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LAMPIRAN

LAMPIRAN

Lampiran 1. Variabel Penelitian

Kabupaten/Kota	Y	X1	X2	X3	X4	U	V
Barru	629	13	708	188285	159	4,41	119,62
Bone	2455	42	1439	819590	178	4,53	120,32
Bulukumba	1474	21	1018	446468	345	5,56	120,18
Enrekang	484	16	342	233739	129	3,56	119,77
Gowa	2907	28	644	793061	416	5,23	119,44
Jeneponto	1459	20	483	415792	581	5,68	119,75
Luwu Timur	1075	19	468	310582	44	2,6	120,81
Luwu Utara	970	16	763	330576	44	2,55	120,37
Luwu	1321	24	486	372161	111	3,06	120,24
Makassar	14926	86	5885	1436626	7188	5,15	119,43
Maros	1322	16	1346	410699	249	4,95	119,59
Palopo	1837	19	1077	194448	754	2,99	120,2
Pangkajene Kepulauan	1630	24	447	354614	310	4,83	119,77
Pare-Pare	1071	10	904	156795	1559	3,98	119,64
Pinrang	1530	21	810	416223	210	3,8	119,64
Selayar	523	15	499	140312	103	6,12	120,46
Sidrap	1365	17	608	331660	174	3,92	119,76
Sinjai	1047	17	450	266282	330	5,13	120,25
Soppeng	714	18	568	236498	152	4,35	119,3
Takalar	1753	17	707	307445	538	5,43	119,44
Toraja Utara	970	16	763	330576	44	2,55	120,37
Toraja	545	24	616	297002	146	3,09	119,87
Wajo	1907	25	603	379975	152	4,11	120,02
Bantaeng	1006	15	447	200900	504	5,55	119,95

Keterangan:

Y = Jumlah kasus tuberkulosis
X1 = Jumlah sarana kesehatan
X2 = Jumlah tenaga medis
X3 = Jumlah penduduk
X4 = Kepadatan penduduk
U = longitude
V = latitude

Lampiran 2. Output bandwidth optimum

No	Kabupaten/Kota	Bandwidht
1	Barru	0.9646891
2	Bone	1.0880660
3	Bulukumba	1.4625706
4	Enrekang	1.1843847
5	Gowa	1.2617363
6	Jeneponto	1.4231340
7	Luwu Timur	2.1808053
8	Luwu Utara	2.0144469
9	Luwu	1.4967223
10	Makassar	1.1894035
11	Maros	0.9464504
12	Palopo	1.5533619
13	Pangkajene Kepulauan	0.8512088
14	Pare-Pare	1.1425843
151	Pinrang	1.1727953
6	Selayar	2.0635136
17	Sidrap	1.0670982
18	Sinjai	1.0641330
19	Soppeng	1.1031776
20	Takalar	1.2772020
21	Toraja Utara	2.0144469
22	Toraja	1.3956193
23	Wajo	1.0790128
24	Bantaeng	1.3725004

Lampiran 3. Jarak Euclidean setiap Kabupaten/Kota di Sulawesi Selatan

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	0	0.71021	12791	0.863133	0.83952	127663	216614	20055	14855	0.764002	0.540832	15338	0.44598	0.430464	0.610327	1905177	3,53888	0.95671	0.32557	103576	200551	134346	0.49993	11868
2	0.71021	0	10394	1115078	112445	128351	199123	198063	14721	108466	0.84219	15446	0.62649	0.87458	0.997647	159615	0.82807	0.60406	103576	125872	198063	150867	0.51613	108503
3	12791	10394	0	204159	0.81024	0.44643	30263	30159	25007	0.85475	0.84864	257007	0.83725	166973	184097	0.62609	169292	0.43566	1496161	0.751332]	301599	248931	14588	0.23021
4	0.86313	11150	20415	0	1702292	212009	14153	117477	0.68622	162594	1401606	0.714002	0.44657	0.43965	0.272946	265135	0.36013	164173	0.91923	189889	117477	0.48052	0.60415	1998124
5	0.83952	11244	0.81024	170229	0	0.546443	296543	283677	231276	0.080622	0.317647	236541	0.51855	126589	144391	135369	134851	0.81614	0.89106	0.19999	283677	218277	126126	0.60207
6	12766	12835	0.44643	212009	0.546443	0	32572	319081	26654	0.61911	0.74732	272737	0.85023	170355	188321	0.83528	176002	0.743303	140406	0.398246	3190814	25927	159304	0.23853
7	21661	19912	30263	141534	2965434	32572	0	0.44283	0.73246	289946	264781	0.724016	246058	180922	167597	353735	168668	259123	23114	3144169	0.44283	106004	170417	30728
8	20051	19806	30159	117477	28367	31908	0.44283	0	0.526307	2764706	252356	0.471699	235762	160555	144754	35711	14996	258278	209401	3026433	0.55234	0.73593	159878	302925
9	14855	14721	250071	0.686221	2312768	26654	0.73246	0.526307	0	2241472	19986	0.080622	183133	109836	0.95268	306789	0.98488	2070024	159615	250137	0.526307	0.371214	10728	250683
10	5	10846	0.85475	162594	0.08062	0.61911	289946	27647	22414	0	0.256124	229314	0.466904	118869	136623	141484	127349	0.82024	0.81049	0.280178	2764706	210646	11957	0.65604
11	0.54083	0.84219	0.84864	140160	0.317647	0.74732	264781	252356	19986	0.256124	0	2052729	0.21633	0.97128	115108	145801	104393	0.684105	0.666408	0.502891	252356	188095	0.94366	0.69971
12	15338	154466	257007	0.714002	23654	272737	0.72401	0.471699	0.08062	229314	205272	0	18895	1137409	0.984733	314078	10288	214058	1630828	255562	0.471699	0.344818	113437	25721
13	0.44598	0.62649	0.83725	0.64854	0.51855	0.85023	246058	235762	18313	0.466904	0.216333	188957	0	0.85988	1038171	146294	0.910054	0.56603	0.67178	0.684762	235762	1742871	0.762167	0.74215
14	0.43046	0.87458	166973	0.439658	126589	170355	180922	160555	10983	118869	0.97128	1137409	0.85988	0	0,0125	229172	0.134164	130176	0.50249	146372	160555	0.91923	0.40162	160031
15	0.61032	0.99764	18409	0.2729468	144391	18832	16759	144754	0.95268	136623	1151086	0.98473	103817	0,49955	0	246065	0.169705	146321	0.646606	1642224	144754	0.746324	0.490407	177724
16	19051	15961	0.62609	265135	1353698	0.83528	35373	357113	306789	1414849	145801	314078	146294	229172	246065	0	230867	101202	211624	1231462	357113	3086907	205759	0.764852
17	0.50960	0.82807	16929	0.3601388	1348517	176002	16866	149966	0.98488	127349	10439	102883	0.91005	0.134164	0.169705	230867	0	130545	0.629682	1543534	149966	0.837257	0.32202	1641036
18	0.95671	0.604069	0.43566	1641736	0.81614	0.743303	25912	258278	207002	0.82024	0.684105	2140584	0.56603	130176	1463215	101202	130545	0	122918	0.86377	258278	207509	1045609	0.51613
19	0.32557	103576	149616	0.919238	0.89106	140406	23114	209401	159615	0.81049	0.666408	1630828	0.67178	0.50249	0.646606	211624	0.62968	122918	0	108903	209401	138293	0.758946	1364734
20	10357	1258729	0.751332	18988	0.19999	0.39824	31441	302643	250137	0.28017	0.50289	255562	0.68476	146372	164222	123146	154353	0.86377	108903	0	302643	237918	1441804	0.52392
21	20055	198063	301599	1174776	283677	3190814	0.44283	0.47543	0.526307	2764706	25235	0.471699	23576	160555	144754	357113	149966	258278	2094015	302643	0	0.735934	159878	302925
22	13434	1508674	248937	0.48052	21827	259277	106004	0.73593	0.37121	210646	18809	0.34481	174287	0.91923	0.74632	30869	0.83725	207509	138293	237918	0.735934	0	103097	24613
23	0.49999	0.51613	145880	0.60415	12612	1593047	170417	159878	10728	11957	0.94366	113437	0.76216	0.40162	0.490407	205759	0.322024	10456	0.75894	1441804	159878	103097	0	14417
24	118680	108503	0.23021	199812	0.60207	0.23853	30728	302925	25068	0.65604	0.69971	257217	0.742159	160031	177724	0.764852	1641036	0.51613	136473	0.52392	302925	24613004	14417	0

Lampiran 4. Matriks pembobot *adaptive bisquare kernel*

No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	`16	17	18	19	20	21	22	23	24
1	1	0.20976	0	0.03978	0.058883	0	0	0	0	0.13897	0.470177	0	0.6182247	0.641419	0.35967	0	0.519754	0.000271	0.785169	0	0	0	0.53489	0
2	0.329414	1	0.007626	0	0	0	0	0	0	0.38939	0.160698	0	0.44684	0.125251	0.02537	0	0.17707	0.47855	0.008804	0	0	0	0.600591	0.30963
3	0.05529	0.24491	1	0	0.480383	0.82234	0	0	0	0.433565	0.43999	0	0.451979	0	0	0.66707	0	0.830415	0	0.541851	0	0	0.26505	0.95106
4	0.21987	0.012907	0	1	0	0	0	0.000261	0.441302	0	0	0.40522	0	0.74339	0.622638	0	0.823628	0	0.158101	0	0.000261	0.697887	0.547304	0
5	0.31056	0.04234	0.345297	0	1	0.66005	0	0	0	0.99185	0.87725	0	0.690711	0	0	0	0	0.338246	0.251251	0.950379	0	0	0.548097	0.59644
6	0.038135	0.034817	0.812874	0	0.726868	1	0	0	0	0.45645	0.52452	0	0.413535	0	0	0.42969	0	0.52882	0.000708	0.84951	0	0	0	0.9446003
7	0.000179	0.02765	0	0.335007	0	0	1	0.919234	0.787111	0	0	0.791707	0	0.097182	0.167598	0	0.16145	0	0	0	0.91923	0.58327	0.151593	0
8	0.78249	0.001108	0	0.435476	0	0	0.905686	1	0.868138	0	0	0.893346	0	0.13305	0.624305	0	0.19872	0	0	0	1	0.750883	0.136979	0
9	0.00022	0.001058	0	0.623773	0	0	0.578375	0.767987	1	0	0	0.994205	0	0.212955	0.35385	0	0.321487	0	0	0	0.76798	0.88075	0.23643	0
10	0.34503	0.02834	0.233828	0	0.990831	0.53152	0	0	0	1	0.909408	0	0.715549	0.14112	0	0	0	0.27501	0.28692	0.892099	0	0	0	0.484084
11	0.453554	0.043333	0.038415	0	0.787406	0.14176	0	0	0	0.85889	1	0	0.89823	0	0	0	0	0.22804	0.254242	0.515053	0	0	0.345919	0.20559
12	0.000621	0.000124	0	0.622082	0	0	0.612703	0.82408	0.994619	0	0	1	0	0.21515	0.357752	0	0.315082	0	0	0	0.82408	0.903875	0.217815	0
13	0.52633	0.210029	0.001056	0	0.39548	0.522635	0	0	0	0.48877	0.874989	0	1	0	0	0	0	0.31113	0.14223	0.124499	0	0	0.03931	0.057509
14	0.73627	0.171473	0	0.725791	0	0	0	0	0.005762	0	0.07693	0.81682	0.188031	1	0.95097	0	0.972614	0	0.650583	0	0	0.124423	0.768157	0
15	0.531702	0.076386	0	0.894605	0	0	0	0	0.115696	0	0.001345	0.087021	0.046829	0.95344	1	0	0.958561	0	0.484452	0	0	0.35407	0.68086	0
16	0.02177	0.161346	0.82435	0	0.32449	0.699142	0	0	0	0.280775	0.250762	0	0.247386	0	0	1	0	0.57679	0	0.414548	0	0	0.328051	0.744103
17	0.59587	0.158261	0	0.785169	0	0	0	0	0.021948	0	0.001844	0.00496	0.074353	0.96863	0.95005	0	1	0	0.424837	0	0	0.14775	0.826155	0
18	0.03674	0.45935	0.69287	0	0.169554	0.262235	0	0	0	0.164716	0.34422	0	0.514169	0	0	0.00912	0	1	0	0.116363	0	0	0.00119	0.584831
19	0.83338	0.014039	0	0.093434	0,838889	0	0	0	0	0.211812	0.403334	0	0.39585	0.62809	0.430927	0	0.454544	0	1	0.000648	0	0	0.27741	0
20	0.11719	0.000824	0.4276444	0	0.95155	0.8150002	0	0	0	0.90607	0.713965	0	0.507728	0	0	0.004947	0	0.29443	0.0745005	1	0	0	0	0.691764
21	0.78249	0.001108	0	0.435476	0	0	0.905686	1	0.868138	0	0	0.89334	0	0.13305	0.233904	0	0.198724	0	0	0	1	0.750883	0.136979	0
22	0.005379	0	0	0.776959	0	0	0.1789957	0.521191	0.863508	0	0	0.881637	0	0.320544	0.509838	0	0.409725	0	0.00032	0	0.521191	1	0.20638	0
23	0.61665	0.41298	0	0.4712801	0	0	0	0	0.000131	0	0.055291	0	0.251061	0.74211	0.62953	0	0.829795	0.00371	0.25529	0	0	0.00758	1	0
24	0.06365	0.140644	0.94452	0	0.652161	0.940501	0	0	0	0.59524	0.547738	0	0.500705	0	0	0.475341	0	0.73716	0.000127	0.729795	0	0	0	1

Lampiran 5. Koefisien parameter GWNBR untuk setiap Kab/Kota di Sulawesi Selatan

No	k	β_0	β_1	β_2	β_3	β_4
1	1.014048	0.561739	-0.453139	-0.005950	0.564888	0.0007375019
2	1.014050	0.331688	-0.604165	-0.224814	0.478687	0.0020582493
3	1.014048	0.755955	-0.866894	-0.302140	0.390658	0.0007475900
4	1.014048	0.946238	-0.558583	-0.394502	0.863176	0.0004861063
5	1.014049	0.144900	-0.676844	-0.012957	0.821749	0.0011147178
6	1.014048	0.020545	-0.368191	-0.097341	0.144112	0.0010930017
7	1.014048	0.732417	-0.248277	-0.677932	0.246813	0.0005429437
8	1.014048	0.403473	-0.910275	-0.487807	0.491671	0.0005045991
9	1.014048	0.620976	-0.152791	-0.006704	0.313222	0.0004772300
10	1.014049	0.234922	-0.515452	-0.065450	0.578477	0.0011453427
11	1.014049	0.147162	-0.000524	-0.029028	0.686640	0.0011017862
12	1.014048	0.590160	-0.095776	-0.968256	0.334973	0.0004764597
13	1.014048	0.899740	-0.709790	-0.801537	0.808468	0.0008402106
14	1.014048	0.748087	-0.624521	-0.149258	0.750580	0.0005470010
15	1.014048	0.837054	-0.638998	-0.095950	0.878299	0.0003895389
16	1.014048	0.933454	-0.386416	-0.320914	0.405301	0.0008329175
17	1.014048	0.713519	-0.616599	-0.047397	0.571884	0.0004787504
18	1.014048	0.268519	-0.844451	-0.330013	0.886653	0.0002996988
19	1.014048	0.012312	-0.791269	-0.919695	0.312335	0.0010992016
20	1.014049	0.229432	-0.841013	-0.048755	0.884035	0.0011561691
21	1.014048	0.403473	-0.910275	-0.487807	0.491671	0.0005045991
22	1.014048	0.722641	-0.862971	-0.147729	0.191028	0.0004775989
23	1.014048	0.145732	-0.707561	-0.467908	0.177492	0.0011030393
24	1.014048	0.274668	-0.834671	-0.526066	0.255536	0.0009040505

Lampiran 6. Zhitung GWNBR pembobot *adaptive bisquare kernel*

No	β_0	β_1	β_2	β_3	β_4
1	-7.968600e+14	-4.7879427	2.98697075	-1.977371629	-1.9768902
2	-4.771087e+13	-3.252207	-10.18030999	8.481963737	-1.815206
3	-1.345604e+15	-4.369003	-5.04593922	-6.5077422917	-2.294409
4	6.775040e+14	-1.99425402	-2.38297128	-1.1373321691	-4.550355
5	-4.203654e+14	-1.985277296	-1.9825746	-1.70671923126	-1.9580754
6	-3.853925e+14	-4.16412371	-3.56901779	-18.8724472047	-1.7681972
7	-1.819179e+15	-1.9725128	-2.0882449	-11.053560421	-1.230205
8	-2.061939e+15	-2.322519	-2.21753939	-11.915215534	-2.862042
9	-1.711038e+15	-3.0393424	-2.66744537	-15.24477629	-3.362223
10	-3.799402e+14	-8.38509762	-4.898432	-7.9743016882	-1.8797254
11	-4.106644e+14	-5.735727626	1.97467488	-2.19336690876	-1.9594719
12	-1.749934e+15	-2.5229391	-2.68096073	-1.5195239446	-3.464099
13	-7.671919e+14	-1.971612798	4.6424371	-1.3728427282	-1.9582907
14	-2.584171e+14	-3.20385	1.98418581	-1.239365308	-3.872082
15	-1.136914e+14	-3.033067	-6.5312906	-9.703863563	-3.009445
16	-6.867822e+14	-2.4615756	-6.428109	-5.6350921999	-1.6169956
17	-1.016490e+14	-3.394066	67.705853	-7.164943964	-2.298246
18	-8.583869e+16	-7.9476007	1.99589001	1.5181923055	-1.9407261
19	-2.345812e+14	-1.9804829	-3.67154168	-4.0033948475	-1.354483
20	-3.206706e+14	-6.94931215	2.13985966	-2.64386907544	-1.625798
21	-2.061939e+15	-2.322519	-2.21753939	-1.1915215534	-2.862042
22	-1.407929e+15	-9.864007	-3.07183974	-1.4868250976	-3.833963
23	-4.942633e+14	-1.990597	-1.98281588	-1.75111691	-1.934853
24	-7.657203e+14	-1.97431684	-5.39760190	-12.6432779134	-1.2103304

Lampiran 7. Koefisien parameter MGWNBR untuk setiap Kab/Kota di Sulawesi Selatan

No	k	β_0	β_1	β_2	β_3	β_4
1	1.094937	6.543788	-3.799216	-1.75605	2.199614	1.750064
2	1.094937	6.543788	-3.801146	-2.059323	2.195116	2.536651
3	1.094937	6.543788	-3.798980	-1.561244	2.039661	1.952243
4	1.094937	6.543788	-3.802567	-2.260801	2.051699	3.523108
5	1.094937	6.543788	-3.798692	-1.467041	2.090809	1.767992
6	1.094937	6.543788	-3.798793	-1.505944	2.078188	1.830012
7	1.094937	6.543788	-3.808237	-2.243477	1.679470	8.585645
8	1.094937	6.543788	-3.807682	-2.233755	1.634042	8.376895
9	1.094937	6.543788	-3.807166	-2.217269	1.687608	7.686382
10	1.094937	6.543788	-3.798682	-1.461783	2.089954	1.764082
11	1.094937	6.543788	-3.798672	-1.458502	2.092578	1.749418
12	1.094937	6.543788	-3.807075	2.216970	1.673067	7.703903
13	1.094937	6.543788	-3.798728	-1.490909	2.096247	1.762178
14	1.027516	6.543788	-3.801159	-2.334969	2.24957	1.988068
15	1.094937	6.543788	3.801508	-2.33961	2.171736	2.326322
16	1.094937	6.543788	-3.799119	-1.591397	1.996489	2.069202
17	1.094937	6.543788	-3.801260	-2.348481	2.273448	1.986040
18	1.094937	6.543788	-3.799207	-1.650368	2.064375	1.968741
19	1.094937	6.543788	-3.799052	-1.633637	2.066110	1.898637
20	1.094937	6.543788	-3.798674	-1.467603	2.107976	1.736455
21	1.094937	6.543788	-3.807682	-2.233755	1.634042	8.376895
22	1.094937	6.543788	3.805786	-2.192520	1.676748	6.707095
23	1.094937	6.543788	-3.801125	-2.233584	2.301648	1.982158
24	1.094937	6.543788	-3.798854	-1.525342	2.065779	1.869586

Lampiran 8. Zhitung MGWNBR pembobot *adaptive bisquare kernel*

No	β_0	β_1	β_2	β_3	β_4
1	3.496979	-5.173551	-3.364149	8.162800	6.167055
2	1.320970	-1.426199	-2.495357	8.284384	5.044942
3	7.460718	-7.623956	-4.771774	1.862439	2.392525
4	3.851765	-9.306045	-2.201921	1.687904	2.365665
5	1.177793	-1.799930	-6.296849	1.301359	6.650384
6	4.87732	-1.219160	-5.538936	1.403781	8.978211
7	1.428417	-3.903705	-2.222549	6.699780	1.310424
8	1.493297	-4.138426	-2.234438	5.518488	1.320640
9	1.740477	-4.383624	-2.255137	6.958131	6.958131
10	1.112995	-1.888104	-6.419152	1.307785	6.539502
11	9.985474	-1.990106	-6.498360	1.288276	6.150765
12	1.740556	-4.430209	-2.255518	6.507990	1.358698
13	1.500900	-1.537889	-5.804630	1.262028	6.486651
14	4.572171	-1.419429	-2.120948	7.042581	4.343401
15	4.275293	-1.256122	-2.116242	8.989312	7.953728
16	3.788340	-5.953477	-4.453496	3.009320	5.851518
17	4.444393	-1.367965	-2.107357	6.622285	4.154899
18	3.681060	-5.231580	-3.964305	1.537945	3.024210
19	5.319908	-6.655314	-4.088425	1.991593	1.404282
20	9.215165	-1.976384	-6.284105	1.185385	5.839070
21	1.493297	-4.138426	-2.234438	5.518488	1.320640
22	2.236040	-5.209669	-2.287547	6.617073	1.435209
23	5.580541	-1.437662	-2.234650	6.195513	3.835316
24	3.299275	-1.018849e	-5.236667	1.923055	1.983227

Lampiran 9. Deskriptif Statistik

```
> library(readxl)
> datatesis <- read_excel("D:/shp/datatesis.xlsx",
+     sheet = "Sheet7")

> #jumlah TB
> summary(datatesis$Y)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
    484     970    1322    1872    1661   14926 
> var(datatesis$Y)
[1] 8083921
> sd(datatesis$Y)
[1] 2843.224

> #jumlah sarana kesehatan
> summary(datatesis$X1)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
  10.00   16.00   18.50   22.46   24.00   86.00 
> var(datatesis$X1)
[1] 223.0417
> sd(datatesis$X1)
[1] 14.93458
```

```
> #jumlah tenaga kesehatan
> summary(datatesis$X2)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
  342.0   485.2   630.0   920.0   833.5  5885.0 
> var(datatesis$X2)
[1] 1197475
> sd(datatesis$X2)
[1] 1094.292

> #jumlah penduduk
> summary(datatesis$X3)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
 140312  235808  330576  390430  411972 1436626 
> var(datatesis$X3)
[1] 77217774633
> sd(datatesis$X3)
[1] 277880.9

> #kepadatan penduduk
> summary(datatesis$X4)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
   44.0   141.8   194.0   600.8   438.0  7188.0 
> var(datatesis$X4)
[1] 2073334
> sd(datatesis$X4)
[1] 1439.907
```

Lampiran 10. Uji multikolinearitas

```
> library(zoo)
> library(car)
> library(lmtest)
> model=glm(Y~X1+X2+X3+X4, data = datatesis)
> vif(model)
      X1        X2        X3        X4 
1.70916   2.68323   5.21281   6.07599 
```

Lampiran 11. Syntax regresi binomial negative

```
library(MASS)

nb=glm.nb(Y~X1+X2+X3+X4,data=data)

summary(nb)

Call:

glm.nb(formula = Y ~ X1 + X2 + X3 + X4, data = data, init.theta = 
10.94937121,

    link = log)

Deviance Residuals:

     Min        1Q    Median        3Q       Max

-2.15494  -0.50861  -0.09266   0.23450   2.39405
```

```
Coefficients:
              Estimate Std. Error z value Pr(>|z|)
(Intercept)  6.544e+00  1.597e-01  40.987   <2e-16 ***
X1          -3.798e-03  1.646e-02  -0.231   0.8175
X2          -1.234e-04  2.431e-04  -0.508   0.6117
X3           1.930e-06  6.907e-07   2.794   0.0052 **
X4           2.034e-04  1.524e-04   1.335   0.1820
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
(Dispersion parameter for Negative Binomial(10.9494) family taken to be 1)
    Null deviance: 188.587  on 23  degrees of freedom
Residual deviance:  24.403  on 19  degrees of freedom
AIC: 368.01
Number of Fisher Scoring iterations: 1
              Theta:  10.95
          Std. Err.:  3.15
 2 x log-likelihood:  -356.014
```

Lampiran 12. Syntax heterogenitas spasial (uji breusch pagan)

```
library(zoo)
library(lmtest)
depen=lm(Y~X1+X2+X3+X4,data=data)
bptest(depen)
bptest(nb)
studentized Breusch-Pagan test
data:  nb
BP = 0.2641, df = 4, p-value = 0.0992
```

Lampiran 13. Syntax Bandwidth optimum

```
library(sp)
```

```
library(spgwr)

bdwt.bisquare=ggwr.sel(Y~X1+X2+X3+X4,data=data,
coords=cbind(data$U,data$V),adapt=TRUE,gweight=gwr.bisquare)

GRTGB=ggwr(Y~X1+X2+X3+X4,data=data,
coords=cbind(data$U,data$V),adapt=bdwt.bisquare,gweight=gwr.bisquare)

Adaptive q: 0.381966 CV score: 285591017

Adaptive q: 0.618034 CV score: 19785612

Adaptive q: 0.763932 CV score: 82394754

Adaptive q: 0.6382813 CV score: 30502623

Adaptive q: 0.527864 CV score: 17210232

Adaptive q: 0.5698 CV score: 17323061

Adaptive q: 0.5463239 CV score: 17189932

Adaptive q: 0.5404996 CV score: 17210232

Adaptive q: 0.555291 CV score: 17245942

Adaptive q: 0.549749 CV score: 17202894

Adaptive q: 0.545629 CV score: 17189758

Adaptive q: 0.5458302 CV score: 17189707

Adaptive q: 0.5458709 CV score: 17189706

Adaptive q: 0.5459116 CV score: 17189710

Adaptive q: 0.5458709 CV score: 17189706

GRTGB$bandwidth

1] 0.9646891 1.0880660 1.4625706 1.1843847 1.2617363 1.4231340

 [7] 2.1808053 2.0144469 1.4967223 1.1894035 0.9464504 1.5533619

[13] 0.8512088 1.1425843 1.1727953 2.0635136 1.0670982 1.0641330

[19] 1.1031776 1.2772020 2.0144469 1.3956193 1.0790128 1.3725004
```

Lampiran 14. Syntax Jarak Euclidean

```
u=data[,6]

u=as.matrix(u)

i=nrow(u)
```

```
v=data[,7]
v=as.matrix(v)
j=nrow(v)
library(maps)
library(spam)
library(fields)
jarak=matrix(nrow=24,ncol=24)
for(i in 1:24)
  for(j in 1:24){jarak[i,j]=sqrt((u[i,]-u[j,])**2+(v[i,]-v[j,])**2)}
write.table(jarak,file="d://jarak.csv",sep=",")
```

Lampiran 15. Syntax pembobot adaptive bisquare kernel

```
bdwt.bisquare=GRTGB$bandwidth
bdwt.bisquare=as.matrix(bdwt.bisquare)
i=nrow(bdwt.bisquare)
pembobotB=matrix(nrow=24,ncol=24)
for(i in 1:24)
  for(j in 1:24){pembobotB[i,j]=(1-(jarak[i,j]/bdwt.bisquare[i,])**2)**2
  pembobotB[i,j]=ifelse(jarak[i,j]<bdwt.bisquare[i,],pembobotB[i,j],0)}
write.table(pembobotB,file="d://pembobotBisquare.csv",sep=",")
```

Lampiran 16. Syntax model GWNBR

```
library(MASS)
gemes2=function(x,y,w1,phi1,b1){
  beta=matrix(c(0),20,6,byrow=T)
  beta[1,1]=phi1
  beta[1,2:6]=c(b1)
  for(i in 1:20){
    satu<-rep(1,24)
    satu<-as.matrix(satu)
```

```
    b01<-rbind(c(phi1,beta[i,2:6]))
    xb1<-as.matrix(x)%*%as.matrix(beta[i,2:6])
    mu1<-exp(xb1)
    delta11<-((log(1+phi1*mu1)-
digamma(y+(1/phi1))+digamma(1/phi1))/phi1^2)+((y-mu1)/((1+phi1*mu1)*phi1))
    delta11<-as.matrix(delta11)
    p11<-t(satu)%*%w1%*%delta11
    delta21<-(y-mu1)/(1+phi1*mu1)
    delta21<-as.matrix(delta21)
    p21<-t(x)%*%as.matrix(w1)%*%delta21
    p21<-as.matrix(p21)
    gt1<-rbind(p11,p21)
    delta31<-((trigamma(y+(1/phi1))-
trigamma(1/phi1))/phi1^4)+((2*digamma(y+(1/phi1))-2*digamma(1/phi1)-
2*log(1+phi1*mu1))/phi1^3)+((2*mu1)/(phi1^2*(1+phi1*mu1)))+(((y+(1/phi1))*m
u1^2)/(1+phi1*mu1)^2)-(y/phi1^2)
    delta31<-as.matrix(delta31)
    p31<-t(satu)%*%w1%*%delta31
    p31<-as.matrix(p31)
    delta41<-mu1*(mu1-y)/(1+phi1*mu1)^2
    delta41<-as.matrix(delta41)
    p41<-t(x)%*%w1%*%delta41
    p41<-as.matrix(p41)
    h11<-rbind(p31,p41)
    delta51<-mu1*(phi1*y+1)/(1+phi1*mu1)^2
    delta51<-t(delta51)
    delta51<-c(delta51)
    delta51<-as.matrix(diag(delta51))
    p51<-t(x)%*%as.matrix(w1)%*%delta51%*%as.matrix(x)
    p51<--1*p51
    p51<-as.matrix(p51)
```

```
    h21<-rbind(t(p41),p51)
    H1<-cbind(h11,h21)
    H11<-ginv(H1)
    beta[i,]<-(t(b01)-H11%*%gt1)
  }
  return(list(beta=beta,hessian=H1))
}
gwnbr1=function(x,y,W,teta){
  beta=nb$coefficient
  parameter=matrix(c(0),nrow(x),ncol(x)+1,byrow=T)
  zhit=matrix(c(0),nrow(x),ncol(x),byrow=T)
  for(i in 1:24){
    ww=as.matrix(diag(W[i,]))
    hit=gemes2(x,y,ww,teta,beta)
    parameter[i,]=hit$beta[20,]
    write.csv(hit$hessian,file=paste("hessian",i,".csv"))
    invh=ginv(as.matrix(hit$hessian))
    for(j in 1:ncol(x)){
      zhit[i,j]=parameter[i,j]/invh[j+1,j+1]
    }
  }
  return(list(koefisien=parameter,Z_hitung=zhit))
}
bobot=as.matrix(read.csv("d://pembobotBisquare.csv",header=TRUE, sep=','))
xx=data[,2:5]
y=data[,1]
x=as.matrix(cbind(1,xx))
mod=gwnbr1(x,y,bobot,1.014047462)
mod$koefisien
```

```
mod$Z_hitung
#Menghitung Nilai Devians
#Devians Binomial Negatif
datay<-as.matrix(data[,1])
datax<-as.matrix(cbind(1,data[,2:6]))
tetanb=1.014047462
betanb<-as.matrix(nb$coefficients)
muw<-as.matrix(rep(exp(betanb[1]),24))
slr<-matrix(c(0),nrow(data),1)
for(i in 1:nrow(data)){
  slr[i]<-0
  for (r in 1:datay[i])
  {slr[i]<-slr[i]+log(r+(1/tetanb))}
}
Lw<-sum(slr-lgamma(datay+1)+datay*log(tetanb*muw)-
          (datay+(1/tetanb))*log(1+tetanb*muw))
muo<-exp(datax%*%betanb)
Lo<-sum(slr-lgamma(datay+1)+datay*log(tetanb*muo)-
          (datay+(1/tetanb)*log(1+tetanb*muo)))
DNB<-2*(Lo-Lw)
DNB

#AICGWNBR
tetagw<-as.matrix(mod$koefisien[,1])
betagw<-as.matrix(mod$koefisien[,2:5])
muwgw<- as.matrix(exp(mod$koefisien[,2]))
muogw<-as.matrix(exp(apply(data*betagw,1,sum)))
slr<-matrix(c(0),nrow(data),1)
for(i in  1:nrow(data)){
```

```
  slr[i]<-0
  for(r in 1:datay[i])
  {slr[i]<-slr[i]+log(r+(1/tetanb))}
}
Lwgw<-sum(slr-lgamma(datay+1)+datay*log(tetagw*muwgw)-
            (datay+(1/tetagw))*log(1+tetagw*muwgw))
Logw<-sum(slr-lgamma(datay+1)+datay*log(tetagw*muogw)-
            (datay+(1/tetagw))*log(1+tetagw*muogw))
DGWp<-(2*(Logw-Lwgw))
DGWp
DGW<-Dev*(2*(Logw-Lwgw))
DGW
#Kesamaan Model Regresi
Fhit=DNB/DGWp
Fhit
#Serentak
DGW
#Menghitung nilai AIC
ssegw<-sum((datay-muogw)^2)
aicgw<- nrow(data)*log(ssegw/ nrow(data))+(2*ncol(datax))
aicgw
```

Lampiran 17. Syntax model MGWNBR

```
# Penaksiran Parameter MGWNBR#
=================================================
##ITERASI##
k1<-nb$theta
Nbcoef1<-nb$coefficients[1:3]
Nbcoefg<-nb$coefficients[4:5]
b1<-as.matrix(Nbcoef1)
```

```
g1<-as.matrix(Nbcoefg)

x1<-data[,2:3]

x1<-as.matrix(x1)

X1<-cbind(1,x1)

xg<-data[,4:5]

Xg<-as.matrix(xg)

y<-data[1]

pembobot=as.matrix(read.csv("d://pembobotBisquare.csv",header=TRUE,
sep=','))

##pembobot Makassar##
==========================================================

W1<-pembobot[10,]

W1<-t(W1)

W1<-c(W1)

W1<-diag(W1)


satu<-rep(1,24)

satu<-as.matrix(satu)

b01<-rbind(k1,b1,g1)

g01<-rbind(g1)


Xg1<-Xg%*%g1

Xb1<-X1%*%b1

miyu1<-exp(Xb1+Xg1)


delta11<-((log(1+k1*miyu1)-digamma(y+(1/k1))+digamma(1/k1))
          /k1^2)+((y-miyu1)/((1+k1*miyu1)*k1))

delta11<-as.matrix(delta11)

p11<-t(satu)%*%W1%*%delta11
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delta21<-(y-miyu1)/(1+k1*miyu1)
delta21<-as.matrix(delta21)
p21<-t(X1)%*%as.matrix(W1)%*%delta11
p21<-as.matrix(p21)

delta31<-(y-miyu1)/(1+k1*miyu1)
delta31<-as.matrix(delta31)
p31<-t(Xg)%*%as.matrix(W1)%*%delta31
p31<-as.matrix(p31)
gt1<-rbind(p11,p21,p31)

delta41<-((trigamma(y+(1/k1))-trigamma(1/k1)-
             2*log(1+k1*miyu1))/k1^3)+((2*miyu1)/(k1^2*(
               1+k1*miyu1)))+(((y+(1/k1))*miyu1^2)/(1+k1*miyu1)^2)-
  (y/k1^2)
delta41<-as.matrix(delta41)
p41<-t(satu)%*%W1%*%delta41
p41<-as.matrix(p41)

delta51<-miyu1*(miyu1-y)/(1+k1*miyu1)^2
delta51<-as.matrix(delta51)
p51<-t(X1)%*%W1%*%delta51
p51<-as.matrix(p51)

delta61<-miyu1*(miyu1-y)/(1+k1*miyu1)^2
delta61<-as.matrix(delta61)
p61<-t(Xg)%*%W1%*%delta61
p61<-as.matrix(p61)
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```
delta71<-miyu1*(k1*y+1)/(1+k1*miyu1^2)
delta71<-t(delta71)
delta71<-c(delta71)
delta71<-as.matrix(diag(delta71))
p71<-t(X1)%*%as.matrix(W1)%*%delta71%*%as.matrix(X1)
p71<--1*p71
p71<-as.matrix(p71)

delta81<-miyu1*(k1*y+1)/(1+k1*miyu1)^2
delta81<-t(delta81)
delta81<-c(delta81)
delta81<-as.matrix(diag(delta81))
p81<-t(Xg)%*%as.matrix(W1)%*%delta81%*%as.matrix(X1)
p81<--1*p81
p81<-as.matrix(p81)

delta91<-miyu1*(k1*y+1)/(1+k1*miyu1)^2
delta91<-t(delta91)
delta91<-c(delta91)
delta91<-as.matrix(diag(delta91))
p91<-t(Xg)%*%as.matrix(W1)%*%delta81%*%as.matrix(Xg)
p91<--1*p91
p91<-as.matrix(p91)

delta101<-miyu1*(k1*y+1)/(1+k1*miyu1)^2
delta101<-t(delta101)
delta101<-c(delta101)
delta101<-as.matrix(diag(delta101))
p101<-t(X1)%*%as.matrix(W1)%*%delta101%*%as.matrix(Xg)
```

```
p101<--1*p101
p101<-as.matrix(p101)

h11<-rbind(p41,p51,p61)
h21<-rbind(t(p51),p71,t(p101))
h31<-rbind(t(p61),t(p81),p91)
H1<-cbind(h11,h21,h31)
H11<-ginv(H1)
b11<-(b01-H11%*%gt1)
parameter<-b11
parameter
bs1<-b11-b01
se1<-abs(bs1)
se1
parameter<-as.matrix(parameter)
sel<-as.matrix(se1)
zhit=parameter/sel
zhit
write.table(zhit,file="D:/zhit10.csv",sep=",")
write.table(parameter,file="D:/parameter10.csv",sep=",")
#menghitung nilai devians#
=====================================================
datay<-as.matrix(data[1])
datax<-as.matrix(cbind(1,data[,2:5]))
tetanb<-nb$theta
betanb<-as.matrix(nb$coefficients)
muw<-as.matrix(rep(exp(betanb[1]),24))
slr<-matrix(0,nrow(data),1)
for (i in 1:nrow(data)){
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  slr[i]<-0 }
for(r in 1:datay[i]){
  slr[i]<-slr[i]+log(r+(1/tetanb))}
slr
#devians mgwnbr#
parameter=as.matrix(read.csv("D://parametermgwnbr.csv",header=TRUE,sep=",")
)
parameter
tetagw<-as.matrix(paramerer [,2])
betagw<-as.matrix(parameter[,3:7])
muwgw<-as.matrix(exp(parameter[,3]))
muogw<-as.matrix(exp(appy(datax*betagw,1,sum)))
Lwgw<-sum(slr-lgamma(datay+1)+datay*log(tetagw*muwgw)-
            (datay+(1/tetagw))*log(1+tetagw*muwgw))
Logw<-sum(slr-lgamma(datay+1)+datay*log(tetagw*muogw)-
            (datay+(1/tetagw))*log(1+tetagw*muogw))
DGW<-2*(Logw-Lwgw)
DGW
#AIC
ssegw<-sum((datay-muogw)^2)
n<-nrow(data)
k=ncol(datax)+1
a<-log(ssegw/n)
b<-2*k
aicgw<-(n*a)+b
aicgw
```