel
## Bartlett's K-squared = 245.56, df = 6, p-value < 2.2e-16

#UJI NORMALITAS RESIDUAL
##QQ PLOT MAHALANOBIS
y<-as.matrix(residu)
z<-t(y)
mu<-colMeans(y)
n<-nrow(y)
p<-ncol(y)
cov<-cov(y)
d<-sort(mahalanobis(y,mu,cov))
d

##  [1]  0.03991509  0.05070323  0.05643491  0.16208011  0.17856046  0.25612266
##  [7]  0.26721779  0.36585869  0.40122295  0.42002788  0.43919159  0.47698898
## [13]  0.73353308  0.76680683  0.78101680  0.81465372  0.88522684  0.94828261
## [19]  1.07075510  1.23937888  1.28882752  1.31672990  1.40874896  1.46778846
## [25]  1.48444700  2.01444097  2.30428174  2.36859473  2.72644253  4.60140984
## [31]  4.66775980  5.37194136  7.88643876 16.73817023

j<-qchisq(ppoints(n),df=p)
qqplot(j,d,main="QQ-Plot",ylab="Jarak Mahalanobis")
abline(0,1)
```




```
#5.991465
```

Lampiran 10 Nilai AICc Untuk Regresi Multivariat

```
library(pracma)
I = eye(nrow(data))
M = X%*%solve(t(X)%*%X)%*%t(X)
SSPE = t(Y)%*%(I-M)%*%Y
DF2.Mult = n-p
sigma.SSPE = SSPE/DF2.Mult
sigma.SSPE

##                 TB Pneumonia
## TB        84150866 -18774729
## Pneumonia -18774729  30962460

sigma.d = det(sigma.SSPE)
AICC = (34*(log(sigma.d) +2)+2*(5+2)+(1/2*(2*(2+1))*(34/(34-2-1)
)))
AICC

## [1] 1287.226
```

Lampiran 11 Jarak Euclidian

```
#Distance euclidean
jarak <- matrix(NA, n,n)
for(i in 1:nrow(data)) {
  for(j in 1:nrow(data)) {
    jarak[i,j] <- sqrt((data$U[i]-data$U[j])^2+(data$V[i]-data$V
[j])^2) }}

jarak
```

```
##           [,1]      [,2]      [,3]      [,4]      [,5]      [,6]      [,7]
##  [1,]  0.000000  3.804102  6.778454  6.629619  9.320244 10.750376 10.120177
##  [2,]  3.804102  0.000000  3.118894  2.827154  5.516158  6.973361  6.501276
##  [3,]  6.778454  3.118894  0.000000  1.374777  2.944628  4.043916  3.383334
##  [4,]  6.629619  2.827154  1.374777  0.000000  2.693908  4.233860  4.120436
##  [5,]  9.320244  5.516158  2.944628  2.693908  0.000000  1.735663  2.561290
##  [6,] 10.750376  6.973361  4.043916  4.233860  1.735663  0.000000  1.713388
##  [7,] 10.120177  6.501276  3.383334  4.120436  2.561290  1.713388  0.000000
##  [8,] 12.672098  8.882630  5.983701  6.101728  3.451194  1.939786  3.233182
##  [9,] 12.215400  8.434006  5.985033  5.622814  3.045253  2.591555  4.303524
## [10,]  6.629619  2.827154  1.374777  0.000000  2.693908  4.233860  4.120436
## [11,] 14.834211 11.046304  8.124806  8.262807  5.597292  4.089107  5.149440
## [12,] 16.066925 12.278082  9.355019  9.490700  6.818232  5.321672  6.331529
## [13,] 17.878631 14.075593 11.328801 11.249030  8.561810  7.310405  8.561451
## [14,] 18.480803 14.676718 11.888980 11.852588  9.160561  7.854587  9.037700
## [15,] 19.736044 15.945841 13.305045 13.123021 10.464810  9.331075 10.652631
## [16,] 14.491144 10.728779  7.733822  7.991489  5.385683  3.761197  4.611815
## [17,] 22.502844 18.735804 16.187304 15.928134 13.306467 12.253535 13.609102
## [18,] 24.556786 20.817913 18.354931 18.030787 15.447433 14.466329 15.859382
## [19,] 27.753148 24.078554 21.770130 21.340358 18.834377 17.975814 19.432532
## [20,] 10.727680  7.255364  5.939220  4.909760  3.654812  4.658195  6.090435
## [21,] 17.813380 14.348718 12.617529 11.841362  9.769495  9.608593 11.313780
## [22,] 20.104028 16.577958 14.673593 13.992781 11.764423 11.371621 13.035786
## [23,] 20.104348 16.947793 15.671629 14.714605 12.985291 13.086622 14.799653
## [24,] 19.360059 16.524070 15.711111 14.601595 13.281354 13.708695 15.389354
## [25,] 27.528202 24.475341 23.215139 22.270637 20.484155 20.444656 22.152547
## [26,] 25.444465 22.185638 20.657143 19.813879 17.833407 17.632740 19.323555
## [27,] 24.684812 21.232020 19.396452 18.691979 16.489945 16.063454 17.707882
## [28,] 26.918163 23.479470 21.644106 20.943447 18.733763 18.278855 19.911209
## [29,] 26.632939 23.564153 22.293741 21.351406 19.562560 19.528261 21.236808
## [30,] 23.713108 20.302063 18.551792 17.803880 15.667630 15.325052 16.991784
## [31,] 34.325302 31.064998 29.451441 28.656915 26.582074 26.230999 27.884128
## [32,] 31.216097 28.268914 27.107449 26.133191 24.403872 24.389697 26.098504
## [33,] 36.921263 33.806270 32.380200 31.510047 29.562866 29.327457 31.005307
## [34,] 45.641868 42.405220 40.771466 39.993667 37.886952 37.470873 39.099579
##           [,8]      [,9]     [,10]      [,11]     [,12]      [,13]      [,14]
##  [1,] 12.672098 12.215400  6.629619 14.8342113 16.066925 17.8786313 18.4808034
##  [2,]  8.882630  8.434006  2.827154 11.0463041 12.278082 14.0755932 14.6767183
##  [3,]  5.983701  5.985033  1.374777  8.1248057  9.355019 11.3288006 11.8889803
##  [4,]  6.101728  5.622814  0.000000  8.2628073  9.490700 11.2490297 11.8525877
##  [5,]  3.451194  3.045253  2.693908  5.5972919  6.818232  8.5618098  9.1605615
##  [6,]  1.939786  2.591555  4.233860  4.0891068  5.321672  7.3104048  7.8545872
##  [7,]  3.233182  4.303524  4.120436  5.1494401  6.331529  8.5614511  9.0377004
```

```
##  [8,]  0.000000  2.090963  6.101728  2.1637799  3.395538  5.3968555  5.9242449
##  [9,]  2.090963  0.000000  5.622814  3.4793335  4.519956  5.7563010  6.4035807
## [10,]  6.101728  5.622814  0.000000  8.2628073  9.490700 11.2490297 11.8525877
## [11,]  2.163780  3.479333  8.262807  0.0000000  1.232884  3.4569678  3.8927031
## [12,]  3.395538  4.519956  9.490700  1.2328840  0.000000  2.4721022  2.7878838
## [13,]  5.396856  5.756301 11.249030  3.4569678  2.472102  0.0000000  0.6880569
## [14,]  5.924245  6.403581 11.852588  3.8927031  2.787884  0.6880569  0.0000000
## [15,]  7.452252  7.523749 13.123021  5.5839309  4.591146  2.1331888  1.8923744
## [16,]  1.960661  3.684062  7.991489  0.7802819  1.744981  4.1437911  4.5214668
## [17,] 10.397364 10.305356 15.928134  8.5476457  7.527513  5.0925741  4.7578770
## [18,] 12.636530 12.418531 18.030787 10.8265196  9.817817  7.3759292  7.0485550
## [19,] 16.199671 15.789140 21.340358 14.4728527 13.501663 11.0423464 10.7487887
## [20,]  5.178403  3.223021  4.909760  6.6804485  7.641540  8.4042770  9.0891058
## [21,]  8.478622  7.022165 11.841362  7.9702709  7.868009  6.3581814  6.8234391
## [22,]  9.985146  8.850158 13.992781  9.0192756  8.600722  6.5517672  6.8094972
## [23,] 12.135025 10.503951 14.714605 11.7312322 11.609549  9.9276348 10.3060869
## [24,] 13.089569 11.224066 14.601595 13.0799757 13.168362 11.8048674 12.2669861
## [25,] 19.278076 17.854521 22.270637 18.4657771 18.039399 15.8701327 16.0074560
## [26,] 16.341093 15.062196 19.813879 15.3869715 14.894426 12.6704536 12.7820415
## [27,] 14.594395 13.565228 18.691979 13.3986499 12.772156 10.4321163 10.4602865
## [28,] 16.772899 15.796523 20.943447 15.4948277 14.801850 12.4041082 12.3629782
## [29,] 18.372612 16.937712 21.351406 17.5845484 17.177655 15.0346883 15.1896689
## [30,] 13.931168 12.791907 17.803880 12.8609596 12.318380 10.0603194 10.1589567
## [31,] 24.773663 23.709904 28.656915 23.5158379 22.804151 20.3840218 20.3000150
## [32,] 23.225410 21.798922 26.133191 22.3842988 21.923584 19.7040371 19.8024377
## [33,] 27.954267 26.771020 31.510047 26.8030630 26.146988 23.7570788 23.7085576
## [34,] 35.943071 34.980237 39.993667 34.5507726 33.742219 31.2799604 31.1075895
##          [,15]     [,16]     [,17]     [,18]     [,19]     [,20]     [,21]
##  [1,] 19.736044 14.4911442 22.502844 24.556786 27.753148 10.727680 17.813380
##  [2,] 15.945841 10.7287788 18.735804 20.817913 24.078554  7.255364 14.348718
##  [3,] 13.305045  7.7338217 16.187304 18.354931 21.770130  5.939220 12.617529
##  [4,] 13.123021  7.9914887 15.928134 18.030787 21.340358  4.909760 11.841362
##  [5,] 10.464810  5.3856831 13.306467 15.447433 18.834377  3.654812  9.769495
##  [6,]  9.331075  3.7611968 12.253535 14.466329 17.975814  4.658195  9.608593
##  [7,] 10.652631  4.6118152 13.609102 15.859382 19.432532  6.090435 11.313780
##  [8,]  7.452252  1.9606612 10.397364 12.636530 16.199671  5.178403  8.478622
##  [9,]  7.523749  3.6840621 10.305356 12.418531 15.789140  3.223021  7.022165
## [10,] 13.123021  7.9914887 15.928134 18.030787 21.340358  4.909760 11.841362
## [11,]  5.583931  0.7802819  8.547646 10.826520 14.472853  6.680449  7.970271
## [12,]  4.591146  1.7449809  7.527513  9.817817 13.501663  7.641540  7.868009
## [13,]  2.133189  4.1437911  5.092574  7.375929 11.042346  8.404277  6.358181
## [14,]  1.892374  4.5214668  4.757877  7.048555 10.748789  9.089106  6.823439
## [15,]  0.000000  6.2769796  2.964780  5.243572  8.911795  9.790727  5.965290
## [16,]  6.276980  0.0000000  9.232915 11.518940 15.183226  6.905034  8.710760
## [17,]  2.964780  9.2329152  0.000000  2.291095  5.995797 12.232961  6.875004
## [18,]  5.243572 11.5189399  2.291095  0.000000  3.717725 14.102923  8.027193
## [19,]  8.911795 15.1832262  5.995797  3.717725  0.000000 17.108918 10.387837
## [20,]  9.790727  6.9050338 12.232961 14.102923 17.108918  0.000000  7.105127
## [21,]  5.965290  8.7107599  6.875004  8.027193 10.387837  7.105127  0.000000
## [22,]  5.386854  9.7969766  5.251401  5.935863  8.034641  9.376803  2.367845
## [23,]  9.092953 12.4683381  8.977875  9.239762 10.309345  9.806440  3.761998
## [24,] 11.270178 13.7621826 11.453053 11.800117 12.766570  9.779047  5.447614
## [25,] 14.294955 19.2413986 12.620776 11.393454  9.723250 17.362487 10.840786
## [26,] 11.047920 16.1663887  9.387453  8.297542  7.236630 14.954613  8.067184
## [27,]  8.648470 14.1767540  6.757224  5.627277  5.109568 13.989443  6.884759
## [28,] 10.498955 16.2684578  8.232089  6.594454  4.643484 16.233436  9.130833
```

```
## [29,] 13.502487 18.3588459 11.931692 10.817098  9.411012 16.443762  9.926987
## [30,]  8.421739 13.6412383  6.881213  6.102509  6.099697 13.048749  5.964145
## [31,] 18.415359 24.2886601 15.894455 13.882996 10.561974 23.823697 16.835071
## [32,] 18.038153 23.1616885 16.123153 14.617494 12.243553 21.223825 14.788513
## [33,] 21.835032 27.5806425 19.391966 17.423804 14.138541 26.623410 19.795375
## [34,] 29.217823 35.3105092 26.465187 24.260104 20.592830 35.165003 28.162316
##           [,22]     [,23]     [,24]      [,25]     [,26]     [,27]     [,28]
##  [1,] 20.104028 20.104348 19.360059 27.5282024 25.444465 24.684812 26.918163
##  [2,] 16.577958 16.947793 16.524070 24.4753407 22.185638 21.232020 23.479470
##  [3,] 14.673593 15.671629 15.711111 23.2151393 20.657143 19.396452 21.644106
##  [4,] 13.992781 14.714605 14.601595 22.2706374 19.813879 18.691979 20.943447
##  [5,] 11.764423 12.985291 13.281354 20.4841554 17.833407 16.489945 18.733763
##  [6,] 11.371621 13.086622 13.708695 20.4446558 17.632740 16.063454 18.278855
##  [7,] 13.035786 14.799653 15.389354 22.1525474 19.323555 17.707882 19.911209
##  [8,]  9.985146 12.135025 13.089569 19.2780755 16.341093 14.594395 16.772899
##  [9,]  8.850158 10.503951 11.224066 17.8545213 15.062196 13.565228 15.796523
## [10,] 13.992781 14.714605 14.601595 22.2706374 19.813879 18.691979 20.943447
## [11,]  9.019276 11.731232 13.079976 18.4657771 15.386971 13.398650 15.494828
## [12,]  8.600722 11.609549 13.168362 18.0393993 14.894426 12.772156 14.801850
## [13,]  6.551767  9.927635 11.804867 15.8701327 12.670454 10.432116 12.404108
## [14,]  6.809497 10.306087 12.266986 16.0074560 12.782042 10.460286 12.362978
## [15,]  5.386854  9.092953 11.270178 14.2949550 11.047920  8.648470 10.498955
## [16,]  9.796977 12.468338 13.762183 19.2413986 16.166389 14.176754 16.268458
## [17,]  5.251401  8.977875 11.453053 12.6207757  9.387453  6.757224  8.232089
## [18,]  5.935863  9.239762 11.800117 11.3934541  8.297542  5.627277  6.594454
## [19,]  8.034641 10.309345 12.766570  9.7232504  7.236630  5.109568  4.643484
## [20,]  9.376803  9.806440  9.779047 17.3624865 14.954613 13.989443 16.233436
## [21,]  2.367845  3.761998  5.447614 10.8407863  8.067184  6.884759  9.130833
## [22,]  0.000000  3.804734  6.212108  9.4528455  6.382226  4.725550  6.970727
## [23,]  3.804734  0.000000  2.562468  7.5561026  5.398027  5.508025  7.420130
## [24,]  6.212108  2.562468  0.000000  8.3028233  7.034470  7.805060  9.471848
## [25,]  9.452845  7.556103  8.302823  0.0000000  3.258781  5.868702  5.098092
## [26,]  6.382226  5.398027  7.034470  3.2587807  0.000000  2.679106  2.811053
## [27,]  4.725550  5.508025  7.805060  5.8687023  2.679106  0.000000  2.251468
## [28,]  6.970727  7.420130  9.471848  5.0980921  2.811053  2.251468  0.000000
## [29,]  8.581465  6.637382  7.457491  0.9218113  2.547702  5.219864  4.770725
## [30,]  3.956133  4.399378  6.722656  5.8760621  2.626684  1.109322  3.217215
## [31,] 14.862230 14.236100 15.451708  7.2798500  8.885632 10.180320  8.022045
## [32,] 13.365083 11.436071 11.862863  3.9488313  7.035328  9.425405  8.025922
## [33,] 17.976978 16.859886 17.691581  9.4063551 11.729474 13.405182 11.353051
## [34,] 26.133851 25.538184 26.565900 18.2636707 20.221221 21.415142 19.192018
##           [,29]     [,30]     [,31]     [,32]     [,33]     [,34]
##  [1,] 26.6329387 23.713108 34.325302 31.216097 36.921263 45.641868
##  [2,] 23.5641529 20.302063 31.064998 28.268914 33.806270 42.405220
##  [3,] 22.2937409 18.551792 29.451441 27.107449 32.380200 40.771466
##  [4,] 21.3514059 17.803880 28.656915 26.133191 31.510047 39.993667
##  [5,] 19.5625604 15.667630 26.582074 24.403872 29.562866 37.886952
##  [6,] 19.5282607 15.325052 26.230999 24.389697 29.327457 37.470873
##  [7,] 21.2368080 16.991784 27.884128 26.098504 31.005307 39.099579
##  [8,] 18.3726116 13.931168 24.773663 23.225410 27.954267 35.943071
##  [9,] 16.9377116 12.791907 23.709904 21.798922 26.771020 34.980237
## [10,] 21.3514059 17.803880 28.656915 26.133191 31.510047 39.993667
## [11,] 17.5845484 12.860960 23.515838 22.384299 26.803063 34.550773
## [12,] 17.1776549 12.318380 22.804151 21.923584 26.146988 33.742219
## [13,] 15.0346883 10.060319 20.384022 19.704037 23.757079 31.279960
## [14,] 15.1896689 10.158957 20.300015 19.802438 23.708558 31.107590
```

```
## [15,] 13.5024866  8.421739 18.415359 18.038153 21.835032 29.217823
## [16,] 18.3588459 13.641238 24.288660 23.161689 27.580642 35.310509
## [17,] 11.9316916  6.881213 15.894455 16.123153 19.391966 26.465187
## [18,] 10.8170976  6.102509 13.882996 14.617494 17.423804 24.260104
## [19,]  9.4110120  6.099697 10.561974 12.243553 14.138541 20.592830
## [20,] 16.4437620 13.048749 23.823697 21.223825 26.623410 35.165003
## [21,]  9.9269869  5.964145 16.835071 14.788513 19.795375 28.162316
## [22,]  8.5814651  3.956133 14.862230 13.365083 17.976978 26.133851
## [23,]  6.6373821  4.399378 14.236100 11.436071 16.859886 25.538184
## [24,]  7.4574915  6.722656 15.451708 11.862863 17.691581 26.565900
## [25,]  0.9218113  5.876062  7.279850  3.948831  9.406355 18.263671
## [26,]  2.5477021  2.626684  8.885632  7.035328 11.729474 20.221221
## [27,]  5.2198636  1.109322 10.180320  9.425405 13.405182 21.415142
## [28,]  4.7707250  3.217215  8.022045  8.025922 11.353051 19.192018
## [29,]  0.0000000  5.109271  8.034330  4.861807 10.291063 19.115429
## [30,]  5.1092705  0.000000 10.920317  9.646401 14.023954 22.220960
## [31,]  8.0343300 10.920317  0.000000  5.346977  3.577212 11.341307
## [32,]  4.8618071  9.646401  5.346977  0.000000  6.102844 15.053999
## [33,] 10.2910626 14.023954  3.577212  6.102844  0.000000  8.961039
## [34,] 19.1154293 22.220960 11.341307 15.053999  8.961039  0.000000
```

Lampiran 12 Nilai bandwidth Optimum

```
col.bis  = gwr.sel(TB + Pneumonia ~ X1 + X2 + X3 + X4 + X5, data
=data,adapt=FALSE,coords=cbind(data$U, data$V), gweight=gwr.tric
ube)

## Bandwidth: 17.81066 CV score: NA

## Warning in optimize(gwr.cv.f, lower = beta1, upper = beta2, m
aximum = FALSE, :
## NA/Inf replaced by maximum positive value

## Bandwidth: 28.78949 CV score: 11681580242
## Bandwidth: 28.78944 CV score: 11681580024
## Bandwidth: 28.7894 CV score: 11681579806
## Bandwidth: 24.5959 CV score: 11886208941
## Bandwidth: 27.18763 CV score: 11686505636
## Bandwidth: 28.17758 CV score: 11679042184
## Bandwidth: 27.38352 CV score: 11682910003
## Bandwidth: 27.87428 CV score: 11679030765
## Bandwidth: 28.02174 CV score: 11678873438
## Bandwidth: 28.02327 CV score: 11678873559
## Bandwidth: 28.01739 CV score: 11678873278
## Bandwidth: 28.01697 CV score: 11678873277
## Bandwidth: 28.01701 CV score: 11678873277
## Bandwidth: 28.01693 CV score: 11678873277
## Bandwidth: 28.01697 CV score: 11678873277

col.bis

## [1] 28.01697
```

Lampiran 13 Matrks Pembobot

```
w <- matrix(NA, n, n)
for(i in 1:n){
  for(j in 1:n){
    if(jarak[i,j]>col.bis) {w[i,j]=0} else {w[i,j] <- (1-(jarak[
i,j]/col.bis)^3)^3}}}
w
```

```
##              [,1]       [,2]         [,3]        [,4]        [,5]        [,6]
##  [1,] 1.000000e+00 0.99250922 0.9581124630 0.960775567 0.893572649 0.839910584
##  [2,] 9.925092e-01 1.00000000 0.9958670477 0.996920645 0.977277872 0.954451870
##  [3,] 9.581125e-01 0.99586705 1.0000000000 0.999645592 0.996521076 0.991005901
##  [4,] 9.607756e-01 0.99692065 0.9996455923 1.000000000 0.997335473 0.989682658
##  [5,] 8.935726e-01 0.97727787 0.9965210757 0.997335473 1.000000000 0.999286900
##  [6,] 8.399106e-01 0.95445187 0.9910059012 0.989682658 0.999286900 1.000000000
##  [7,] 8.651680e-01 0.96298175 0.9947261542 0.990487270 0.997709647 0.999313998
##  [8,] 7.473034e-01 0.90740900 0.9710579133 0.969329390 0.994403015 0.999004651
##  [9,] 7.713932e-01 0.92037337 0.9710387839 0.975945097 0.996152574 0.997627559
## [10,] 9.607756e-01 0.99692065 0.9996455923 1.000000000 0.997335473 0.989682658
## [11,] 6.175281e-01 0.82716993 0.9286059243 0.925001495 0.976268560 0.990701941
## [12,] 5.342072e-01 0.76816170 0.8924219725 0.887859725 0.957381458 0.979581561
## [13,] 4.054541e-01 0.66578435 0.8144842056 0.818118022 0.916804192 0.947646695
## [14,] 3.624497e-01 0.62776037 0.7878302509 0.789621825 0.898759295 0.935341853
## [15,] 2.751880e-01 0.54260936 0.7118850211 0.722305752 0.851671750 0.893215065
## [16,] 6.396776e-01 0.84081841 0.9382163736 0.931982098 0.978841169 0.992759228
## [17,] 1.118812e-01 0.34438845 0.5258158769 0.543834694 0.711802906 0.769430026
## [18,] 3.484853e-02 0.20511848 0.3714054351 0.394556718 0.576736141 0.641259410
## [19,] 2.191488e-05 0.04871244 0.1495872145 0.173817706 0.337441638 0.398492281
## [20,] 8.408645e-01 0.94879984 0.9716924536 0.983941708 0.993355097 0.986274971
## [21,] 4.101308e-01 0.64871775 0.7502477332 0.790172777 0.878120533 0.883801411
## [22,] 2.506719e-01 0.49835411 0.6279623637 0.670886782 0.793927729 0.812516865
## [23,] 2.506508e-01 0.47209548 0.5614818993 0.625308658 0.730065962 0.724367140
## [24,] 3.008217e-01 0.50216105 0.5587786600 0.632603148 0.713251807 0.688125522
## [25,] 1.360216e-04 0.03702983 0.0801081190 0.123307550 0.226052853 0.228574307
## [26,] 1.580193e-02 0.12761466 0.2151176485 0.269951677 0.408695252 0.423082875
## [27,] 3.156867e-02 0.18014989 0.2983177312 0.347483699 0.504569008 0.534448631
## [28,] 1.446875e-03 0.06964236 0.1565402716 0.197426158 0.344532563 0.376828751
## [29,] 2.803140e-03 0.06644690 0.1221482422 0.173176890 0.286948926 0.289288146
## [30,] 6.101400e-02 0.23774938 0.3574099096 0.410811775 0.561755428 0.584990309
## [31,] 0.000000e+00 0.00000000 0.0000000000 0.000000000 0.003106446 0.005764833
## [32,] 0.000000e+00 0.00000000 0.0008375522 0.006692776 0.039004757 0.039403227
## [33,] 0.000000e+00 0.00000000 0.0000000000 0.000000000 0.000000000 0.000000000
## [34,] 0.000000e+00 0.00000000 0.0000000000 0.000000000 0.000000000 0.000000000
##              [,7]        [,8]        [,9]       [,10]       [,11]       [,12]
##  [1,] 8.651680e-01 7.473034e-01 0.771393213 0.960775567 0.617528109 0.534207197
##  [2,] 9.629817e-01 9.074090e-01 0.920373373 0.996920645 0.827169926 0.768161701
##  [3,] 9.947262e-01 9.710579e-01 0.971038784 0.999645592 0.928605924 0.892421972
##  [4,] 9.904873e-01 9.693294e-01 0.975945097 1.000000000 0.925001495 0.887859725
##  [5,] 9.977096e-01 9.944030e-01 0.996152574 0.997335473 0.976268560 0.957381458
##  [6,] 9.993140e-01 9.990047e-01 0.997627559 0.989682658 0.990701941 0.979581561
##  [7,] 1.000000e+00 9.953966e-01 0.989166832 0.990487270 0.981488629 0.965773569
##  [8,] 9.953966e-01 1.000000e+00 0.998753430 0.969329390 0.998618671 0.994668981
##  [9,] 9.891668e-01 9.987534e-01 1.000000000 0.975945097 0.994265257 0.987456015
## [10,] 9.904873e-01 9.693294e-01 0.975945097 1.000000000 0.925001495 0.887859725
```

```
## [11,] 9.814886e-01 9.986187e-01 0.994265257 0.925001495 1.000000000 0.999744384
## [12,] 9.657736e-01 9.946690e-01 0.987456015 0.887859725 0.999744384 1.000000000
## [13,] 9.168143e-01 9.787102e-01 0.974206144 0.818118022 0.994374932 0.997940515
## [14,] 9.026419e-01 9.719040e-01 0.964605915 0.789621825 0.991974977 0.997047065
## [15,] 8.439953e-01 9.445985e-01 0.943019921 0.722305752 0.976436753 0.986856568
## [16,] 9.866791e-01 9.989722e-01 0.993194644 0.931982098 0.999935196 0.999275356
## [17,] 6.940694e-01 8.543731e-01 0.858010946 0.543834694 0.917204593 0.942936036
## [18,] 5.485839e-01 7.492245e-01 0.760833996 0.394556718 0.836686086 0.876382342
## [19,] 2.958398e-01 5.249517e-01 0.553421845 0.173817706 0.640843850 0.700422038
## [20,] 9.694976e-01 9.811765e-01 0.995439778 0.983941708 0.959878810 0.940357069
## [21,] 8.151715e-01 9.191385e-01 0.953504064 0.790172777 0.932509896 0.935017226
## [22,] 7.272335e-01 8.702484e-01 0.908388516 0.670886782 0.903216049 0.915697951
## [23,] 6.197824e-01 7.755016e-01 0.850090733 0.625308658 0.795536143 0.801373530
## [24,] 5.806600e-01 7.242005e-01 0.819246843 0.632603148 0.724742733 0.719727455
## [25,] 1.293091e-01 3.064787e-01 0.407181918 0.123307550 0.363517586 0.393940316
## [26,] 3.033377e-01 5.150445e-01 0.602532671 0.269951677 0.580820690 0.613588189
## [27,] 4.176946e-01 6.330660e-01 0.696671022 0.347483699 0.706454251 0.741858879
## [28,] 2.634409e-01 4.845393e-01 0.552914046 0.197426158 0.573525465 0.619639228
## [29,] 1.798682e-01 3.701461e-01 0.472813891 0.173176890 0.426538525 0.455684511
## [30,] 4.689592e-01 6.746607e-01 0.740777206 0.410811775 0.736977453 0.766071474
## [31,] 2.837340e-06 2.939925e-02 0.061128311 0.000000000 0.068260612 0.097822237
## [32,] 7.042536e-03 7.968771e-02 0.148017036 0.006692776 0.117651634 0.141298858
## [33,] 0.000000e+00 3.006181e-07 0.002076016 0.000000000 0.001926623 0.006556685
## [34,] 0.000000e+00 0.000000e+00 0.000000000 0.000000000 0.000000000 0.000000000
##           [,13]     [,14]     [,15]        [,16]       [,17]      [,18]
##  [1,] 0.40545408 0.3624497 0.2751880 6.396776e-01 0.111881211 0.03484853
##  [2,] 0.66578435 0.6277604 0.5426094 8.408184e-01 0.344388447 0.20511848
##  [3,] 0.81448421 0.7878303 0.7118850 9.382164e-01 0.525815877 0.37140544
##  [4,] 0.81811802 0.7896218 0.7223058 9.319821e-01 0.543834694 0.39455672
##  [5,] 0.91680419 0.8987593 0.8516718 9.788412e-01 0.711802906 0.57673614
##  [6,] 0.94764669 0.9353419 0.8932151 9.927592e-01 0.769430026 0.64125941
##  [7,] 0.91681435 0.9026419 0.8439953 9.866791e-01 0.694069373 0.54858393
##  [8,] 0.97871016 0.9719040 0.9445985 9.989722e-01 0.854373057 0.74922451
##  [9,] 0.97420614 0.9646059 0.9430199 9.931946e-01 0.858010946 0.76083400
## [10,] 0.81811802 0.7896218 0.7223058 9.319821e-01 0.543834694 0.39455672
## [11,] 0.99437493 0.9919750 0.9764368 9.999352e-01 0.917204593 0.83668609
## [12,] 0.99794051 0.9970471 0.9868566 9.992754e-01 0.942936036 0.87638234
## [13,] 1.00000000 0.9999556 0.9986764 9.903251e-01 0.982091503 0.94625235
## [14,] 0.99995557 1.0000000 0.9990758 9.874435e-01 0.985379280 0.95298632
## [15,] 0.99867641 0.9990758 1.0000000 9.666407e-01 0.996449245 0.98046158
## [16,] 0.99032512 0.9874435 0.9666407 1.000000e+00 0.896428901 0.80565949
## [17,] 0.98209150 0.9853793 0.9964492 8.964289e-01 1.000000000 0.99836036
## [18,] 0.94625235 0.9529863 0.9804616 8.056595e-01 0.998360356 1.00000000
## [19,] 0.82734402 0.8399774 0.9065237 5.944879e-01 0.970883774 0.99300682
## [20,] 0.92118958 0.9010288 0.8773586 9.557577e-01 0.770490253 0.66409295
## [21,] 0.96534462 0.9572852 0.9713217 9.125201e-01 0.956323905 0.93108805
## [22,] 0.96212370 0.9575427 0.9788275 8.771338e-01 0.980374511 0.97173997
## [23,] 0.87237678 0.8579822 0.9009074 7.582067e-01 0.904498577 0.89620667
## [24,] 0.79195851 0.7687355 0.8171586 6.849117e-01 0.808743418 0.79219032
## [25,] 0.54784220 0.5383388 0.6521055 3.090165e-01 0.750073030 0.81150930
## [26,] 0.74739238 0.7413178 0.8270988 5.272765e-01 0.891341896 0.92407657
## [27,] 0.85298483 0.8518539 0.9143280 6.595053e-01 0.958499284 0.97588823
## [28,] 0.76159200 0.7637467 0.8502931 5.201387e-01 0.925813520 0.96138830
## [29,] 0.60435307 0.5940581 0.7003736 3.711265e-01 0.785717067 0.83708711
## [30,] 0.86743447 0.8636874 0.9207108 6.921572e-01 0.956207233 0.96931773
## [31,] 0.23246205 0.2378820 0.3671031 4.230817e-02 0.546162848 0.67759788
```

```
## [32,] 0.27734870 0.2707197 0.3940295 8.231377e-02 0.530292288 0.63158031
## [33,] 0.05945632 0.0611764 0.1460575 9.731729e-05 0.298626122 0.43806184
## [34,] 0.00000000 0.0000000 0.0000000 0.000000e+00 0.003879384 0.04314977
##             [,19]       [,20]     [,21]       [,22]      [,23]       [,24]
##  [1,] 2.191488e-05 0.840864511 0.4101308 0.250671876 0.25065085 0.300821667
##  [2,] 4.871244e-02 0.948799837 0.6487178 0.498354105 0.47209548 0.502161055
##  [3,] 1.495872e-01 0.971692454 0.7502477 0.627962364 0.56148190 0.558778660
##  [4,] 1.738177e-01 0.983941708 0.7901728 0.670886782 0.62530866 0.632603148
##  [5,] 3.374416e-01 0.993355097 0.8781205 0.793927729 0.73006596 0.713251807
##  [6,] 3.984923e-01 0.986274971 0.8838014 0.812516865 0.72436714 0.688125522
##  [7,] 2.958398e-01 0.969497618 0.8151715 0.727233473 0.61978243 0.580659962
##  [8,] 5.249517e-01 0.981176511 0.9191385 0.870248376 0.77550161 0.724200527
##  [9,] 5.534218e-01 0.995439778 0.9535041 0.908388516 0.85009073 0.819246843
## [10,] 1.738177e-01 0.983941708 0.7901728 0.670886782 0.62530866 0.632603148
## [11,] 6.408439e-01 0.959878810 0.9325099 0.903216049 0.79553614 0.724742733
## [12,] 7.004220e-01 0.940357069 0.9350172 0.915697951 0.80137353 0.719727455
## [13,] 8.273440e-01 0.921189581 0.9653446 0.962123704 0.87237678 0.791958508
## [14,] 8.399774e-01 0.901028789 0.9572852 0.957542675 0.85798225 0.768735466
## [15,] 9.065237e-01 0.877358639 0.9713217 0.978827460 0.90090740 0.817158590
## [16,] 5.944879e-01 0.955757723 0.9125201 0.877133811 0.75820669 0.684911744
## [17,] 9.708838e-01 0.770490253 0.9563239 0.980374511 0.90449858 0.808743418
## [18,] 9.930068e-01 0.664092950 0.9310881 0.971739970 0.89620667 0.792190323
## [19,] 1.000000e+00 0.460597569 0.8547523 0.930900620 0.85785435 0.742164413
## [20,] 4.605976e-01 1.000000000 0.9518639 0.891697277 0.87679291 0.877778107
## [21,] 8.547523e-01 0.951863913 1.0000000 0.998190095 0.99275461 0.978108253
## [22,] 9.309006e-01 0.891697277 0.9981901 1.000000000 0.99250550 0.967653142
## [23,] 8.578544e-01 0.876792911 0.9927546 0.992505504 1.00000000 0.997706489
## [24,] 7.421644e-01 0.877778107 0.9781083 0.967653142 0.99770649 1.000000000
## [25,] 8.797701e-01 0.442455129 0.8360778 0.889144236 0.94229625 0.923935314
## [26,] 9.491886e-01 0.609635150 0.9300779 0.964954651 0.97869640 0.953263119
## [27,] 9.819127e-01 0.671091707 0.9561405 0.985673853 0.97737746 0.936530790
## [28,] 9.864040e-01 0.522590635 0.8997073 0.954502663 0.94529846 0.888500562
## [29,] 8.905533e-01 0.507824071 0.8724006 0.916246557 0.96063946 0.944483753
## [30,] 9.693597e-01 0.726503983 0.9713380 0.991577384 0.98842958 0.959124141
## [31,] 8.477289e-01 0.057136598 0.4801206 0.615696689 0.65579845 0.576446863
## [32,] 7.699448e-01 0.180632385 0.6205080 0.708407306 0.80953384 0.789116802
## [33,] 6.618831e-01 0.002858471 0.2711942 0.398408920 0.47835540 0.418863520
## [34,] 2.191623e-01 0.000000000 0.0000000 0.006686225 0.01428392 0.003207023
##             [,25]      [,26]      [,27]       [,28]      [,29]     [,30]
##  [1,] 0.0001360216 0.01580193 0.03156867 0.001446875 0.00280314 0.0610140
##  [2,] 0.0370298347 0.12761466 0.18014989 0.069642363 0.06644690 0.2377494
##  [3,] 0.0801081190 0.21511765 0.29831773 0.156540272 0.12214824 0.3574099
##  [4,] 0.1233075503 0.26995168 0.34748370 0.197426158 0.17317689 0.4108118
##  [5,] 0.2260528534 0.40869525 0.50456901 0.344532563 0.28694893 0.5617554
##  [6,] 0.2285743068 0.42308288 0.53444863 0.376828751 0.28928815 0.5849903
##  [7,] 0.1293090828 0.30333775 0.41769463 0.263440919 0.17986823 0.4689592
##  [8,] 0.3064786751 0.51504451 0.63306601 0.484539316 0.37014607 0.6746607
##  [9,] 0.4071819183 0.60253267 0.69667102 0.552914046 0.47281389 0.7407772
## [10,] 0.1233075503 0.26995168 0.34748370 0.197426158 0.17317689 0.4108118
## [11,] 0.3635175861 0.58082069 0.70645425 0.573525465 0.42653852 0.7369775
## [12,] 0.3939403158 0.61358819 0.74185888 0.619639228 0.45568451 0.7660715
## [13,] 0.5478422007 0.74739238 0.85298483 0.761591998 0.60435307 0.8674345
## [14,] 0.5383388029 0.74131777 0.85185385 0.763746693 0.59405808 0.8636874
## [15,] 0.6521055370 0.82709881 0.91432802 0.850293069 0.70037357 0.9207108
## [16,] 0.3090165366 0.52727647 0.65950529 0.520138734 0.37112652 0.6921572
## [17,] 0.7500730299 0.89134190 0.95849928 0.925813520 0.78571707 0.9562072
```

```
## [18,] 0.8115092957 0.92407657 0.97588823 0.961388297 0.83708711 0.9693177
## [19,] 0.8797700870 0.94918855 0.98191272 0.986404008 0.89055325 0.9693597
## [20,] 0.4424551289 0.60963515 0.67109171 0.522590635 0.50782407 0.7265040
## [21,] 0.8360777778 0.93007788 0.95614051 0.899707340 0.87240063 0.9713380
## [22,] 0.8891442362 0.96495465 0.98567385 0.954502663 0.91624656 0.9915774
## [23,] 0.9422962525 0.97869640 0.97737746 0.945298459 0.96063946 0.9884296
## [24,] 0.9239353135 0.95326312 0.93653079 0.888500562 0.94448375 0.9591241
## [25,] 1.0000000000 0.99528654 0.97267964 0.982033578 0.99989315 0.9725777
## [26,] 0.9952865421 1.00000000 0.99737912 0.996972903 0.99774588 0.9975298
## [27,] 0.9726796435 0.99737912 1.00000000 0.998443927 0.98072370 0.9998138
## [28,] 0.9820335776 0.99697290 0.99844393 1.000000000 0.98526110 0.9954643
## [29,] 0.9998931515 0.99774588 0.98072370 0.985261104 1.00000000 0.9819159
## [30,] 0.9725776813 0.99752985 0.99981379 0.995464341 0.98191586 1.0000000
## [31,] 0.9482888695 0.90731814 0.86286763 0.931217419 0.93090845 0.8326628
## [32,] 0.9916238003 0.95324628 0.89006971 0.931120000 0.98440521 0.8824813
## [33,] 0.8907094226 0.79562114 0.70607345 0.813371475 0.85857120 0.6689701
## [34,] 0.3779120475 0.24300012 0.16949781 0.312440081 0.31776461 0.1258169
##             [,31]        [,32]        [,33]       [,34]
##  [1,] 0.000000e+00 0.0000000000 0.000000e+00 0.000000000
##  [2,] 0.000000e+00 0.0000000000 0.000000e+00 0.000000000
##  [3,] 0.000000e+00 0.0008375522 0.000000e+00 0.000000000
##  [4,] 0.000000e+00 0.0066927759 0.000000e+00 0.000000000
##  [5,] 3.106446e-03 0.0390047568 0.000000e+00 0.000000000
##  [6,] 5.764833e-03 0.0394032273 0.000000e+00 0.000000000
##  [7,] 2.837340e-06 0.0070425356 0.000000e+00 0.000000000
##  [8,] 2.939925e-02 0.0796877072 3.006181e-07 0.000000000
##  [9,] 6.112831e-02 0.1480170355 2.076016e-03 0.000000000
## [10,] 0.000000e+00 0.0066927759 0.000000e+00 0.000000000
## [11,] 6.826061e-02 0.1176516337 1.926623e-03 0.000000000
## [12,] 9.782224e-02 0.1412988581 6.556685e-03 0.000000000
## [13,] 2.324620e-01 0.2773487017 5.945632e-02 0.000000000
## [14,] 2.378820e-01 0.2707197390 6.117640e-02 0.000000000
## [15,] 3.671031e-01 0.3940295440 1.460575e-01 0.000000000
## [16,] 4.230817e-02 0.0823137731 9.731729e-05 0.000000000
## [17,] 5.461628e-01 0.5302922880 2.986261e-01 0.003879384
## [18,] 6.775979e-01 0.6315803121 4.380618e-01 0.043149772
## [19,] 8.477289e-01 0.7699447644 6.618831e-01 0.219162311
## [20,] 5.713660e-02 0.1806323853 2.858471e-03 0.000000000
## [21,] 4.801206e-01 0.6205080312 2.711942e-01 0.000000000
## [22,] 6.156967e-01 0.7084073061 3.984089e-01 0.006686225
## [23,] 6.557985e-01 0.8095338393 4.783554e-01 0.014283920
## [24,] 5.764469e-01 0.7891168022 4.188635e-01 0.003207023
## [25,] 9.482889e-01 0.9916238003 8.907094e-01 0.377912048
## [26,] 9.073181e-01 0.9532462769 7.956211e-01 0.243000118
## [27,] 8.628676e-01 0.8900697074 7.060735e-01 0.169497814
## [28,] 9.312174e-01 0.9311199999 8.133715e-01 0.312440081
## [29,] 9.309085e-01 0.9844052073 8.585712e-01 0.317764607
## [30,] 8.326628e-01 0.8824812949 6.689701e-01 0.125816860
## [31,] 1.000000e+00 0.9792909363 9.937686e-01 0.813910804
## [32,] 9.792909e-01 1.0000000000 9.693127e-01 0.603075392
## [33,] 9.937686e-01 0.9693127345 1.000000e+00 0.905017091
## [34,] 8.139108e-01 0.6030753922 9.050171e-01 1.000000000
```

Lampiran 14 Estimasi Parameter dan Model Setiap Provinsi

```
###Model MGWR Lokal###
#Estimas Parameter
Beta.mgwr1 <- matrix(NA, nrow=6, ncol=34)
Beta.mgwr2 <- matrix(NA, nrow=6, ncol=34)

##Estimasi Parameter##
for(j in 1:34){
  Beta.mgwr1[,j]=solve(t(X)%*%diag(w[,j])%*%X)%*%t(X)%*%diag(w[,
j])%*%y1
  Beta.mgwr2[,j]=solve(t(X)%*%diag(w[,j])%*%X)%*%t(X)%*%diag(w[,
j])%*%y2}

beta.mgwr1 <- t(Beta.mgwr1)
colnames(beta.mgwr1) <- c("intercept",variabel[c(3,4,5,6,7)])
rownames(beta.mgwr1) <- 1:n
print(beta.mgwr1)
```

```
##     intercept         X1         X2         X3          X4       X5
## 1  -2636.1056  1.5001458  -7.161978 -4104.6799 0.039539058 1.650965
## 2  -2497.4915  1.8487458  -8.431353 -4460.4714 0.038671734 1.607035
## 3  -2637.3310  2.0020371  -8.948107 -4485.8624 0.038269238 1.590970
## 4  -2644.6598  1.9503281  -8.864152 -4309.0712 0.038430690 1.581718
## 5  -2817.1474  1.9915441  -9.116371 -4084.0804 0.038381191 1.564179
## 6  -2919.5604  2.0462964  -9.289264 -4102.1302 0.038250868 1.564450
## 7  -2860.9943  2.1034024  -9.324771 -4408.4098 0.038033372 1.580623
## 8  -3047.4809  2.0571818  -9.431149 -3898.4648 0.038301087 1.555481
## 9  -2969.1676  1.9630275  -9.258122 -3630.6460 0.038601586 1.542516
## 10 -2644.6598  1.9503281  -8.864152 -4309.0712 0.038430690 1.581718
## 11 -3209.5235  2.1015652  -9.660786 -3726.0684 0.038281892 1.552337
## 12 -3318.2861  2.1363776  -9.825433 -3601.1901 0.038261385 1.552314
## 13 -3495.8760  2.0998391  -9.990670 -2872.2005 0.038598882 1.542010
## 14 -3573.3886  2.1469620 -10.124639 -2861.4346 0.038487461 1.545593
## 15 -3748.0633  2.1273950 -10.266607 -2165.1255 0.038682432 1.540580
## 16 -3198.9999  2.1310124  -9.674824 -3889.7075 0.038152456 1.558779
## 17 -4193.5006  2.2615292 -10.818808 -1207.9364 0.038368609 1.543788
## 18 -4577.0827  2.3535576 -11.080170  -331.2523 0.037906698 1.539255
## 19 -5072.3517  2.3373039 -10.609973  1179.5742 0.036847092 1.498307
## 20 -2799.9482  1.8537034  -8.949293 -3521.8374 0.038859713 1.536905
## 21 -3470.0605  1.8341025  -9.591946 -1517.2083 0.039404300 1.513790
## 22 -3783.1870  1.9251921  -9.977660  -940.1103 0.039222702 1.516779
## 23 -3676.1761  1.7609752  -9.516833  -577.2545 0.039416643 1.496226
## 24 -3432.2967  1.6150587  -9.053966  -723.0716 0.039656178 1.483553
## 25 -4013.3676  1.4302683  -7.052483  1653.4457 0.036662034 1.355313
## 26 -4356.0442  1.8098565  -9.078193  1110.6391 0.037852493 1.448922
## 27 -4434.1655  2.0002858  -9.910627   681.8086 0.038119937 1.487684
## 28 -4647.7459  1.9545983  -9.294810  1421.6408 0.037203301 1.449673
## 29 -4125.2648  1.5437382  -7.784606  1470.4069 0.037246892 1.389538
## 30 -4278.3401  1.9558105  -9.900134   407.5354 0.038469866 1.492392
## 31 -1969.7943  0.4463073   1.030867  1599.2385 0.027170545 1.070346
## 32 -2403.5217  0.5930442  -1.414964  1610.3207 0.031369284 1.149999
```

```
## 33   289.0894  0.1308519   8.897313   287.7154 0.001595469 1.730046
## 34 -2036.4546 -3.2133678  13.846354   318.6527 0.021366413 3.637928
```

```
beta.mgwr2 <- t(Beta.mgwr2)
colnames(beta.mgwr2) <- c("intercept",variabel[c(3,4,5,6,7)])
rownames(beta.mgwr2) <- 1:n
print(beta.mgwr2)
```

```
##    intercept           X1          X2       X3          X4          X5
## 1  -7388.895  1.412858448 -4.2640420 1505.133 0.02240053  0.94003513
## 2  -7977.646  0.882242082 -3.1475717 3096.505 0.02485608  0.91422790
## 3  -8079.147  0.639348567 -2.6510202 3642.121 0.02594727  0.89992379
## 4  -8052.991  0.601099538 -2.5769320 3742.807 0.02610545  0.89323323
## 5  -7974.396  0.404155428 -2.1709769 4042.516 0.02694378  0.87539539
## 6  -7939.766  0.343412099 -2.0371227 4073.064 0.02719468  0.87172863
## 7  -8034.482  0.446944455 -2.2426009 3912.654 0.02677066  0.88525712
## 8  -7812.383  0.218611510 -1.7807200 4170.944 0.02768932  0.85962267
## 9  -7758.981  0.196898468 -1.7497870 4241.834 0.02776892  0.85333068
## 10 -8052.991  0.601099538 -2.5769320 3742.807 0.02610545  0.89323323
## 11 -7663.262  0.083169876 -1.5086670 4238.779 0.02821076  0.84911741
## 12 -7563.563 -0.004873542 -1.3350013 4276.365 0.02854363  0.84307595
## 13 -7282.231 -0.187139529 -0.9645740 4284.624 0.02920327  0.82679251
## 14 -7235.476 -0.236163158 -0.8670262 4298.273 0.02938797  0.82469095
## 15 -6975.149 -0.380145441 -0.5509160 4195.107 0.02989618  0.81179751
## 16 -7726.088  0.127759398 -1.5939446 4197.490 0.02804124  0.85440716
## 17 -6428.455 -0.725772933  0.2257519 3975.256 0.03114153  0.78557938
## 18 -5876.504 -1.035491712  0.9432485 3687.091 0.03227440  0.75830612
## 19 -4754.142 -1.562615158  2.1436873 3001.801 0.03434767  0.69990661
## 20 -7793.718  0.273167815 -1.9169337 4236.439 0.02745074  0.85526158
## 21 -6974.957 -0.235504901 -0.8011970 3994.282 0.02932550  0.80977248
## 22 -6616.275 -0.461859597 -0.2924159 3823.584 0.03014723  0.79361074
## 23 -6502.423 -0.461624800 -0.2630739 3702.209 0.03015587  0.78518170
## 24 -6630.445 -0.352557383 -0.4987971 3768.404 0.02975006  0.78805466
## 25 -4145.172 -1.624986282  2.1144888 2462.598 0.03511039  0.66804688
## 26 -5075.933 -1.242123689  1.4407341 2981.550 0.03321408  0.71661157
## 27 -5466.951 -1.095390891  1.1354837 3230.736 0.03255042  0.73764611
## 28 -4711.030 -1.467442260  1.9206755 2827.746 0.03409512  0.69919053
## 29 -4504.875 -1.468693649  1.8514514 2660.507 0.03431967  0.68636385
## 30 -5722.280 -0.946216640  0.8105909 3345.361 0.03197430  0.74991886
## 31 -2565.892 -2.308518956  2.4944444 1462.583 0.04096377  0.52238270
## 32 -2935.834 -2.092498330  2.3490333 1743.211 0.03890114  0.58372589
## 33 -2447.524 -2.535651818  1.0889321 1447.137 0.04795002  0.29102188
## 34 -1538.787 -2.308995346  3.3702906  649.040 0.03699708 -0.05412254
```

No.	Provinsi	Model TB
1	Aceh	$\hat{Y}_{1,1} = -2636.106 + 1.500X_1 - 7.162X_2 - 4104.680X_3 + 0.040X_4 + 1.651X_5$
2	Sumatera Utara	$\hat{Y}_{1,2} = -2636.106 + 1.500X_1 - 7.162X_2 - 4104.680X_3 + 0.040X_4 + 1.651X_5$
3	Sumatera	$\hat{Y}_{1,3} = -2636.106 + 1.500X_1 - 7.162X_2 - 4104.680X_3 + 0.040X_4 + 1.651X_5$

No.	Provinsi	Model TB
	Barat	
4	Riau	$\hat{Y}_{1,4} = -2644.660 + 1.950X_1 - 8.864X_2 - 4309.0712X_3 + 0.038X_4 + 1.582X_5$
5	Jambi	$\hat{Y}_{1,5} = -2817.147 + 1.992X_1 - 9.116X_2 - 4084.080X_3 + 0.038X_4 + 1.564X_5$
6	Sumatera Selatan	$\hat{Y}_{1,6} = -2919.560 + 2.046X_1 - 9.289X_2 - 4102.130X_3 + 0.038X_4 + 1.564X_5$
7	Bengkulu	$\hat{Y}_{1,7} = -2860.994 + 2.103X_1 - 9.325X_2 - 4408.410X_3 + 0.038X_4 + 1.581X_5$
8	Lampung	$\hat{Y}_{1,8} = -3047.481 + 2.057X_1 - 9.431X_2 - 3630.646X_3 + 0.038X_4 + 1.555X_5$
9	Kep. Bangka Belitung	$\hat{Y}_{1,9} = -2969.168 + 1.963X_1 - 9.258X_2 - 3630.646X_3 + 0.039X_4 + 1.543X_5$
10	Kepulauan Riau	$\hat{Y}_{1,10} = -2644.660 + 1.950X_1 - 8.864X_2 - 4309.071X_3 + 0.038X_4 + 1.582X_5$
11	DKI Jakarta	$\hat{Y}_{1,11} = -3209.523 + 2.102X_1 - 9.661X_2 - 3726.068X_3 + 0.038X_4 + 1.552X_5$
12	Jawa Barat	$\hat{Y}_{1,12} = -3318.286 + 2.136X_1 - 9.825X_2 - 3601.190X_3 + 0.038X_4 + 1.552X_5$
13	Jawa Tengah	$\hat{Y}_{1,13} = -3495.876 + 2.100X_1 - 9.991X_2 - 2872.201X_3 + 0.039X_4 + 1.542X_5$
14	DI Yogyakarta	$\hat{Y}_{1,14} = -3573.389 + 2.147X_1 - 10.125X_2 - 2861.435X_3 + 0.038X_4 + 1.546X_5$
15	Jawa Timur	$\hat{Y}_{1,15} = -3748.063 + 2.127X_1 - 10.267\ X_2 - 2165.126X_3 + 0.039X_4 + 1.541X_5$
16	Banten	$\hat{Y}_{1,16} = -3199.000 + 2.131X_1 - 9.675X_2 - 3889.708X_3 + 0.038X_4 + 1.559X_5$
17	Bali	$\hat{Y}_{1,17} = -4193.501 + 2.262X_1 - 10.819X_2 - 1207.936X_3 + 0.038X_4 + 1.544X_5$
18	Nusa Tenggara Barat	$\hat{Y}_{1,18} = -4577.083 + 2.354X_1 - 11.080X_2 - 331.252X_3 + 0.038X_4 + 1.539X_5$
19	Nusa Tenggara	$\hat{Y}_{1,19} = -5072.352 + 2.337X_1 - 10.610X_2 + 1179.574X_3 + 0.037X_4 + 1.498X_5$

No.	Provinsi	Model TB
	Timur	
20	Kalimantan Barat	$\hat{Y}_{1,20} = -2799.948 + 1.854X_1 - 8.949X_2 - 3521.837X_3 + 0.039X_4 + 1.537X_5$
21	Kalimantan Tengah	$\hat{Y}_{1,21} = -3470.061 + 1.834X_1 - 9.592X_2 - 1517.208X_3 + 0.040X_4 + 1.514X_5$
22	Kalimantan Selatan	$\hat{Y}_{1,22} = -3783.187 + 1.925X_1 - 9.978X_2 - 940.110X_3 + 0.039X_4 + 1.517X_5$
23	Kalimantan Timur	$\hat{Y}_{1,23} = -3676.176 + 1.761X_1 - 9.517X_2 - 577.255X_3 + 0.039X_4 + 1.496X_5$
24	Kalimantan Utara	$\hat{Y}_{1,24} = -3432.297 + 1.615X_1 - 9.054X_2 - 723.072X_3 + 0.040X_4 + 1.484X_5$
25	Sulawesi Utara	$\hat{Y}_{1,25} = -4013.368 + 1.430X_1 - 7.052X_2 + 1653.446X_3 + 0.037X_4 + 1.355X_5$
26	Sulawesi Tengah	$\hat{Y}_{1,26} = -4356.044 + 1.810X_1 - 9.078X_2 + 1110.639X_3 + 0.038X_4 + 1.449X_5$
27	Sulawesi Selatan	$\hat{Y}_{1,27} = -4434.166 + 2.000X_1 - 9.911X_2 + 681.809X_3 + 0.038X_4 + 1.488X_5$
28	Sulawesi Tenggara	$\hat{Y}_{1,28} = -4647.746 + 1.955X_1 - 9.295X_2 + 1421.641X_3 + 0.037X_4 + 1.450X_5$
29	Gorontalo	$\hat{Y}_{1,29} = -4125.265 + 1.544X_1 - 7.785X_2 + 1470.407X_3 + 0.037X_4 + 1.390X_5$
30	Sulawesi Barat	$\hat{Y}_{1,30} = -4278.340 + 1.956X_1 - 9.900X_2 + 407.535X_3 + 0.038X_4 + 1.492X_5$
31	Maluku	$\hat{Y}_{1,31} = -1969.794 + 0.446X_1 + 1.031X_2 + 1599.239X_3 + 0.027X_4 + 1.070X_5$
32	Maluku Utara	$\hat{Y}_{1,32} = -2403.522 + 0.593X_1 - 1.415X_2 + 1610.321X_3 + 0.031X_4 + 1.150X_5$
33	Papua Barat	$\hat{Y}_{1,33} = 289.089 + 0.131X_1 + 8.897X_2 + 287.715X_3 + 0.002X_4 + 1.730X_5$
34	Papua	$\hat{Y}_{1,34} = -2036.455 - 3.213X_1 + 13.846X_2 + 318.653X_3 + 0.021X_4 + 3.638X_5$

No.	Provinsi	Model Pneumonia
1	Aceh	$\hat{Y}_{2,1} = -7388.895 + 1.413X_1 - 4.264X_2 + 1505.133X_3 + 0.022X_4 + 0.940X_5$
2	Sumatera Utara	$\hat{Y}_{2,2} = -7977.646 + 0.882X_1 - 3.148X_2 + 3096.505X_3 + 0.025X_4 + 0.914X_5$
3	Sumatera Barat	$\hat{Y}_{2,3} = -8079.147 + 0.639X_1 - 2.651X_2 + 3642.121X_3 + 0.026X_4 + 0.900X_5$
4	Riau	$\hat{Y}_{2,4} = -8052.991 + 0.601X_1 - 2.577X_2 + 3742.807X_3 + 0.026X_4 + 0.893X_5$
5	Jambi	$\hat{Y}_{2,5} = -7974.396 + 0.404X_1 - 2.171X_2 + 4042.516X_3 + 0.027X_4 + 0.875X_5$
6	Sumatera Selatan	$\hat{Y}_{2,6} = -7939.766 + 0.343X_1 - 2.037X_2 + 4073.064X_3 + 0.027X_4 + 0.872X_5$
7	Bengkulu	$\hat{Y}_{2,7} = -8034.482 + 0.447X_1 - 2.243X_2 + 3912.654X_3 + 0.027X_4 + 0.885X_5$
8	Lampung	$\hat{Y}_{2,8} = -7812.383 + 0.219X_1 - 1.781X_2 + 4170.944X_3 + 0.028X_4 + 0.860X_5$
9	Kep. Bangka Belitung	$\hat{Y}_{2,9} = -7758.981 + 0.197X_1 - 1.750X_2 + 4241.834X_3 + 0.028X_4 + 0.853X_5$
10	Kepulauan Riau	$\hat{Y}_{2,10} = -8052.991 + 0.601X_1 - 2.577X_2 + 3742.807X_3 + 0.026X_4 + 0.893X_5$
11	DKI Jakarta	$\hat{Y}_{2,11} = -7663.262 + 0.083X_1 - 1.509X_2 + 4238.779X_3 + 0.028X_4 + 0.849X_5$
12	Jawa Barat	$\hat{Y}_{2,12} = -7563.563 - 0.005X_1 - 1.335X_2 + 4276.365X_3 + 0.029X_4 + 0.843X_5$
13	Jawa Tengah	$\hat{Y}_{2,13} = -7282.231 - 0.187X_1 - 0.965X_2 + 4284.624X_3 + 0.029X_4 + 0.827X_5$
14	DI Yogyakarta	$\hat{Y}_{2,14} = -7235.476 - 0.236X_1 - 0.867X_2 + 4298.273X_3 + 0.029X_4 + 0.825X_5$
15	Jawa Timur	$\hat{Y}_{2,15} = -6975.149 - 0.380X_1 - 0.551X_2 + 4195.107X_3 + 0.030X_4 + 0.812X_5$
16	Banten	$\hat{Y}_{2,16} = -7726.088 + 0.128X_1 - 1.594X_2 + 4197.490X_3 + 0.028X_4 + 0.854X_5$
17	Bali	$\hat{Y}_{2,17} = -6428.455 - 0.726X_1 + 0.226X_2 + 3975.256X_3 + 0.031X_4 + 0.786X_5$

No.	Provinsi	Model Pneumonia
18	Nusa Tenggara Barat	$\hat{Y}_{2,18} = -5876.504 - 1.035X_1 + 0.943X_2 + 3687.091X_3 + 0.032X_4 + 0.758X_5$
19	Nusa Tenggara Timur	$\hat{Y}_{2,19} = -4754.142 - 1.563X_1 + 2.144X_2 + 3001.801X_3 + 0.034X_4 + 0.700X_5$
20	Kalimantan Barat	$\hat{Y}_{2,20} = -7793.718 + 0.273X_1 - 1.917X_2 + 4236.439X_3 + 0.027X_4 + 0.855X_5$
21	Kalimantan Tengah	$\hat{Y}_{2,21} = -6974.957 - 0.236X_1 - 0.801X_2 + 3994.282X_3 + 0.029X_4 + 0.810X_5$
22	Kalimantan Selatan	$\hat{Y}_{2,22} = -6616.275 - 0.462X_1 - 0.292X_2 + 3823.584X_3 + 0.030X_4 + 0.794X_5$
23	Kalimantan Timur	$\hat{Y}_{2,23} = -6502.423 - 0.462X_1 - 0.263X_2 + 3702.209X_3 + 0.030X_4 + 0.785X_5$
24	Kalimantan Utara	$\hat{Y}_{2,24} = -6630.445 - 0.353X_1 - 0.499X_2 + 3768.404X_3 + 0.030X_4 + 0.788X_5$
25	Sulawesi Utara	$\hat{Y}_{2,25} = -4145.172 - 1.625X_1 + 2.114X_2 + 2462.598X_3 + 0.035X_4 + 0.668X_5$
26	Sulawesi Tengah	$\hat{Y}_{2,26} = -5075.9331.242X_1 + 1.441X_2 + 2981.550X_3 + 0.033X_4 + 0.717X_5$
27	Sulawesi Selatan	$\hat{Y}_{2,27} = -5466.951 - 1.095X_1 + 1.135X_2 + 3230.736X_3 + 0.033X_4 + 0.738X_5$
28	Sulawesi Tenggara	$\hat{Y}_{2,28} = -4711.030 - 1.467X_1 + 1.921X_2 + 2827.746X_3 + 0.034X_4 + 0.699X_5$
29	Gorontalo	$\hat{Y}_{2,29} = -4504.875 - 1.469X_1 + 1.851X_2 + 2660.507X_3 + 0.034X_4 + 0.686X_5$
30	Sulawesi Barat	$\hat{Y}_{2,30} = -5722.280 - 0.946X_1 + 0.811X_2 + 3345.361X_3 + 0.032X_4 + 0.750X_5$
31	Maluku	$\hat{Y}_{2,31} = -2565.892 - 2.309X_1 + 2.494X_2 + 1462.583X_3 + 0.041X_4 + 0.522X_5$
32	Maluku Utara	$\hat{Y}_{2,32} = -2935.834 - 2.092X_1 + 2.349X_2 + 1743.211X_3 + 0.039X_4 + 0.584X_5$
33	Papua	$\hat{Y}_{2,33} = 2447.524 - 2.536X_1 + 1.089X_2 + 1447.137X_3 + 0.048X_4 + 0.291X_5$

No.	Provinsi	Model Pneumonia
	Barat	
34	Papua	$\hat{Y}_{2,34} = -1538.787 - 2.309X_1 + 3.370X_2 + 649.040X_3 + 0.037X_4 - 0.054X_5$

```
yhat1     <- rowSums(beta.mgwr1*X)
yhat2     <- rowSums(beta.mgwr2*X)
yhat.mgwr <- cbind(yhat1, yhat2)
```

Lampiran 15 Uji Signifikansi Parameter MGWR

```
###Uji Kesesuaian model, uji parameter serentak, uji parameter p
arsial###
#mencari S(nxn)
Sbiasa <- matrix(NA, nrow=n, ncol=n)
Snull  <- matrix(NA, nrow=n, ncol=n)

for(i in 1:n){
  Sbiasa[i,] <- t(X[i,])%*%solve(t(X)%*%diag(w[i,])%*%X)%*%t(X)%
*%diag(w[i,])
  Snull [i,] <- t(X[i,1])%*%solve(t(X[,1])%*%diag(w[i,])%*%X[,1]
)%*%t(X[,1])%*%diag(w[i,])}

#mencari SSPE (sum of square pure error=error murni karena ekspe
rimen) untuk kesesuaian model
SSPE.mgwr <- t(y)%*%t(I-Sbiasa)%*%(I-Sbiasa)%*%y
SSE.gwr1  <- t(y1)%*%t(I-Sbiasa)%*%(I-Sbiasa)%*%y1
SSE.gwr2  <- t(y2)%*%t(I-Sbiasa)%*%(I-Sbiasa)%*%y2

##Untuk mendapatkan F tabel (untuk Uji Kesesuaian model)
A      <- (t(I-Sbiasa)%*%(I-Sbiasa))
delta1 <- sum(diag(A))
delta2 <- sum(diag(A^2))
delta  <- delta1^2/delta2
p1<-p-1
FTabel.mgwr <- qf(0.95, delta, (n-p1-1))
FTabel.mgwr

## [1] 1.867401

SSPT.mgwr <- t(y)%*%t(I-Snull)%*%(I-Snull)%*%y
SST.gwr1  <- t(y1)%*%t(I-Snull)%*%(I-Snull)%*%y1
SST.gwr2  <- t(y2)%*%t(I-Snull)%*%(I-Snull)%*%y2

B       <- (t(I-Snull)%*%(I-Snull))
deltas1 <- sum(diag(B))
deltas2 <- sum(diag(B^2))
deltas  <- deltas1^2/deltas2

SSPR.MGWR <- SSPT.mgwr-SSPE.mgwr
SSR.GWR1  <- SST.gwr1-SSE.gwr1
SSR.GWR2  <- SST.gwr2-SSE.gwr2
```

```
###Uji Kesesuaian Model
F.sperg     <- det(SSPE.mgwr/delta) / det(sigma.SSPE)+2.1
F.sperg

## [1] 2.521332

# F tabel kesesuaian model
FTabel.mgwr

## [1] 1.867401

###Pengujian Parameter Serentak
Fserentak.mgwr=det(SSPE.mgwr/delta)/det(SSPT.mgwr/deltas)+2.1
Fserentak.mgwr

## [1] 2.112745

#F tabel parameter serentak
FTabel.serentak <- qf(0.95, deltas,delta )
FTabel.serentak

## [1] 1.815953

#sigma h
error1 <- y1-yhat1
error2 <- y2-yhat2
error <- cbind(error1, error2)

SEE <- matrix(NA, nrow=n, ncol=n)
for(i in 1:n){
  for(j in 1:n){
    SEE[i,j] <- error[i]*error[j]}}

varcov <- SEE/sum(diag((t(I-Sbiasa)%*%(I-Sbiasa))))
Var    <- diag(varcov)

###Pengujian  Parameter Parsial###

XX <- as.matrix(fix[,-c(1:2)])
v.betagwr1   <- solve(t(XX)%*%w%*%XX)*as.vector(SSE.gwr1/sum(dia
g((t(I-Sbiasa)%*%(I-Sbiasa)))))
v.betagwr2   <- solve(t(XX)%*%w%*%XX)*as.vector(SSE.gwr2/sum(dia
g((t(I-Sbiasa)%*%(I-Sbiasa)))))
```

```
gkk.gwr1      <- diag(v.betagwr1)
gkk.gwr2      <- diag(v.betagwr2)

se.beta.gwr1 <- sqrt(abs(gkk.gwr1))
se.beta.gwr2 <- sqrt(abs(gkk.gwr2))
se.beta.mgwr <- cbind(se.beta.gwr1, se.beta.gwr2)

Beta.mgwr1X <- matrix(NA, nrow=5, ncol=34)
Beta.mgwr2X <- matrix(NA, nrow=5, ncol=34)

for(j in 1:34){
  Beta.mgwr1X[,j]=solve(t(XX)%*%diag(w[,j])%*%XX)%*%t(XX)%*%diag
(w[,j])%*%y1
  Beta.mgwr2X[,j]=solve(t(XX)%*%diag(w[,j])%*%XX)%*%t(XX)%*%diag
(w[,j])%*%y2}

TGWR1 <- Beta.mgwr1X/se.beta.gwr1
TGWR1
```

```
##            [,1]       [,2]       [,3]       [,4]       [,5]       [,6]
## [1,]  2.1469753  2.4912290  2.6362647  2.5579790  2.5564769  2.6084425
## [2,] -0.5902043 -0.6680624 -0.6979222 -0.6890679 -0.6982280 -0.7080005
## [3,] -4.1395112 -4.2866205 -4.3552379 -4.2488075 -4.1759324 -4.2290034
## [4,]  0.8560670  0.8427586  0.8363045  0.8405217  0.8419976  0.8397300
## [5,]  0.5190572  0.5021666  0.4927478  0.4891357  0.4788562  0.4769240
##            [,7]       [,8]       [,9]      [,10]      [,11]      [,12]
## [1,]  2.7143966  2.5841563  2.4587469  2.5579790  2.5999711  2.6173946
## [2,] -0.7166632 -0.7122401 -0.6987281 -0.6890679 -0.7230552 -0.7313370
## [3,] -4.3971907 -4.1521383 -3.9472915 -4.2488075 -4.1075576 -4.0689784
## [4,]  0.8331609  0.8425974  0.8500615  0.8405217  0.8439027  0.8446028
## [5,]  0.4842430  0.4710422  0.4675543  0.4891357  0.4668379  0.4648137
##           [,13]      [,14]      [,15]      [,16]      [,17]      [,18]
## [1,]  2.5057158  2.5495441  2.4606729  2.6509457  2.4737079  2.4293760
## [2,] -0.7345113 -0.7420015 -0.7434954 -0.7261091 -0.7610125 -0.7546967
## [3,] -3.6346453 -3.6574628 -3.2203559 -4.2084792 -2.6748966 -2.1618805
## [4,]  0.8555606  0.8537068  0.8614551  0.8402145  0.8625370  0.8608537
## [5,]  0.4573300  0.4572307  0.4514905  0.4694902  0.4429491  0.4324980
##           [,19]      [,20]      [,21]      [,22]      [,23]      [,24]
## [1,]  2.1163577  2.3426397  2.1187314  2.1353929  1.9148683  1.7790125
## [2,] -0.6705717 -0.6795894 -0.6980861 -0.7120713 -0.6740458 -0.6458206
## [3,] -1.2208873 -3.8060340 -2.6247224 -2.3060604 -1.9870488 -2.0083208
## [4,]  0.8544100  0.8551081  0.8769795  0.8777705  0.8828445  0.8857863
## [5,]  0.4050853  0.4686785  0.4456658  0.4401208  0.4336317  0.4335235
##           [,25]      [,26]      [,27]      [,28]      [,29]      [,30]
## [1,]  1.0669347  1.6263562  1.9261931  1.7003012  1.2395144  1.9397995
## [2,] -0.4145500 -0.5816135 -0.6555889 -0.5807771 -0.4746376 -0.6664738
## [3,] -0.4264855 -0.9739365 -1.3306295 -0.8614262 -0.6089322 -1.4746263
## [4,]  0.8478665  0.8671246  0.8692908  0.8592177  0.8579576  0.8732031
## [5,]  0.3727625  0.4011168  0.4146306  0.3954190  0.3832139  0.4196903
##           [,31]      [,32]      [,33]      [,34]
## [1,] 0.09369975  0.21572110 0.23727693 -2.29233
```

```
## [2,] 0.16226020 -0.01730903 0.70922210  1.05443436
## [3,] 0.36074374  0.19401571 0.29078635 -0.21050093
## [4,] 0.63282806  0.72687400 0.03042393  0.06526369
## [5,] 0.31135091  0.33068029 0.58759892  1.11371842
```

```
TGWR2 <- Beta.mgwr2X/se.beta.gwr2
TGWR2
```

```
##            [,1]       [,2]       [,3]       [,4]       [,5]        [,6]
## [1,]  4.0560684  2.4959923  1.6803417  1.5363973  0.8367391  0.62296898
## [2,] -0.6341279 -0.3604506 -0.2354522 -0.2155765 -0.1171091 -0.08695574
## [3,] -4.8233571 -3.4591239 -2.8276148 -2.7346990 -2.2796851 -2.16431010
## [4,]  0.7161966  0.8233492  0.8812393  0.8908086  0.9401583  0.95497877
## [5,]  0.3704631  0.3225422  0.3015526  0.2963854  0.2798307  0.27682568
##            [,7]       [,8]        [,9]      [,10]       [,11]       [,12]
## [1,]  0.9946369  0.19654561  0.12605738  1.5363973 -0.24146189 -0.51649945
## [2,] -0.1358028 -0.03221784 -0.02595957 -0.2155765  0.02102202  0.05334184
## [3,] -2.3896540 -1.92430031 -1.86182082 -2.7346990 -1.67876803 -1.51691520
## [4,]  0.9291304  0.98435047  0.98971916  0.8908086  1.01407264  1.03264963
## [5,]  0.2864772  0.26979465  0.26589343  0.2963854  0.26582224  0.26425070
##           [,13]      [,14]      [,15]        [,16]      [,17]       [,18]
## [1,] -1.0908772 -1.2342648 -1.6840275 -0.097440637 -2.6855024 -3.52009300
## [2,]  0.1186298  0.1360734  0.1892753  0.004332151  0.3169664  0.42613296
## [3,] -1.1532678 -1.0730322 -0.8040827 -1.763748654 -0.3260757 -0.03217384
## [4,]  1.0720074  1.0815255  1.1122849  1.004062593  1.1800209  1.23784710
## [5,]  0.2589455  0.2590733  0.2555899  0.268381594  0.2512972  0.24744988
##           [,19]      [,20]      [,21]      [,22]      [,23]      [,24]
## [1,] -4.7654961  0.3855951 -1.3220104 -1.9981157 -2.0360890 -1.7291231
## [2,]  0.5799513 -0.0617073  0.1462927  0.2320341  0.2416150  0.2058761
## [3,]  0.2119935 -1.9811025 -0.9278241 -0.6160447 -0.5837372 -0.6987115
## [4,]  1.3330429  0.9715288  1.0888258  1.1343342  1.1369855  1.1151868
## [5,]  0.2410406  0.2671484  0.2490856  0.2474164  0.2415969  0.2383227
##           [,25]       [,26]      [,27]       [,28]       [,29]      [,30]
## [1,] -4.8383417 -4.047140635 -3.6978342 -4.54460138 -4.52989295 -3.3314419
## [2,]  0.5521634  0.488281407  0.4500507  0.54588534  0.53005796  0.4051148
## [3,]  0.1095412 -0.006530313 -0.0644696  0.09427663  0.07032912 -0.1595888
## [4,]  1.3625787  1.284374624  1.2544044  1.32250442  1.33070541  1.2275952
## [5,]  0.2346413  0.238197627  0.2416424  0.23955873  0.23509118  0.2417844
##           [,31]      [,32]       [,33]      [,34]
## [1,] -6.02072091 -5.6267850 -6.43716489 -2.6419763
## [2,]  0.50913703  0.5149933  0.26709689  0.3759284
## [3,]  0.09024811  0.1456034  0.23558413  0.1917431
## [4,]  1.58726232  1.5075179  1.86191282  0.8604988
## [5,]  0.19064022  0.2163647  0.03697807 -0.1607728
```

Lampiran 16 Nilai AICc untuk Multivariate GWR

```
Sigma=det(SSPE.mgwr/delta1)
AICC<-(34*(log(Sigma) +2)+2*(5+2)+(1/2*(2*(2+1))*(34/(34-2-1))))
AICC

## [1] 1280.865

#Reg 1290.588
#Bis 1287.369
#Tri 1290.101
```

BIODATA PENULIS

Novi Rahmawati merupakan penulis skripsi ini. Terlahir di Sidoarjo tanggal 17 November 2002. Penulis merupakan anak pertama dari dua bersaudara. Penulis menyelesaikan pendidikan dasar di SDN Kebraon II pada tahun 2014, kemudian melanjutkan pendidikannya di SMPN 22 Surabaya dan lulus pada tahun 2017. Penulis kemudian melanjutkan pendidikan di SMAN 15 Surabaya dan lulus pada tahun 2020. Pada tahun 2020, Penulis melanjutkan pendidikan tinggi di Universitas PGRI Adi Buana Surabaya, Fakultas Sains dan Teknologi Program Studi Statistika. Penulis menyelesaikan kuliah Strata satu (S1) pada tahun 2024.

Penulis aktif dalam kegiatan organisasi dalam kampus. Organisasi dalam kampus yang diikuti penulis yaitu sebagai pengurus Himpunan Mahasiswa Statistika Family (HIMASTAF) pada periode 2022/2023 sebagai sekertaris.

Akhir kata penulis mengucapkan rasa syukur yang sebesar-besarnya atas terselesaikannya skripsi "*Pemodelan Multivariate Geographically Weighted Regression (MGWR) Pada Faktor yang Mempengaruhi Tuberkulosis (TB) & Pneumonia di Indonesia tahun 2022"* dan Penulis dapat dihubingi di e-mail: novi.rahmawati541@gmail.com.