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
BIMBINGAN SKRIPSI

Nama	:	Faldianus Karno
NIM	:	202400005
Judul Skripsi	:	Pemodelan Pada Faktor Penyebaran Demam Berdarah *Deunge* (DBD) di Provinsi Jawa Barat Tahun 2022 Dengan *Geograpchally Weighted Regression* (GWR)
Dosen Pembimbing 1	:	Fenny Fitriani, S.Si,M.Si
Dosen Pembimbing 2	:	Gangga Anuraga, S.Si., M.Si, Ph.D

Materi Pembimbingan Skripsi	Tanda Tangan Dosen Pembimbing
1. Revisi Statistika Deskriptif	[signature]
2. Revisi Peta	[signature]
3. Revisi Interpretasi OLS	[signature]
4. Revisi Penulisan Persamaan OLS	[signature]
5. Revisi Interpretasi Variabel Signifikan	[signature]
6. Revisi Interpretasi model GWR	[signature]
7. Revisi Lampiran Syntax R studio	[signature]
8. Revisi artikel	[signature]

Catatan: *) Coret yang tidak sesuai

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

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FAKULTAS SAINS DAN TEKNOLOGI
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Unipa Surabaya

FORM F.SK08

PERBAIKAN/REVISI SEMINAR DAN UJIAN SKRIPSI

Nama	:	Faldianus Karno
NIM	:	202400005
Judul Skripsi	:	Pemodelan Pada Faktor Penyebaran Demam Berdarah *Deunge* (DBD) di Provinsi Jawa Barat Tahun 2022 Dengan *Geograpchally Weighted Regression* (GWR)
Pembimbing 1	:	Fenny Fitriani, S.Si,M.Si
Pembimbing 2	:	Gangga Anuraga, S.Si., M.Si, Ph.D

Materi Perbaikan/Revisi Proposal	Tanda Tangan Dosen Penguji
1. Perbaikan koefisien korelasi antara variabel independen dan dependen	[signature]
2. Justifikasi variabel signifikan	[signature]
3.	
4.	
5.	
6.	

Surabaya, 4 Juli 2024

Pembimbing 1	**Pembimbing 2**
[signature]	[signature]
Fenny Fitriani, S.Si,M.Si	Gangga Anuraga, S.Si., M.Si, Ph.D
NPP. 1503717/DY	NIP. 198601182015041001

*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 skripsi

LAMPIRAN

Lampiran 1. Data Penelitian

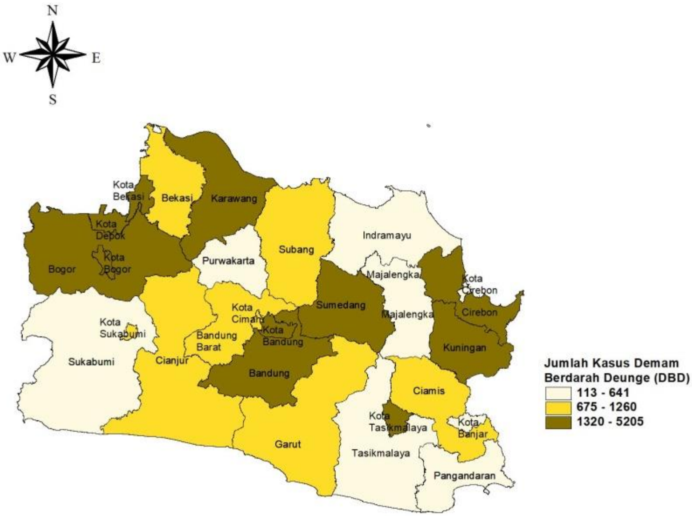
Nama kabupaten kota	**Y**	**X1**	**X2**	**X3**	**X4**	**X5**	**V**	**U**
Kabupaten Bogor	1953	4374	8,34	73,47	7,73	101	-6,6	106,8
Kabupaten Sukabumi	383	2167	7,11	63,32	7,34	58	-6,92405	106,9222
Kabupaten Cianjur	819	1678	7,2	61,76	10,55	47	-6,81725	107,1307
Kabupaten Bandung	4191	2310	9,08	70,85	6,8	62	-6,91474	107,6098
Kabupaten Garut	904	2464	7,83	51,9	10,42	67	-7,22791	107,9087
Kabupaten Tasikmalaya	319	1091	7,73	54,39	10,73	40	-7,32795	108,2141
Kabupaten Ciamis	702	1207	8	75,5	7,72	37	-7,33333	108,35
Kabupaten Kuningan	1474	1418	7,88	69,29	12,76	37	-6,98333	108,4833
Kabupaten Cirebon	1815	3049	7,4	86,76	12,01	60	-6,71553	108,564
Kabupaten Majalengka	641	1242	7,49	81,26	11,94	32	-6,8531	108,2259
Kabupaten Sumedang	2186	944	8,72	80,59	10,14	35	0,609595	110,0331
Kabupaten Indramayu	370	1648	6,83	86,64	12,77	49	-6,33632	108,3251
Kabupaten Subang	995	1324	7,2	80,02	9,75	40	-6,56936	107,7524
Kabupaten Purwakarta	412	1835	8,11	82,46	8,7	20	-6,53868	107,4499
Kabupaten Karawang	1320	3313	7,96	85,1	8,44	50	-6,32273	107,3376
Kabupaten Bekasi	1009	4444	9,53	89,99	5,01	46	-6,23333	107
Kabupaten Bandung Barat	1260	1091	8,22	50,96	10,82	32	-6,89371	107,4322
Kabupaten Pangandaran	502	562	8,03	83	9,32	15	-7,61506	108,4988
Kota Bogor	1531	3029	10,63	67,93	7,1	25	-6,6	106,8
Kota Sukabumi	1028	1221	10,14	45,8	8,02	15	-6,92405	106,9222
Kota Bandung	5205	6645	11	49,85	4,25	80	-6,91474	107,6098
Kota Cirebon	270	1322	10,33	90,62	9,82	22	-6,71553	108,564
Kota Bekasi	2442	5445	11,44	90,8	4,43	48	-6,23333	107
Kota Depok	2234	3372	11,47	96,21	2,53	38	-6,39	106,83
Kota Cimahi	675	1604	11,21	77,18	5,11	13	-6,88024	107,5355
Kota Tasikmalaya	1855	1597	9,53	52,62	12,72	22	-7,32795	108,2141
Kota Banjar	113	494	8,78	88,26	6,73	10	-7,36667	108,5333

Keterangan :

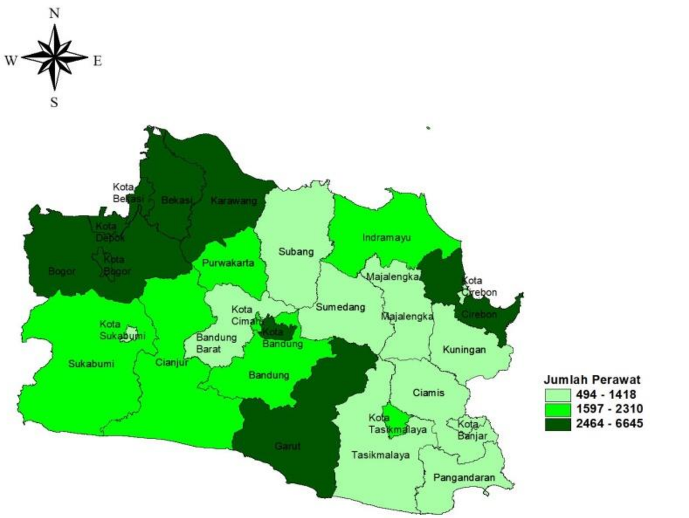
Y	:	Jumlah Kasus DBD
X1	:	Jumlah Perawat
X2	:	Rata-rata Lama Sekolah
X3	:	Persentase Rumah Tangga Yang memiliki Sanitasi layak huni
X4	:	Persentase Penduduk Miskin
X5	:	Jumlah Puskesmas

Lampiran 2. Peta tematik Pada Setiap Variabel

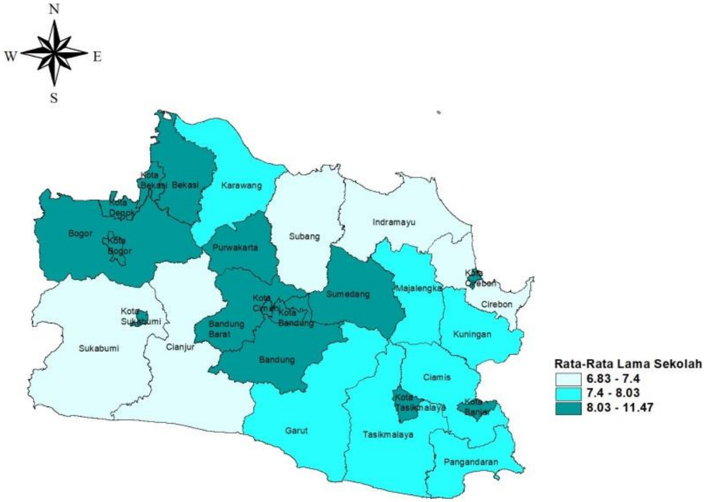
Pembuatan peta tematik menggunakan aplikasi ArcView versi 3.3



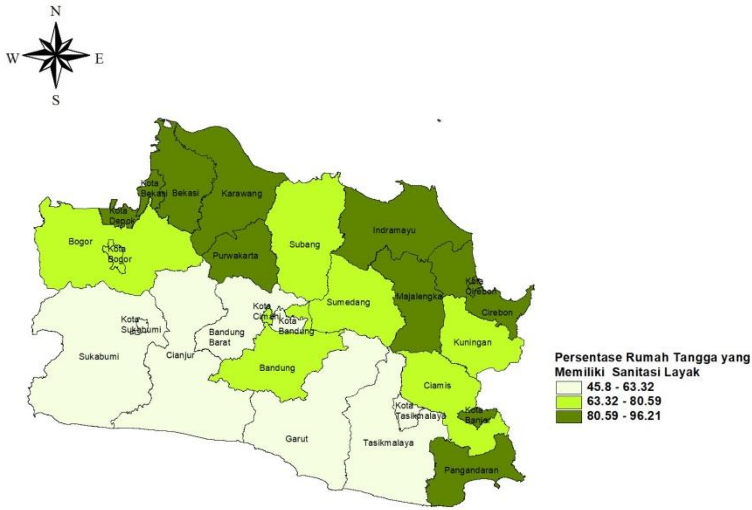
Peta Persebaran Jumlah Kasus Demam Berdarah *Deunge* (DBD)



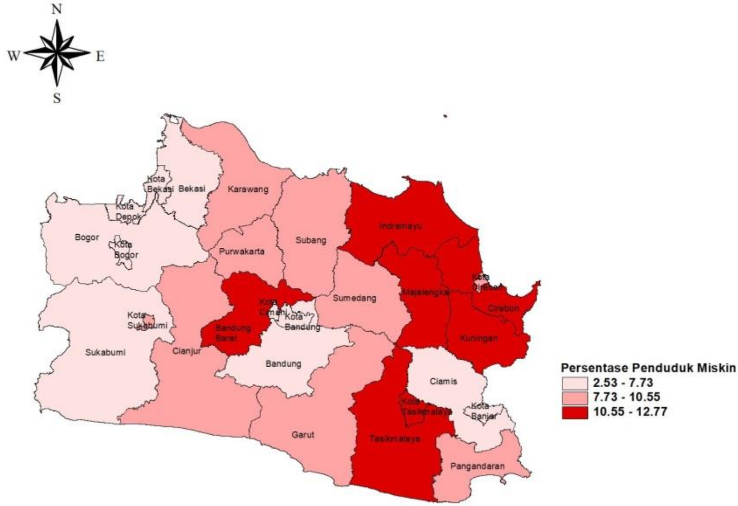
Peta Persebaran Jumlah Perawat (X_1)



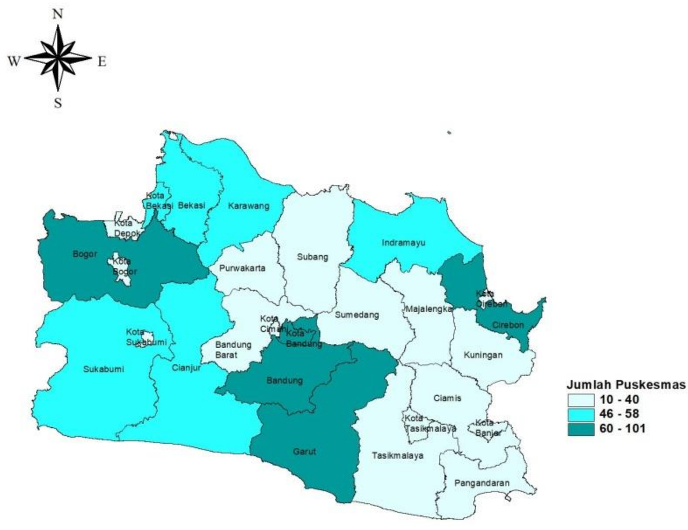
Peta Persebaran Rata-rata Lama Sekolah (X_2)



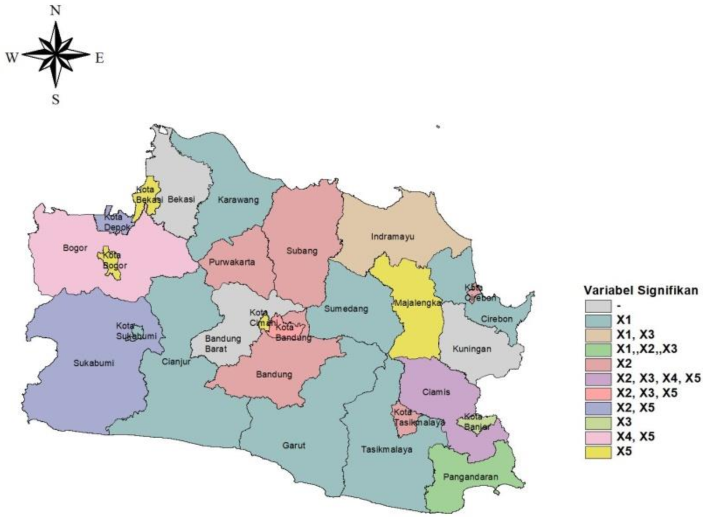
Peta Persebaran Persentase Rumah Tangga yang Memiliki Sanitasi Layak (X_3)



Peta Persebaran Persentase Penduduk Miskin (X_4)



Peta Persebaran Jumlah Perawat (X_5)



Peta Persebaran Variabel Signifikan

Lampiran 3. Bandwith Masing-masing Fungsi Kernel tiap kabupaten/kota

Fungsi Pembobot

Fungsi Pembobot	Bandwidth
Fix Kernel Gaussian	4,752558
Fix Kernel Tricube	7,752624
Fix Kernel Bisquare	4,752558
Addaptive Kernel Gaussian	0,9812593
Addaptive Kernel Tricube	0,9812593
Addaptive Kernel Bisquare	0,4980761

Fungsi Kernel Tiap Kabupaten/kota

Kabupaten/kota	***Addaptive Bisquare***	***Addaptive Tricube***	***Addaptive Gaussian***
Kabupaten Bogor	0,8688257	4,904625	4,904625
Kabupaten Sukabumi	0,730837	4,897464	4,897464
Kabupaten Cianjur	0,5983748	4,740434	4,740434
Kabupaten Bandung	0,7320602	4,477691	4,477691
Kabupaten Garut	0,8279439	4,702583	4,702583
Kabupaten Tasikmalaya	0,8880491	4,868816	4,868816
Kabupaten Ciamis	0,969936	4,916134	4,916134
Kabupaten Kuningan	0,8762109	4,71707	4,71707
Kabupaten Cirebon	0,9747651	4,585172	4,585172
Kabupaten Majalengka	0,6909228	4,53731	4,53731

Kabupaten/kota	***Addaptive Bisquare***	***Addaptive Tricube***	***Addaptive Gaussian***
Kabupaten Sumedang	7,901323	8,257298	8,257298
Kabupaten Indramayu	0,9978321	4,31665	4,31665
Kabupaten Subang	0,8246582	4,371165	4,371165
Kabupaten Purwakarta	0,6534649	4,515219	4,515219
Kabupaten Karawang	0,730837	4,553475	4,553475
Kabupaten Bekasi	0,9144346	4,729095	4,729095
Kabupaten Bandung Barat	0,7850897	4,574557	4,574557
Kabupaten Pangandaran	1,2847713	5,180599	5,180599
Kota Bogor	0,8688257	4,904625	4,904625
Kota Sukabumi	0,730837	4,897464	4,897464
Kota Bandung	0,7320602	4,477691	4,477691
Kota Cirebon	0,9747651	4,585172	4,585172
Kota Bekasi	0,9144346	4,729095	4,729095
Kota Depok	0,9399266	4,850174	4,850174
Kota Cimahi	0,7870795	4,513342	4,513342
Kota Tasikmalaya	0,8880491	4,868816	4,868816

Kabupaten/kota	***Addaptive Bisquare***	***Addaptive Tricube***	***Addaptive Gaussian***
Kota Banjar	11100825	5,002843	5,002843

Lampiran 4. T_hitung Parameter Parsial Model GWR Pada Setiap Kabupaten/kota

Nama kabupaten kota	X1	X2	X3	X4	X5
Kabupaten Bogor	0,589269	2,140184	0,920173	1,007955	1,554733
Kabupaten Sukabumi	0,113427	1,338775	0,557477	0,843848	0,729961
Kabupaten Cianjur	1,357708	1,584954	-0,76231	0,919294	1,013197
Kabupaten Bandung	-0,99874	-1,43589	-1,7036	-2,74592	2,17796
Kabupaten Garut	0,101041	2,966047	2,028936	1,846806	2,627173
Kabupaten Tasikmalaya	2,580241	0,785213	0,16697	0,860725	-0,54962
Kabupaten Ciamis	2,818057	-0,59345	-0,7653	0,510697	-1,48288
Kabupaten Kuningan	1,840607	-0,91555	-1,23308	0,35419	-1,398
Kabupaten Cirebon	1,912379	-0,77031	-1,76621	0,222238	-1,26804
Kabupaten Majalengka	2,602229	-0,68237	-1,50509	0,26244	-1,3075
Kabupaten Sumedang	-0,934	2,763436	-2,59115	-0,28343	2,732839
Kabupaten Indramayu	0,773259	0,107501	-2,01761	-0,43987	0,102619
Kabupaten Subang	-0,99584	0,161723	-1,07382	-1,42139	3,447921
Kabupaten Purwakarta	-1,01828	-0,2012	-1,10008	-0,96008	2,189339
Kabupaten Karawang	-0,51928	1,405744	0,316737	0,667528	1,827141
Kabupaten Bekasi	-0,61432	2,057854	1,08116	1,133167	1,684728
Kabupaten Bandung Barat	-0,41435	3,25946	1,220908	1,506391	4,253611
Kabupaten Pangandaran	2,821096	-0,57216	-0,72445	0,527137	-1,4392
Kota Bogor	-0,58927	2,140184	0,920173	1,007955	1,554733
Kota Sukabumi	-0,11343	1,338775	0,557477	0,843848	0,729961
Kota Bandung	-0,99874	-1,43589	-1,7036	-2,74592	2,17796
Kota Cirebon	1,912379	-1,77031	-1,76621	0,222238	-1,26804
Kota Bekasi	-0,61432	2,057854	1,08116	1,133167	1,684728
Kota Depok	-0,58642	2,194366	1,007856	1,110495	1,604745
Kota Cimahi	-0,46933	2,024239	0,752313	0,202195	3,824755
Kota Tasikmalaya	2,580241	0,785213	0,16697	0,860725	-0,54962
Kota Banjar	2,077598	-0,90359	-0,93801	0,454471	-1,4408

Lampiran 5. Syintaks dan Output R studio

#Packages yang diguanakan

```
library(car)
library(lmtest)
library(spgwr)
library(fBasics)
library(AICcmodavg)
library(foreign)
library(lattice)
library(zoo)
library(lmtest)
library(ape)
library(Matrix)
library(mvtnorm)
library(emulator)
library(MLmetrics)
library(spgwr)
library(GWmodel)
library(sp)
library(skedastic)
```

#Input Data

```
library(readxl)
FGWR <- read_excel("D:/semester 7/proposal Skripsi/T
uhan yesus/DATA SKRIPSI DAN SINTAKS/FGWR.xlsx",
    col_types = c("text", "numeric",
        "numeric", "numeric", "numeric",
        "numeric", "numeric", "numeric", "numeric"))
attach(FGWR)
FGWR
summary(FGWR)

Nama kabupaten kota        Y                 X1              X2
Length:27          Min.   : 113.0   Min.   : 494   Min.   : 6.830
Class :character   1st Qu.: 571.5   1st Qu.:1232   1st Qu.: 7.780
Mode  :character   Median :1009.0   Median :1648   Median : 8.220
                   Mean   :1355.9   Mean   :2255   Mean   : 8.785
                   3rd Qu.:1835.0   3rd Qu.:3039   3rd Qu.: 9.835
                   Max.   :5205.0   Max.   :6645   Max.   :11.470
       X3               X4                X5                V
Min.   :45.80   Min.   : 2.530   Min.   : 10.00   Min.   :-7.6151
1st Qu.:62.54   1st Qu.: 6.950   1st Qu.: 23.50   1st Qu.:-6.9537
Median :77.18   Median : 8.700   Median : 38.00   Median :-6.8531
```

```
Mean   :73.58   Mean   : 8.654   Mean   : 40.78   Mean   :-6.5537
3rd Qu.:85.87   3rd Qu.:10.640   3rd Qu.: 49.50   3rd Qu.:-6.5540
Max.   :96.21   Max.   :12.770   Max.   :101.00   Max.   : 0.6096
      U
Min.   :106.8
1st Qu.:107.1
Median :107.6
Mean   :107.8
3rd Qu.:108.3
Max.   :110.0
```

#Cek Korelasi Variabe INDEPENDEN~DEPENDEN

```
#cek korelasi dependen independen
{r cek korelasi variabel independen}
cor(FGWR[,-c(1,8:9)]
    Y          X1         X2          X3          X4         X5
Y   1.00000  0.661069  0.439750   -0.190236    -0.3751   0.51991
X1  0.66106  1.000000  0.459812    0.052631    -0.57139  0.658599
X2  0.43975  0.459812  1.000000    0.073843    -0.710788 -0.18294
X3 -0.19023  0.052631  0.073843    1.000000    -0.22932  -0.14306
X4 -0.37514  -0.57139 -0.710788   -0.229325    1.00000   -0.10003
X5  0.51991  0.658599  -0.182942  -0.143060    -0.10003  1.0000000
#p-valuecorelasi
cor.test(Y,X1)
Pearson's product-moment correlation

data:  Y and X1
t = 4.4052, df = 25, p-value = 0.0001741
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.3753487 0.8320574
sample estimates:
      cor
0.6610692
cor.test(Y,X2)
Pearson's product-moment correlation

data:  Y and X2
t = 2.4482, df = 25, p-value = 0.02172
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.07172244 0.70238771
sample estimates:
      cor
0.4397508
cor.test(Y,X3)
Pearson's product-moment correlation

data:  Y and X3
t = -0.96887, df = 25, p-value = 0.3419
```

```
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.5318047  0.2045663
sample estimates:
       cor
-0.1902362
cor.test(Y,X4)
Pearson's product-moment correlation

data:  Y and X4
t = -2.0235, df = 25, p-value = 0.05383
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.660936298  0.005677507
sample estimates:
       cor
-0.3751458
cor.test(Y,X5)
Pearson's product-moment correlation

data:  Y and X5
t = 3.0432, df = 25, p-value = 0.005442
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.1743429 0.7514572
sample estimates:
      cor
0.5199113
```

#Regresi OLS

```
regols<-lm(formula=Y~X1+X2+X3+X4+X5,data=FGWR)
summary(regols)

Call:
lm(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR)

 Residuals:
    Min       1Q   Median       3Q      Max
 -1149.8   -514.4   101.4   371.4   2113.4

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
 (Intercept) -4.113e+03  2.981e+03  -1.380   0.1821
 X1           7.825e-02  2.406e-01   0.325   0.7482
 X2           4.881e+02  2.181e+02   2.238   0.0362 *
 X3          -1.011e+01  1.188e+01  -0.851   0.4045
 X4           5.724e+01  9.292e+01   0.616   0.5445
 X5           3.072e+01  1.546e+01   1.987   0.0601 .
 ---
 Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 832.3 on 21 degrees of freedom
Multiple R-squared:  0.5954, Adjusted R-squared:  0.499
F-statistic:  6.18 on 5 and 21 DF,  p-value: 0.001136
```

#**Deteksi multikolinearitas**

```
vif(regols)

      X1       X2       X3       X4       X5
5.026558 3.764369 1.185816 2.584348 4.104894
```

#Pengujian signifikansi parameter OLS

```
anova(regols)

Analysis of Variance Table

Response: Y
          Df   Sum Sq  Mean Sq F value    Pr(>F)
X1         1 15712889 15712889 22.6810 0.0001052 ***
X2         1   840642   840642  1.2134 0.2831182
X3         1  1973289  1973289  2.8484 0.1062643
X4         1   144352   144352  0.2084 0.6527360
X5         1  2735740  2735740  3.9489 0.0601000 .
Residuals 21 14548324   692777
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

#AIC OLS

```
AIC(regols)

[1] 446.9457
```

#Pengujian Asumsi Klasik Regresi Ols Dan Efek Spasial
#Uji Normalitas Residual

```
resid<-abs(regols$residuals)
res=regols$residual
ks.test(res,"pnorm",mean(res),sd(res),alternative=c("two.sided"))


 Exact one-sample Kolmogorov-Smirnov test

data:  res
D = 0.13577, p-value = 0.6528
alternative hypothesis: two-sided
```

#Uji Heterogenitas Spasial (Heterokedastisitas) Untuk Melihat Keragaman Data Spasial

```
bptest(lm(regols$residuals~X1+X2+X3+X4+X5, data=FGWR))
```

```
 studentized Breusch-Pagan test

 data:  lm(regols$residuals ~ X1 + X2 + X3 + X4 + X5, data = FGWR)
 BP = 12.934, df = 5, p-value = 0.02401
```

#Pengujian Independen

```
dwtest(lm(regols$residuals~X1+X2+X3+X4+X5, data =FGWR))
  Durbin-Watson test

 data:  lm(regols$residuals ~ X1 + X2 + X3 + X4 + X5, data = FGWR)
 DW = 2.3166, p-value = 0.7023
 alternative hypothesis: true autocorrelation is greater than 0
```

#Penentuan Fungsi Pembobot Pada Model GWR
#fixed kernel Gaussian

```
fixgauss=gwr.sel(Y~X1+X2+X3+X4+X5,data = FGWR,adapt=FALSE,coords=c
bind(FGWR$U,FGWR$V),gweight=gwr.Gauss)
gwr.fixgauss=gwr(Y~X1+X2+X3+X4+X5,data = FGWR,bandwidth = fixgauss
,coords = cbind(FGWR$U,FGWR$V),hatmatrix = TRUE,gweight = gwr.Gaus
s)
gwr.fixgauss
names(gwr.fixgauss)
BFC02.gwr.test(gwr.fixgauss)
anova(gwr.fixgauss)


 Call:
gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = cb
ind(FGWR$U,  FGWR$V), bandwidth = fixgauss, gweight = gwr.Gauss, h
atmatrix = TRUE)
 Kernel function: gwr.Gauss
 Fixed bandwidth: 4.752558
 Summary of GWR coefficient estimates at data points:
                Min.      1st Qu.       Median      3rd Qu.         Max.
X.Intercept.-5596.80821 -3374.90886 -3336.13480 -3300.12619 -3237.
77253
 X1        -0.10652     0.14679     0.15132     0.15350     0.16175
 X2       419.85808   425.53862   428.89585   432.40131   613.69267
 X3       -12.68752   -12.61367   -12.59718   -12.54712    -6.04824
 X4       43.06465    43.99933    44.71540    45.33472    76.12869
 X5       26.25272    26.66048    26.72676    26.91632    41.05154
                 Global
 X.Intercept. -4113.4068
 X1               0.0783
 X2             488.1392
 X3             -10.1058
 X4              57.2410
 X5              30.7213
Number of data points: 27
```

```
Effective number of parameters (residual: 2traceS - traceS'S): 6.7
42854
Effective degrees of freedom (residual: 2traceS - traceS'S): 20.25
715
Sigma (residual: 2traceS - traceS'S): 821.326
Effective number of parameters (model: traceS): 6.444053
Effective degrees of freedom (model: traceS): 20.55595
Sigma (model: traceS): 815.3348
Sigma (ML): 711.4147
AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 452.9176
AIC (GWR p. 96, eq. 4.22): 437.6985
Residual sum of squares: 13664994
Quasi-global R2: 0.6199443
 [1] "SDF"       "lhat"      "lm"        "results"   "bandwidth" "
adapt"
  [7] "hatmatrix" "gweight"   "gTSS"      "this.call" "fp.given"
"timings"


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA

 data:  gwr.fixgauss
 F = 1.0646, df1 = 21.000, df2 = 20.257, p-value = 0.4452
 alternative hypothesis: greater
 sample estimates:
 SS OLS residuals SS GWR residuals
         14548324         13664994

 Analysis of Variance Table
                        Df   Sum Sq Mean Sq F value
 OLS Residuals    6.00000 14548324
 GWR Improvement  0.74285   883330 1189103
 GWR Residuals   20.25715 13664994  674576  1.7627
```

#untuk Fixed kernel Bisquare

```
fixbisquare=gwr.sel(Y~X1+X2+X3+X4+X5,data=FGWR,adapt

=FALSE,coords=cbind(FGWR$U,FGWR$V),gweight=gwr.bisquare)
gwr.fixbisquare=gwr(Y~X1+X2+X3+X4+X5,data=FGWR,bandwidth=fixbisqua
re,coords=cbind(FGWR$U,FGWR$V),hatmatrix=TRUE,gweight=gwr.bisquare
)
gwr.fixbisquare
names(gwr.fixbisquare)
BFC02.gwr.test(gwr.fixbisquare)
anova(gwr.fixbisquare)

 Call:
gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = cb
ind(FGWR$U,
```

```
     FGWR$V), bandwidth = fixbisquare, gweight = gwr.bisquare,
     hatmatrix = TRUE)
 Kernel function: gwr.bisquare
 Fixed bandwidth: 7.752624
 Summary of GWR coefficient estimates at data points:
                 Min.     1st Qu.      Median     3rd Qu.        Max.
 X.Intercept. -3.0923e+03 -3.0652e+03 -3.0153e+03 -2.9480e+03  9.2
610e+03
X1      -8.2934e-03  1.7568e-01  1.8076e-01  1.8746e-01  1.9098e-01
X2       3.9572e+02  3.9871e+02  4.0433e+02  4.1010e+02  8.9080e+02
X3      -2.2886e+02 -1.3694e+01 -1.3607e+01 -1.3581e+01 -1.3524e+01
X4      3.7691e+01  3.8324e+01  3.9426e+01  4.0190e+01  1.0587e+02
X5       2.4728e+01  2.4891e+01  2.5132e+01  2.5299e+01  7.2414e+01
                  Global
 X.Intercept. -4113.4068
 X1               0.0783
 X2             488.1392
 X3             -10.1058
 X4              57.2410
 X5              30.7213
Number of data points: 27
Effective number of parameters (residual: 2traceS - traceS'S): 7.2
87358
Effective degrees of freedom (residual: 2traceS - traceS'S): 19.71
264
Sigma (residual: 2traceS - traceS'S): 810.0603
Effective number of parameters (model: traceS): 7.143944
Effective degrees of freedom (model: traceS): 19.85606
Sigma (model: traceS): 807.1297
Sigma (ML): 692.1623
AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 454.4018
AIC (GWR p. 96, eq. 4.22): 436.9169
Residual sum of squares: 12935392
Quasi-global R2: 0.6402362
  [1] "SDF"       "lhat"      "lm"         "results"   "bandwidth"
"adapt"
  [7] "hatmatrix" "gweight"   "gTSS"      "this.call" "fp.given"
"timings"


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA

 data:  gwr.fixbisquare
 F = 1.1247, df1 = 21.000, df2 = 19.713, p-value = 0.3987
 alternative hypothesis: greater
 sample estimates:
 SS OLS residuals SS GWR residuals
         14548324         12935392
```

#untuk fixed kernel Tricube

```
fixtricube=gwr.sel(Y~X1+X2+X3+X4+X5,data = FGWR,adapt =
```

```
FALSE,coords = cbind(FGWR$U,FGWR$V))
gwr.fixtricube=gwr(Y~X1+X2+X3+X4+X5,data = FGWR,bandwidth =
fixtricube,coords = cbind(FGWR$U,FGWR$V),hatmatrix = TRUE)
gwr.fixtricube
names(gwr.fixtricube)
BFC02.gwr.test(gwr.fixtricube)
```

```
Call:
 gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = c
bind(FGWR$U,
     FGWR$V), bandwidth = fixtricube, hatmatrix = TRUE)
 Kernel function: gwr.Gauss
 Fixed bandwidth: 4.752558
 Summary of GWR coefficient estimates at data points:
              Min.     1st Qu.      Median     3rd Qu.        Max.
## X.Intercept. -5596.80821 -3374.90886 -3336.13480 -3300.12619 -3
237.77253
X1        -0.10652     0.14679     0.15132     0.15350     0.16175
X2       419.85808   425.53862   428.89585   432.40131   613.69267
X3       -12.68752   -12.61367   -12.59718   -12.54712    -6.04824
X4        43.06465    43.99933    44.71540    45.33472    76.12869
X5        26.25272    26.66048    26.72676    26.91632    41.05154
                  Global
 X.Intercept. -4113.4068
 X1               0.0783
 X2             488.1392
 X3             -10.1058
 X4              57.2410
 X5              30.7213
 Number of data points: 27
 Effective number of parameters (residual: 2traceS - traceS'S): 6.
742854
 Effective degrees of freedom (residual: 2traceS - traceS'S): 20.2
5715
 Sigma (residual: 2traceS - traceS'S): 821.326
 Effective number of parameters (model: traceS): 6.444053
 Effective degrees of freedom (model: traceS): 20.55595
 Sigma (model: traceS): 815.3348
 Sigma (ML): 711.4147
 AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 452.9176
 AIC (GWR p. 96, eq. 4.22): 437.6985
 Residual sum of squares: 13664994
 Quasi-global R2: 0.6199443

  [1] "SDF"       "lhat"      "lm"        "results"   "bandwidth"
"adapt"
  [7] "hatmatrix" "gweight"   "gTSS"      "this.call" "fp.given"
"timings"


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA
```

```
data:  gwr.fixtricube
F = 1.0646, df1 = 21.000, df2 = 20.257, p-value = 0.4452
alternative hypothesis: greater
sample estimates:
SS OLS residuals SS GWR residuals
        14548324         13664994

Analysis of Variance Table
                      Df    Sum Sq Mean Sq F value
OLS Residuals    6.00000 14548324
GWR Improvement  0.74285    883330 1189103
GWR Residuals   20.25715 13664994  674576  1.7627
```

Penentuan Fungsi Pembobot pada Model GWR
#FUNGSI KERNEL ADAPTIVE (adapttive)
Untuk kernel adaptive gaussian

```
adaptgauss=gwr.sel(Y~X1+X2+X3+X4+X5,data=FGWR,adapt

=TRUE,coords=cbind(FGWR$U,FGWR$V),gweight=gwr.Gauss)
gwr.adaptgauss=gwr(Y~X1+X2+X3+X4+X5,data=FGWR,adapt=adaptgauss,

coords=cbind(FGWR$U,FGWR$V),hatmatrix=TRUE,gweight=gwr.Gauss)
gwr.adaptgauss
names(gwr.adaptgauss)
BFC02.gwr.test(gwr.adaptgauss)
anova(gwr.adaptgauss)

Call:
 gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = c
bind(FGWR$U,
     FGWR$V), gweight = gwr.Gauss, adapt = adaptgauss, hatmatrix =
TRUE)
 Kernel function: gwr.Gauss
 Adaptive quantile: 0.9812593 (about 26 of 27 data points)
 Summary of GWR coefficient estimates at data points:
              Min.      1st Qu.       Median      3rd Qu.         Max.
## X.Intercept. -4.4898e+03 -3.3751e+03 -3.3015e+03 -3.2815e+03 -3
.2649e+03
X1       3.0274e-02  1.4796e-01  1.5419e-01  1.5532e-01  1.5695e-01
X2       4.2314e+02  4.2454e+02  4.2557e+02  4.3214e+02  5.2001e+02
X3      -1.2778e+01 -1.2695e+01 -1.2604e+01 -1.2519e+01 -9.1173e+00
X4       4.3232e+01  4.3758e+01  4.4061e+01  4.5451e+01  6.2166e+01
X5       2.6451e+01  2.6542e+01  2.6666e+01  2.6846e+01  3.3445e+01
                 Global
 X.Intercept. -4113.4068
 X1               0.0783
 X2             488.1392
 X3             -10.1058
```

```
 X4              57.2410
 X5              30.7213
 Number of data points: 27
Effective number of parameters (residual: 2traceS - traceS'S): 6.4
49167
Effective degrees of freedom (residual: 2traceS - traceS'S): 20.55
083
Sigma (residual: 2traceS - traceS'S): 828.1787
Effective number of parameters (model: traceS): 6.266165
Effective degrees of freedom (model: traceS): 20.73384
Sigma (model: traceS): 824.5158
Sigma (ML): 722.5317
AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 453.0364
AIC (GWR p. 96, eq. 4.22): 438.358
Residual sum of squares: 14095405
Quasi-global R2: 0.6079735

[1] "SDF"       "lhat"      "lm"        "results"   "bandwidth" "a
dapt"
[7] "hatmatrix" "gweight"   "gTSS"      "this.call" "fp.given"  "t
imings"


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA

 data:  gwr.adaptgauss
 F = 1.0321, df1 = 21.000, df2 = 20.551, p-value = 0.4723
 alternative hypothesis: greater
 sample estimates:
 SS OLS residuals SS GWR residuals
         14548324         14095405

 Analysis of Variance Table
                      Df   Sum Sq Mean Sq F value
 OLS Residuals    6.00000 14548324
 GWR Improvement  0.44917   452919 1008352
 GWR Residuals   20.55083 14095405  685880  1.4702
```

##Untuk Fungsi Kernel Adaptive Bisquare

```
adaptbisquare=gwr.sel(Y~X1+X2+X3+X4+X5,
data=FGWR,adapt=TRUE,coords=cbind(FGWR$U,FGWR$V),gweight=gwr.bisqu
are)
gwr.adaptbisquare=gwr(Y~X1+X2+X3+X4+X5,data=FGWR,adapt=adaptbisqua
re,coords=cbind(FGWR$U,FGWR$V),hatmatrix=TRUE,gweight=gwr.bisquare
)
gwr.adaptbisquare
names(gwr.adaptbisquare)
BFC02.gwr.test(gwr.adaptbisquare)
anova(gwr.adaptbisquare)
```

```
 Call:
 gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = 
cbind(FGWR$U, 
     FGWR$V), gweight = gwr.bisquare, adapt = adaptbisquare, 
hatmatrix = TRUE)
Kernel function: gwr.bisquare 
Adaptive quantile: 0.4980761 (about 13 of 27 data points)
Summary of GWR coefficient estimates at data points:
             Min.     1st Qu.      Median     3rd Qu.        Max.
X.Intercept. -1.5937e+04 -8.1610e+03 -3.1935e+03  4.1019e+03  
8.8792e+03
X1     -4.8295e-01 -2.1948e-01  6.6267e-02  1.0087e+00  1.4633e+00
X2     -3.1047e+02 -1.3851e+02  2.7897e+02  6.6488e+02  1.0980e+03
X3     -1.5286e+02 -2.2942e+01 -9.9099e+00  1.5418e+01  4.6051e+01
X4     -5.7760e+02  2.1808e+01  7.5175e+01  1.7915e+02  2.6764e+02
X5     -5.4721e+01 -2.1717e+01  2.5717e+01  5.7704e+01  9.5187e+01
                  Global
 X.Intercept. -4113.4068
 X1              0.0783
 X2            488.1392
 X3            -10.1058
 X4             57.2410
 X5             30.7213
 Number of data points: 27 
Effective number of parameters (residual: 2traceS - traceS'S): 
21.46769 
Effective degrees of freedom (residual: 2traceS - traceS'S): 
5.532313 
Sigma (residual: 2traceS - traceS'S): 659.5758 
Effective number of parameters (model: traceS): 19.2113 
Effective degrees of freedom (model: traceS): 7.788704 
Sigma (model: traceS): 555.8857 
Sigma (ML): 298.5632 
AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 572.909 
AIC (GWR p. 96, eq. 4.22): 403.579 
Residual sum of squares: 2406779 
Quasi-global R2: 0.9330618 
```

```
[1] "SDF"       "lhat"      "lm"        "results"   "bandwidth" "a
dapt"    
[7] "hatmatrix" "gweight"   "gTSS"      "this.call" "fp.given"  "t
imings"  


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA

 data:  gwr.adaptbisquare
 F = 6.0447, df1 = 21.0000, df2 = 5.5323, p-value = 0.02103
 alternative hypothesis: greater
 sample estimates:
```

```
 SS OLS residuals SS GWR residuals
         14548324          2406779

 Analysis of Variance Table
                      Df   Sum Sq Mean Sq F value
 OLS Residuals    6.0000 14548324
 GWR Improvement 15.4677 12141545  784962
 GWR Residuals    5.5323  2406779  435040  1.8043
```

#FUNGSI KERNEL ADAPTIVE TRICUBE

```
adapttricube=gwr.sel(Y~X1+X2+X3+X4+X5,data=FGWR,adapt=TRUE,coords=
cbind(FGWR$U,FGWR$V))

gwr.adapttricube=gwr(Y~X1+X2+X3+X4+X5,data=FGWR,adapt=adapttricube
,coords=cbind(FGWR$U,FGWR$V),hatmatrix=TRUE)
gwr.adapttricube
names(gwr.adapttricube)
BFC02.gwr.test(gwr.adapttricube)
anova(gwr.adapttricube)

 Call:
gwr(formula = Y ~ X1 + X2 + X3 + X4 + X5, data = FGWR, coords = cb
ind(FGWR$U,
     FGWR$V), adapt = adapttricube, hatmatrix = TRUE)
Kernel function: gwr.Gauss
Adaptive quantile: 0.9812593 (about 26 of 27 data points)
Summary of GWR coefficient estimates at data points:
               Min.     1st Qu.      Median     3rd Qu.        Max.
X.Intercept. -4.4898e+03 -3.3751e+03 -3.3015e+03 -3.2815e+03 -3.26
49e+03
X1      3.0274e-02  1.4796e-01  1.5419e-01  1.5532e-01  1.5695e-01
X2      4.2314e+02  4.2454e+02  4.2557e+02  4.3214e+02  5.2001e+02
X3     -1.2778e+01 -1.2695e+01 -1.2604e+01 -1.2519e+01 -9.1173e+00
X4      4.3232e+01  4.3758e+01  4.4061e+01  4.5451e+01  6.2166e+01
X5      2.6451e+01  2.6542e+01  2.6666e+01  2.6846e+01  3.3445e+01
                  Global
 X.Intercept. -4113.4068
 X1              0.0783
 X2            488.1392
 X3            -10.1058
 X4             57.2410
 X5             30.7213
Number of data points: 27
Effective number of parameters (residual: 2traceS - traceS'S): 6.4
49167
Effective degrees of freedom (residual: 2traceS - traceS'S): 20.55
083
Sigma (residual: 2traceS - traceS'S): 828.1787
```

```
Effective number of parameters (model: traceS): 6.266165
Effective degrees of freedom (model: traceS): 20.73384
Sigma (model: traceS): 824.5158
Sigma (ML): 722.5317
AICc (GWR p. 61, eq 2.33; p. 96, eq. 4.21): 453.0364
AIC (GWR p. 96, eq. 4.22): 438.358
Residual sum of squares: 14095405
Quasi-global R2: 0.6079735

  [1] "SDF"       "lhat"      "lm"         "results"   "bandwidth"
"adapt"
  [7] "hatmatrix" "gweight"   "gTSS"       "this.call" "fp.given"
"timings"


  Brunsdon, Fotheringham & Charlton (2002, pp. 91-2) ANOVA

 data:  gwr.adapttricube
 F = 1.0321, df1 = 21.000, df2 = 20.551, p-value = 0.4723
 alternative hypothesis: greater
 sample estimates:
 SS OLS residuals SS GWR residuals
         14548324         14095405

 Analysis of Variance Table
                       Df    Sum Sq Mean Sq F value
 OLS Residuals    6.00000 14548324
 GWR Improvement  0.44917   452919 1008352
 GWR Residuals   20.55083 14095405  685880  1.4702
```

#**Mencari Pembobot GWR Setiap Lokasi** (SUDAH DIKETAHUI FUNGSI PEMBOBOT TERBAIK ADALAH ADAPTIVE BISQUARE)

```
h<-as.matrix(gwr.adaptbisquare$bandwidth)
i<-nrow(h)
W<-matrix(0,27,27)
for (i in 1:27) {
  for (j in 1:27) {
    W[i,j]<-(1-(jarak[i,j]/h[i,])**2)**2
    W[i,j]<-ifelse(jarak[i,j]<h[i,],W[i,j],0)
  }
}
W

       [,1] [,2] [,3] [,4] [,5]      [,6]      [,7]      [,8] [,9]
[,10]
[1,]    1    0    0    0    0 0.0000000 0.0000000 0.0000000    0 0
.0000000
[2,]    0    1    0    0    0 0.0000000 0.0000000 0.0000000    0 0
.0000000
```

```
[3,]    0    0    1    0    0 0.0000000 0.0000000 0.0000000    0 0
.0000000
[4,]    0    0    0    1    0 0.0000000 0.0000000 0.0000000    0 0
.0000000
[5,]    0    0    0    0    1 0.0000000 0.0000000 0.0000000    0 0
.0000000
[6,]    0    0    0    0    0 1.0000000 0.0000000 0.0000000    0 0
.0000000
[7,]    0    0    0    0    0 0.0000000 1.0000000 0.0000000    0 0
.0000000
[8,]    0    0    0    0    0 0.0000000 0.0000000 1.0000000    0 0
.0000000
[9,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    1 0
.0000000
[10,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
1.0000000
[11,]    0    0    0    0    0 0.8162707 0.9240968 0.9166667    0
0.9066232
[12,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[13,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[14,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[15,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[16,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[17,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[18,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[19,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[20,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[21,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[22,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[23,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[24,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[25,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[26,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[27,]    0    0    0    0    0 0.0000000 0.0000000 0.0000000    0
0.0000000
[,11] [,12]    [,13] [,14] [,15] [,16]     [,17] [,18] [,19] [,20]
```

```
[,21]
[1,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[2,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[3,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[4,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[5,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[6,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[7,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[8,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[9,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[10,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[11,]     1     0 0.817553     0     0     0 0.9270174     0     0
0     0
[12,]     0     1 0.000000     0     0     0 0.0000000     0     0
0     0
[13,]     0     0 1.000000     0     0     0 0.0000000     0     0
0     0
[14,]     0     0 0.000000     1     0     0 0.0000000     0     0
0     0
[15,]     0     0 0.000000     0     1     0 0.0000000     0     0
0     0
[16,]     0     0 0.000000     0     0     1 0.0000000     0     0
0     0
[17,]     0     0 0.000000     0     0     0 1.0000000     0     0
0     0
[18,]     0     0 0.000000     0     0     0 0.0000000     1     0
0     0
[19,]     0     0 0.000000     0     0     0 0.0000000     0     1
0     0
[20,]     0     0 0.000000     0     0     0 0.0000000     0     0
1     0
[21,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     1
[22,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[23,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[24,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
[25,]     0     0 0.000000     0     0     0 0.0000000     0     0
0     0
```

```
[26,]      0      0 0.000000      0      0      0 0.0000000      0      0
0      0
[27,]      0      0 0.000000      0      0      0 0.0000000      0      0
0      0
      [,22] [,23] [,24] [,25] [,26] [,27]
[1,]     0     0     0     0     0     0
[2,]     0     0     0     0     0     0
[3,]     0     0     0     0     0     0
[4,]     0     0     0     0     0     0
[5,]     0     0     0     0     0     0
[6,]     0     0     0     0     0     0
[7,]     0     0     0     0     0     0
[8,]     0     0     0     0     0     0
[9,]     0     0     0     0     0     0
[10,]     0     0     0     0     0     0
[11,]     0     0     0     0     0     0
[12,]     0     0     0     0     0     0
[13,]     0     0     0     0     0     0
[14,]     0     0     0     0     0     0
[15,]     0     0     0     0     0     0
[16,]     0     0     0     0     0     0
[17,]     0     0     0     0     0     0
[18,]     0     0     0     0     0     0
[19,]     0     0     0     0     0     0
[20,]     0     0     0     0     0     0
[21,]     0     0     0     0     0     0
[22,]     1     0     0     0     0     0
[23,]     0     1     0     0     0     0
[24,]     0     0     1     0     0     0
[25,]     0     0     0     1     0     0
[26,]     0     0     0     0     1     0
[27,]     0     0     0     0     0     1
```

#Estimasi Parameter Model GWR (Konstanta Setiap Variabel Pada Setiap Model Kabupaten/Kota)

```
gwr.adaptbisquare$SDF$"(Intercept)"
gwr.adaptbisquare$SDF$X1
gwr.adaptbisquare$SDF$X2
gwr.adaptbisquare$SDF$X3
gwr.adaptbisquare$SDF$X4
gwr.adaptbisquare$SDF$X5

[1]  -8161.007  -5950.627  -5197.417   8879.189 -15937.475  -3193.
459
[7]   1491.054   4208.390   4967.594   3245.202   5807.307   3995.
402
[13]   2672.034   6585.641  -5813.647 -10400.185 -12566.326   1452
.774
[19]  -8161.007  -5950.627   8879.189   4967.594 -10400.185  -8908
```

```
.670
[25]  -9209.332  -3193.459   3255.596
[1] -0.20623557  0.06626685  0.35882063 -0.23278464  0.08868439  0
.84177951
[7]  1.19701489  1.36086025  1.46328952  1.17567680 -0.48295379  0
.45048357
[13] -0.24346956 -0.25991306 -0.08278421 -0.22659150 -0.10641164
1.18496395
[19] -0.20623557  0.06626685 -0.23278464  1.46328952 -0.22659150 -
0.21237112
[25] -0.14200792  0.84177951  1.32786880
[1]  642.32989  490.46162  489.88085 -284.02239 1097.97301  278.96
797
[7]  -98.74662 -310.46841 -301.82519 -178.27244  789.59792  124.08
132
[13]   82.65582  -95.57087  581.46184  763.41106  946.57603  -98.0
7855
[19]  642.32989  490.46162 -284.02239 -301.82519  763.41106  687.4
3620
[25]  723.24621  278.96797 -249.48544
[1]   22.917165    8.623200  -13.213328  -25.601802   46.051382
3.069755
[7]  -10.164648  -20.282188  -28.582156  -20.056394 -152.860977  -
58.913439
[13]  -18.540869  -33.697172   -3.788856   29.058308   15.736464
-9.909912
[19]   22.917165    8.623200  -25.601802  -28.582156   29.058308
24.465949
[25]   15.100037    3.069755  -15.125951
[1]  189.60069  163.02041  168.70502 -577.59682  239.00780   75.17
462
[7]   45.80620   51.90598   30.94536   12.67075 -105.32713  -72.92
384
[13] -304.56702 -429.31112  139.25122  267.63670  242.51874   45.7
2292
[19]  189.60069  163.02041 -577.59682   30.94536  267.63670  214.1
1549
[25]   84.71511   75.17462   45.87138
[1]  25.716817  17.370211  18.926317  57.703566  61.537911  -9.656
607
[7] -34.917581 -51.492794 -54.720806 -35.098256  95.187419  21.433
622
[13]  67.111969  60.296137  35.887392  29.114662  76.133755 -33.77
7558
[19]  25.716817  17.370211  57.703566 -54.720806  29.114662  26.95
3525
[25]  77.026848  -9.656607 -45.680673
```