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Lampiran 1. Nilai variabel *input* dan variabel *output* pada bulan Januari 2015 hingga Desember 2021

Tahun	Bulan	Indeks yang Diterima (It)	Indeks yang Dibayar (Ib)	Konsumsi Rumah Tangga						
				Bahan Makanan	Makanan Jadi	Perumahan	Sandang	Kesehatan	Pendidikan, rekreasi & Olahraga	Transportasi dan Komunikasi
2015	1	122.32	117.27	126.00	113.70	116.49	115.01	114.44	107.36	128.11
	2	121.27	116.78	124.87	113.95	117.05	116.08	115.59	107.70	125.05
	3	122.19	116.89	123.87	114.58	117.03	116.16	116.00	107.45	126.85
	4	121.51	117.31	123.00	115.25	118.01	116.63	116.29	107.45	129.98
	5	121.19	117.76	123.98	115.74	118.80	116.85	116.64	107.49	130.49
	6	122.97	118.73	126.35	116.31	119.54	117.05	116.85	108.06	131.05
	7	125.04	119.61	128.63	116.47	119,85	118.44	117.33	108.35	132.03
	8	125.32	120.15	129.84	116.88	120.05	118.71	118.07	108.64	132.65
	9	128.34	120.58	130.78	117.11	120.14	118.86	118.10	108.83	133.21
	10	127.90	120.86	131.11	117.25	120.88	119.13	118.39	109.05	133.73
	11	129.10	121.31	131.96	117.75	121.12	119.67	118.58	109.06	133.73
	12	130.16	122.34	134.65	118.95	121.56	119.98	118.95	109.13	134.01
2016	1	130.87	123.19	137.75	119.89	121.75	120.74	119.77	109.10	132.24
	2	130.85	123.13	137.10	120.03	121.75	121.02	120.53	109.14	132.15
	3	129.82	123.2	136.94	120.78	121.77	121.22	120.72	109.15	132.33
	4	127.56	122.65	136.11	121.02	122.17	122.10	120.80	109.27	129.44

Tahun	Bulan	Indeks yang Diterima (It)	Indeks yang Dibayar (Ib)	Konsumsi Rumah Tangga							
				Bahan Makanan	Makanan Jadi	Perumahan	Sandang	Kesehatan	Pendidikan, rekreasi & Olahraga	Transportasi dan Komunikasi	
	5	127.59	122.8	136.52	121.30	122.45	122.21	120.82	109.42	129.06	
	6	128.80	123.62	138.06	122.45	122.49	123.19	121.30	109.68	129.65	
	7	129.68	123.97	138.81	122.91	123.12	123.95	121.80	109.80	129.57	
	8	130.48	123.99	138.20	123.86	123.19	124.28	122.51	109.87	129.37	
	9	130.29	124.25	138.45	124.21	123.41	124.75	122.81	109.91	129.42	
	10	129.48	124.23	137.64	124.65	124.62	125.28	123.18	110.04	129.50	
	11	129.57	124.7	139.02	125.04	124.33	125.49	123.47	110.05	129.71	
	12	130.22	125.3	140.21	125.13	124.62	125.93	124.06	110.19	129.84	
	2017	1	128.88	126.16	141.57	125.87	126.45	126.85	125.71	110.72	130.09
		2	128.46	126.67	142.43	126.61	127.03	126.92	126.12	110.90	130.65
		3	127.74	126.80	142.23	127.04	127.66	127.06	126.29	111.07	131.20
		4	127.06	126.92	141.75	127.57	128.29	127.54	126.27	111.07	131.14
5		127.68	127.16	141.92	127.92	128.66	127.77	126.82	111.20	131.13	
6		128.74	128.05	143.33	128.17	131.13	130.38	128.11	111.40	131.81	
7		129.04	128.81	145.46	128.31	131.12	130.68	128.53	111.81	132.07	
8		129.99	129.06	145.72	128.40	131.38	130.94	128.69	111.89	132.74	
9		129.03	129.01	145.11	128.78	131.27	131.16	128.89	112.06	132.99	

Tahun	Bulan	Indeks yang Diterima (It)	Indeks yang Dibayar (Ib)	Konsumsi Rumah Tangga						
				Bahan Makanan	Makanan Jadi	Perumahan	Sandang	Kesehatan	Pendidikan, rekreasi & Olahraga	Transportasi dan Komunikasi
	10	129.83	128.85	143.79	128.84	131.15	131.46	129.28	112.16	133.90
	11	130.80	128.89	143.53	129.11	131.48	131.74	129.51	112.15	133.96
	12	131.47	129.26	144.58	129.15	131.76	132.03	129.64	112.16	134.19
2018	1	131.96	129.98	146.50	129.19	132.07	132.76	129.76	113.49	134.28
	2	132.38	130.93	148.49	130.40	132.57	133.40	131.02	114.31	134.48
	3	132.99	131.24	148.66	130.87	133.11	134.41	131.39	114.64	135.33
	4	133.87	131.36	148.45	131.07	133.28	134.58	132.08	115.04	135.47
	5	135.93	131.57	148.84	131.17	133.50	134.76	132.25	115.10	135.58
	6	136.62	132.46	151.01	131.45	134.29	136.51	132.34	115.26	135.88
	7	136.30	133.43	153.18	131.73	134.91	136.78	132.74	116.09	136.91
	8	136.07	133.44	152.44	132.64	135.07	137.05	133.02	116.16	137.02
	9	135.93	133.16	150.69	132.92	135.41	137.17	133.36	116.12	137.31
	10	136.13	133.07	149.31	133.79	135.43	137.50	133.67	115.95	137.48
	11	137.63	133.21	148.82	134.38	135.60	137.61	134.33	116.17	137.63
	12	138.12	133.70	149.81	134.38	135.67	138.05	134.78	116.33	137.84
2019	1	138.80	134.37	150.31	135.05	136.12	138.92	135.63	116.52	137.98
	2	137.88	133.87	147.99	135.43	136.30	139.12	136.09	116.64	138.42

Tahun	Bulan	Indeks yang Diterima (It)	Indeks yang Dibayar (Ib)	Konsumsi Rumah Tangga							
				Bahan Makanan	Makanan Jadi	Perumahan	Sandang	Kesehatan	Pendidikan, rekreasi & Olahraga	Transportasi dan Komunikasi	
	3	137.11	133.34	145.88	135.49	136.25	139.41	136.30	116.70	138.59	
	4	136.77	133.87	147.67	135.49	136.25	139.76	136.24	116.73	138.79	
	5	138.34	134.84	151.00	135.81	136.47	140.39	136.25	116.76	138.33	
	6	138.13	135.03	151.45	136.07	136.63	141.03	136.83	116.82	138.37	
	7	138.19	134.91	150.61	136.32	136.81	141.36	137.98	117.18	138.41	
	8	139.09	135.19	150.99	136.71	137.51	141.79	137.47	117.13	138.76	
	9	138.91	134.51	148.34	136.82	137.39	142.13	137.65	117.19	138.82	
	10	139.65	134.81	148.95	137.02	137.80	142.42	137.77	117.19	138.82	
	11	140.46	135.26	150.50	137.21	137.87	142.59	138.00	117.28	138.88	
	12	141.52	135.53	150.63	138.48	138.01	142.86	138.14	117.33	138.92	
	2020	1	100.63	103.89	103.84	102.80	104.42	107.04	104.33	104.95	104.18
		2	101.78	104.15	104.31	103.29	104.48	107.22	104.27	105.38	104.19
3		101.10	104.44	104.72	103.49	104.56	107.69	105.11	106.12	104.29	
4		101.23	104.47	104.71	103.53	104.71	107.67	105.28	106.12	104.34	
5		100.93	104.43	104.44	103.60	104.81	108.09	105.45	106.15	104.37	
6		101.10	104.69	104.89	103.60	105.05	108.37	105.92	106.43	104.45	
7		100.88	105.03	105.57	103.68	105.25	108.62	106.00	106.56	104.50	

Tahun	Bulan	Indeks yang Diterima (It)	Indeks yang Dibayar (Ib)	Konsumsi Rumah Tangga						
				Bahan Makanan	Makanan Jadi	Perumahan	Sandang	Kesehatan	Pendidikan, rekreasi & Olahraga	Transportasi dan Komunikasi
	8	101.44	105.03	105.31	103.69	105.47	108.71	106.56	106.62	104.45
	9	102.43	105.16	105.58	103.69	105.49	108.79	106.63	106.62	104.58
	10	102.15	105.07	105.18	103.70	105.56	108.80	106.67	106.62	104.60
	11	102.31	105.12	105.19	103.70	105.63	108.88	106.81	106.71	104.60
	12	102.79	105.37	105.66	103.83	105.74	108.96	107.18	106.80	104.63
2021	1	102.52	105.70	106.12	103.92	105.91	109.08	107.25	107.09	104.67
	2	103.61	106.28	107.15	103.92	105.95	109.11	107.60	107.08	104.73
	3	104.32	106.33	107.17	103.93	106.04	109.24	107.68	107.17	104.81
	4	104.81	106.85	108.09	103.97	106.54	109.46	107.21	107.24	104.86
	5	105.36	107.22	108.74	103.98	106.72	110.25	107.82	107.24	104.89
	6	105.59	107.15	108.37	104.23	106.76	110.34	107.77	107.24	104.92
	7	105.24	107.38	108.76	104.23	106.75	110.51	107.91	107.16	104.95
	8	105.69	107.63	109.13	104.23	106.94	110.53	107.96	107.16	105.01
	9	106.33	107.51	108.78	104.23	107.01	110.58	107.96	107.31	105.01
	10	107.11	107.35	108.19	104.28	107.20	110.61	107.92	107.15	105.08
	11	107.34	107.48	108.22	104.58	107.39	110.76	107.92	107.37	105.24
	12	108.25	107.86	108.98	104.63	107.55	110.81	107.91	107.37	105.38

Tahun	Bulan	Biaya Produksi & Penambahan Barang Modal						Nilai Tukar Usaha Pertanian	Nilai Tukar Petani (NTP-P)
		Bibit	Pupuk & Obat-obatan	Biaya Sewa & lainnya	Transportasi	Penambahan Barang Modal	Upah Buruh		
2015	1	108.19	107.19	108.69	131.03	109.32	111.07	104.31	110.37
	2	108.46	107.29	108.68	125.44	109.71	111.47	103.84	109.67
	3	108.39	107.27	109.21	127.35	110.08	111.84	104.53	110.12
	4	108.68	107.49	109.37	131.99	110.34	112.12	103.58	108.90
	5	108.82	107.20	109.58	132.37	110.96	112.20	102.91	108.54
	6	109.10	107.43	109.65	132.78	111.32	112.62	103.57	109.86
	7	109.39	107.46	109.66	133.60	111.19	112.93	104.53	111.52
	8	109.57	107.55	109.75	133.76	111.24	112.98	104.30	111.71
	9	110.11	107.70	109.81	134.21	111.23	113.32	106.43	114.18
	10	110.10	107.80	109.85	134.32	111.37	113.47	105.83	113.69
	11	110.62	108.18	110.09	134.49	111.61	113.62	106.42	114.41
	12	110.86	108.25	110.54	134.65	111.84	113.66	106.39	115.18
2016	1	110.97	108.48	111.11	129.57	112.19	114.35	106.24	115.79
	2	111.10	108.64	111.57	128.80	112.20	114.74	106.27	115.58
	3	111.34	108.55	111.71	128.81	112.33	114.84	105.37	114.62
	4	110.98	108.26	111.97	123.57	112.62	115.22	104.01	113.01
	5	111.37	108.24	111.84	123.45	112.68	115.34	103.9	112.99

Tahun	Bulan	Biaya Produksi & Penambahan Barang Modal						Nilai Tukar Usaha Pertanian	Nilai Tukar Petani (NTP-P)
		Bibit	Pupuk & Obat-obatan	Biaya Sewa & lainnya	Transportasi	Penambahan Barang Modal	Upah Buruh		
2017	6	111.82	108.72	112.09	123.44	112.58	115.34	104.19	113.84
	7	112.19	108.70	112.15	123.78	112.62	115.68	104.6	114.5
	8	112.49	108.88	112.21	123.85	112.73	115.99	105.23	115.04
	9	112.69	108.91	112.57	124.24	113.05	116.09	104.86	114.66
	10	112.99	109.07	112.77	124.46	112.98	116.39	104.23	113.81
	11	112.98	109.35	112.56	124.44	113.15	116.41	103.91	113.83
	12	113.26	108.80	113.16	124.54	113.55	117.19	103.93	113.83
	1	113.58	110.19	113.27	125.25	113.77	118.39	102.16	112.15
	2	113.16	110.11	113.35	125.52	114.28	118.91	101.41	111.58
	3	113.42	110.16	113.35	125.62	114.53	119.14	100.74	110.84
	4	113.44	110.32	113.48	125.57	114.93	119.41	100.11	109.96
	5	113.95	110.36	113.67	125.60	115.14	119.56	100.41	110.34
6	114.24	110.66	113.84	125.95	115.19	119.58	100.54	111.06	
7	114.10	110.91	113.99	126.14	115.56	119.94	100.18	111.07	
8	114.44	111.15	114.64	126.23	115.82	120.12	100.72	111.65	
9	114.43	111.24	114.90	126.37	115.93	120.50	100.02	110.70	
10	114.65	111.60	115.17	126.62	115.83	120.84	100.76	111.14	

Tahun	Bulan	Biaya Produksi & Penambahan Barang Modal						Nilai Tukar Usaha Pertanian	Nilai Tukar Petani (NTP-P)
		Bibit	Pupuk & Obat-obatan	Biaya Sewa & lainnya	Transportasi	Penambahan Barang Modal	Upah Buruh		
	11	114.49	111.67	115.32	126.67	116.11	120.84	101.48	111.88
	12	114.59	111.71	115.56	126.64	116.40	120.84	101.71	112.38
2018	1	114.64	111.48	115.54	126.93	117.34	122.07	101.52	112.36
	2	114.62	111.96	116.11	127.35	117.43	122.34	101.10	112.39
	3	114.47	111.82	116.39	127.61	117.89	122.87	101.33	112.68
	4	114.79	112.06	116.30	128.09	118.23	123.09	101.91	113.14
	5	114.85	112.44	116.30	128.31	118.31	123.09	103.31	114.72
	6	115.47	112.70	116.59	128.55	118.89	123.13	103.14	115.02
	7	115.13	113.10	116.80	128.88	118.88	123.52	102.15	114.40
	8	115.37	113.18	116.97	129.15	118.85	123.52	101.97	114.11
	9	115.89	113.37	117.14	129.33	119.52	123.61	102.08	113.77
	10	116.46	113.77	117.38	129.72	120.10	123.66	102.30	113.59
	11	117.22	114.12	117.47	129.72	120.14	123.76	103.32	114.57
	12	117.43	114.30	117.51	130.18	120.77	124.40	103.31	114.56
2019	1	118.17	115.03	118.28	131.31	121.22	125.96	103.30	114.18
	2	118.16	114.99	118.36	131.76	121.04	126.53	102.99	113.38
	3	118.07	114.90	118.47	131.48	121.60	126.58	102.82	112.71

Tahun	Bulan	Biaya Produksi & Penambahan Barang Modal						Nilai Tukar Usaha Pertanian	Nilai Tukar Petani (NTP-P)	
		Bibit	Pupuk & Obat-obatan	Biaya Sewa & lainnya	Transportasi	Penambahan Barang Modal	Upah Buruh			
	4	118.25	115.03	118.54	131.61	121.75	126.58	102.16	112.34	
	5	118.19	115.01	118.71	131.63	121.93	126.65	102.60	113.59	
	6	118.22	115.04	118.59	131.62	121.80	126.69	102.29	113.45	
	7	118.49	115.18	118.68	131.79	121.98	126.72	102.43	113.37	
	8	118.37	115.23	119.03	132.12	122.18	126.72	102.88	114.03	
	9	118.66	115.26	118.85	132.17	122.31	126.79	103.27	113.84	
	10	118.75	115.53	119.18	132.23	122.51	127.06	103.59	114.26	
	11	119.29	115.44	119.13	132.42	122.74	127.06	103.84	114.88	
	12	119.60	115.57	119,14	132.73	122.79	127.06	104.42	115.66	
	2020	1	101.61	103.16	101.75	104.65	103.54	103.83	96.86	97.55
		2	101.63	103.21	101.81	104.66	103.38	103.86	97.73	98.59
		3	101.98	103.49	102.16	104.81	103.77	104.09	96.80	97.69
4		102.46	103.54	102.14	104.93	103.81	104.14	96.90	97.75	
5		102.79	103.61	102.16	105.02	103.80	104.37	96.65	97.37	
6		102.89	103.79	102.16	105.12	103.91	104.77	96.57	97.39	
7		102.83	103.96	102.23	105.15	104.03	104.81	96.04	97.10	
8		102.56	104.31	102.42	105.20	104.04	105.11	96.58	97.45	

Tahun	Bulan	Biaya Produksi & Penambahan Barang Modal						Nilai Tukar Usaha Pertanian	Nilai Tukar Petani (NTP-P)
		Bibit	Pupuk & Obat-obatan	Biaya Sewa & lainnya	Transportasi	Penambahan Barang Modal	Upah Buruh		
	9	102.59	104.41	102.43	105.19	104.12	105.16	97.40	98.34
	10	102.73	104.46	102.43	105.20	104.15	105.71	97.23	97.93
	11	102.92	104.63	102.43	105.20	104.20	105.71	97.33	98.00
	12	103.26	104.69	102.43	105.20	104.26	105.79	97.56	98.32
2021	1	103.22	105.68	102.5	105.31	104.55	106.12	96.99	97.73
	2	103.30	106.47	102.67	105.41	104.65	107.47	97.48	98.19
	3	103.69	106.49	102.69	105.56	104.68	107.52	98.11	98.82
	4	103.77	106.87	102.71	105.63	104.88	108.12	98.09	98.98
	5	104.32	107.01	102.72	105.71	104.95	108.51	98.26	99.33
	6	104.21	107.22	102.84	105.81	105.14	108.51	98.54	99.42
	7	104.76	107.49	102.84	105.79	105.57	108.69	98.01	98.90
	8	105.96	107.69	102.86	105.89	105.68	108.74	98.19	99.15
	9	105.92	107.62	102.85	105.91	105.75	108.74	98.90	99.76
	10	105.91	107.78	102.85	106.37	105.81	108.74	99.78	100.40
	11	105.99	108.31	102.86	106.90	105.98	108.74	99.87	100.41
	12	106.17	108.51	102.87	106.63	106.01	108.76	100.37	101.19

Lampiran 2. Nilai variabel *input* dan variabel *output* pada bulan Januari 2015 hingga Desember 2021 dengan tahun 2018 sebagai tahun dasar

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
1	86.25	89.22	85.68	83.99	87.89	85.57	86.06	95.51	95.94	91.59	95.30	92.76	103.01	91.88	90.61	96.21	92.26
2	85.51	88.85	84.91	84.17	88.31	86.37	86.93	95.81	93.65	91.82	95.39	92.75	98.62	92.21	90.94	95.78	91.67
3	86.16	88.93	84.23	84.64	88.30	86.43	87.23	95.59	95.00	91.76	95.37	93.20	100.12	92.52	91.24	96.42	92.05
4	85.68	89.25	83.64	85.13	89.04	86.78	87.45	95.59	97.34	92.00	95.57	93.34	103.77	92.74	91.47	95.54	91.03
5	85.46	89.60	84.31	85.49	89.64	86.94	87.72	95.62	97.72	92.12	95.31	93.52	104.06	93.26	91.53	94.92	90.73
6	86.71	90.33	85.92	85.91	90.19	87.09	87.87	96.13	98.14	92.36	95.51	93.58	104.39	93.56	91.87	95.53	91.83
7	88.17	91.00	87.47	86.03	90.43	88.13	88.23	96.39	98.88	92.60	95.54	93.59	105.03	93.45	92.13	96.42	93.22
8	88.37	91.41	88.29	86.33	90.58	88.33	88.79	96.65	99.34	92.76	95.62	93.67	105.16	93.49	92.17	96.21	93.38
9	90.50	91.74	88.93	86.50	90.65	88.44	88.81	96.81	99.76	93.21	95.75	93.72	105.51	93.48	92.45	98.17	95.44
10	90.19	91.95	89.15	86.61	91.20	88.64	89.03	97.01	100.15	93.20	95.84	93.75	105.60	93.60	92.57	97.62	95.03
11	91.04	92.30	89.73	86.98	91.39	89.04	89.17	97.02	100.15	93.64	96.18	93.96	105.73	93.80	92.69	98.16	95.64
12	91.78	93.08	91.56	87.86	91.72	89.27	89.45	97.08	100.36	93.85	96.24	94.34	105.86	94.00	92.72	98.13	96.28
13	92.28	93.73	93.67	88.56	91.86	89.84	90.07	97.06	99.03	93.94	96.45	94.83	101.86	94.29	93.29	98.00	96.79
14	92.27	93.68	93.23	88.66	91.86	90.05	90.64	97.09	98.96	94.05	96.59	95.22	101.26	94.30	93.60	98.02	96.61
15	91.54	93.73	93.12	89.21	91.88	90.20	90.78	97.10	99.10	94.25	96.51	95.34	101.27	94.41	93.69	97.19	95.81
16	89.95	93.32	92.55	89.39	92.18	90.85	90.84	97.21	96.94	93.95	96.25	95.56	97.15	94.65	94.00	95.94	94.47
17	89.97	93.43	92.83	89.60	92.39	90.93	90.86	97.34	96.65	94.28	96.23	95.45	97.05	94.70	94.09	95.84	94.45
18	90.82	94.05	93.88	90.45	92.42	91.66	91.22	97.57	97.09	94.66	96.66	95.66	97.04	94.62	94.09	96.10	95.16
19	91.44	94.32	94.39	90.79	92.89	92.23	91.60	97.68	97.03	94.97	96.64	95.71	97.31	94.65	94.37	96.48	95.71
20	92.01	94.34	93.97	91.49	92.95	92.47	92.13	97.74	96.88	95.23	96.80	95.76	97.37	94.74	94.62	97.06	96.16

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
21	91.87	94.53	94.14	91.75	93.11	92.82	92.36	97.78	96.92	95.40	96.83	96.07	97.67	95.01	94.71	96.72	95.84
22	91.30	94.52	93.59	92.07	94.03	93.22	92.63	97.89	96.98	95.65	96.97	96.24	97.85	94.96	94.95	96.14	95.13
23	91.37	94.88	94.53	92.36	93.81	93.37	92.85	97.90	97.14	95.64	97.22	96.06	97.83	95.10	94.97	95.85	95.15
24	91.83	95.33	95.34	92.43	94.03	93.70	93.30	98.02	97.24	95.88	96.73	96.58	97.91	95.43	95.60	95.86	95.15
25	90.88	95.99	96.27	92.97	95.41	94.38	94.54	98.50	97.42	96.15	97.97	96.67	98.47	95.62	96.58	94.23	93.75
26	90.58	96.38	96.85	93.52	95.84	94.44	94.84	98.66	97.84	95.79	97.90	96.74	98.68	96.05	97.01	93.54	93.27
27	90.08	96.47	96.72	93.84	96.32	94.54	94.97	98.81	98.25	96.01	97.94	96.74	98.76	96.26	97.19	92.92	92.66
28	89.60	96.56	96.39	94.23	96.80	94.90	94.96	98.81	98.21	96.03	98.08	96.85	98.72	96.59	97.41	92.34	91.92
29	90.04	96.75	96.50	94.49	97.07	95.07	95.37	98.92	98.20	96.46	98.12	97.01	98.74	96.77	97.54	92.62	92.24
30	90.78	97.42	97.46	94.67	98.94	97.01	96.34	99.10	98.71	96.71	98.38	97.16	99.02	96.81	97.55	92.74	92.84
31	90.99	98.00	98.91	94.78	98.93	97.23	96.66	99.47	98.91	96.59	98.61	97.28	99.17	97.12	97.85	92.41	92.84
32	91.66	98.19	99.09	94.84	99.13	97.43	96.78	99.54	99.41	96.88	98.82	97.84	99.24	97.34	97.99	92.91	93.33
33	90.99	98.16	98.67	95.12	99.04	97.59	96.93	99.69	99.59	96.87	98.90	98.06	99.35	97.43	98.30	92.25	92.53
34	91.55	98.04	97.78	95.17	98.95	97.81	97.22	99.78	100.28	97.06	99.22	98.29	99.54	97.35	98.58	92.94	92.90
35	92.23	98.06	97.60	95.37	99.20	98.02	97.39	99.77	100.32	96.92	99.28	98.42	99.58	97.59	98.58	93.60	93.52
36	92.70	98.34	98.31	95.40	99.41	98.24	97.49	99.78	100.49	97.00	99.32	98.62	99.56	97.83	98.58	93.81	93.94
37	93.05	98.89	99.62	95.43	99.65	98.78	97.58	100.96	100.56	97.05	99.11	98.61	99.79	98.62	99.58	93.64	93.92
38	93.35	99.62	100.97	96.32	100.02	99.26	98.53	101.69	100.71	97.03	99.54	99.09	100.12	98.70	99.80	93.26	93.95
39	93.78	99.85	101.09	96.67	100.43	100.01	98.81	101.98	101.35	96.90	99.42	99.33	100.32	99.08	100.24	93.47	94.19
40	94.40	99.94	100.94	96.82	100.56	100.14	99.33	102.34	101.45	97.17	99.63	99.26	100.70	99.37	100.42	94.00	94.57
41	95.85	100.10	101.21	96.89	100.73	100.27	99.45	102.39	101.53	97.22	99.97	99.26	100.87	99.43	100.42	95.29	95.90
42	96.34	100.78	102.69	97.10	101.32	101.57	99.52	102.53	101.76	97.75	100.20	99.50	101.06	99.92	100.45	95.13	96.15
43	96.11	101.52	104.16	97.30	101.79	101.77	99.82	103.27	102.53	97.46	100.55	99.68	101.32	99.91	100.77	94.22	95.63

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
44	95.95	101.53	103.66	97.98	101.91	101.97	100.03	103.34	102.61	97.67	100.62	99.83	101.53	99.89	100.77	94.06	95.39
45	95.85	101.31	102.47	98.18	102.17	102.06	100.29	103.30	102.83	98.11	100.79	99.97	101.67	100.45	100.84	94.16	95.10
46	95.99	101.24	101.53	98.82	102.18	102.31	100.52	103.15	102.96	98.59	101.15	100.18	101.98	100.94	100.88	94.36	94.95
47	97.05	101.35	101.20	99.26	102.31	102.39	101.02	103.34	103.07	99.23	101.46	100.25	101.98	100.97	100.96	95.30	95.77
48	97.40	101.72	101.87	99.26	102.36	102.72	101.36	103.49	103.23	99.41	101.62	100.29	102.34	101.50	101.48	95.29	95.76
49	97.88	102.23	102.21	99.76	102.70	103.36	102.00	103.66	103.33	100.04	102.27	100.95	103.23	101.88	102.76	95.28	95.44
50	97.23	101.85	100.63	100.04	102.84	103.51	102.34	103.76	103.66	100.03	102.23	101.01	103.59	101.73	103.22	95.00	94.78
51	96.68	101.45	99.20	100.08	102.80	103.73	102.50	103.82	103.79	99.95	102.15	101.11	103.37	102.20	103.26	94.84	94.21
52	96.44	101.85	100.41	100.08	102.80	103.99	102.45	103.84	103.94	100.10	102.27	101.17	103.47	102.33	103.26	94.24	93.90
53	97.55	102.59	102.68	100.32	102.97	104.46	102.46	103.87	103.59	100.05	102.25	101.31	103.48	102.48	103.32	94.64	94.95
54	97.40	102.73	102.98	100.51	103.09	104.93	102.90	103.92	103.62	100.08	102.28	101.21	103.48	102.37	103.35	94.35	94.83
55	97.44	102.65	102.41	100.69	103.22	105.18	103.76	104.24	103.65	100.31	102.40	101.29	103.61	102.52	103.38	94.48	94.77
56	98.08	102.86	102.67	100.98	103.75	105.50	103.38	104.20	103.92	100.20	102.45	101.59	103.87	102.69	103.38	94.90	95.32
57	97.96	102.34	100.87	101.06	103.66	105.75	103.52	104.25	103.96	100.45	102.47	101.43	103.91	102.80	103.43	95.26	95.16
58	98.47	102.56	101.28	101.21	103.97	105.97	103.61	104.25	103.96	100.53	102.71	101.71	103.95	102.96	103.65	95.55	95.51
59	99.04	102.91	102.34	101.35	104.02	106.10	103.78	104.33	104.00	100.98	102.63	101.67	104.10	103.16	103.65	95.78	96.02
60	99.79	103.12	102.43	102.29	104.13	106.30	103.88	104.38	104.03	101.25	102.75	101.68	104.35	103.20	103.65	96.32	96.68
61	100.63	103.89	103.84	102.80	104.42	107.04	104.33	104.95	104.18	101.61	103.16	101.75	104.65	103.54	103.83	96.86	97.55
62	101.78	104.15	104.31	103.29	104.48	107.22	104.27	105.38	104.19	101.63	103.21	101.81	104.66	103.38	103.86	97.73	98.59
63	101.10	104.44	104.72	103.49	104.56	107.69	105.11	106.12	104.29	101.98	103.49	102.16	104.81	103.77	104.09	96.80	97.69
64	101.23	104.47	104.71	103.53	104.71	107.67	105.28	106.12	104.34	102.46	103.54	102.14	104.93	103.81	104.14	96.90	97.75
65	100.93	104.43	104.44	103.60	104.81	108.09	105.45	106.15	104.37	102.79	103.61	102.16	105.02	103.80	104.37	96.65	97.37
66	101.10	104.69	104.89	103.60	105.05	108.37	105.92	106.43	104.45	102.89	103.79	102.16	105.12	103.91	104.77	96.57	97.39

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
67	100.88	105.03	105.57	103.68	105.25	108.62	106.00	106.56	104.50	102.83	103.96	102.23	105.15	104.03	104.81	96.04	97.10
68	101.44	105.03	105.31	103.69	105.47	108.71	106.56	106.62	104.45	102.56	104.31	102.42	105.20	104.04	105.11	96.58	97.45
69	102.43	105.16	105.58	103.69	105.49	108.79	106.63	106.62	104.58	102.59	104.41	102.43	105.19	104.12	105.16	97.40	98.34
70	102.15	105.07	105.18	103.70	105.56	108.80	106.67	106.62	104.60	102.73	104.46	102.43	105.20	104.15	105.71	97.23	97.93
71	102.31	105.12	105.19	103.70	105.63	108.88	106.81	106.71	104.60	102.92	104.63	102.43	105.20	104.20	105.71	97.33	98.00
72	102.79	105.37	105.66	103.83	105.74	108.96	107.18	106.80	104.63	103.26	104.69	102.43	105.20	104.26	105.79	97.56	98.32
73	102.52	105.70	106.12	103.92	105.91	109.08	107.25	107.09	104.67	103.22	105.68	102.50	105.31	104.55	106.12	96.99	97.73
74	103.61	106.28	107.15	103.92	105.95	109.11	107.60	107.08	104.73	103.30	106.47	102.67	105.41	104.65	107.47	97.48	98.19
75	104.32	106.33	107.17	103.93	106.04	109.24	107.68	107.17	104.81	103.69	106.49	102.69	105.56	104.68	107.52	98.11	98.82
76	104.81	106.85	108.09	103.97	106.54	109.46	107.21	107.24	104.86	103.77	106.87	102.71	105.63	104.88	108.12	98.09	98.98
77	105.36	107.22	108.74	103.98	106.72	110.25	107.82	107.24	104.89	104.32	107.01	102.72	105.71	104.95	108.51	98.26	99.33
78	105.59	107.15	108.37	104.23	106.76	110.34	107.77	107.24	104.92	104.21	107.22	102.84	105.81	105.14	108.51	98.54	99.42
79	105.24	107.38	108.76	104.23	106.75	110.51	107.91	107.16	104.95	104.76	107.49	102.84	105.79	105.57	108.69	98.01	98.90
80	105.69	107.63	109.13	104.23	106.94	110.53	107.96	107.16	105.01	105.96	107.69	102.86	105.89	105.68	108.74	98.19	99.15
81	106.33	107.51	108.78	104.23	107.01	110.58	107.96	107.31	105.01	105.92	107.62	102.85	105.91	105.75	108.74	98.90	99.76
82	107.11	107.35	108.19	104.28	107.20	110.61	107.92	107.15	105.08	105.91	107.78	102.85	106.37	105.81	108.74	99.78	100.40
83	107.34	107.48	108.22	104.58	107.39	110.76	107.92	107.37	105.24	105.99	108.31	102.86	106.90	105.98	108.74	99.87	100.41
84	108.25	107.86	108.98	104.63	107.55	110.81	107.91	107.37	105.38	106.17	108.51	102.87	106.63	106.01	108.76	100.37	101.19

Lampiran 3. Normalisasi data

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
1	0.127974	0.115655	0.16402	0.1	0.1	0.1	0.1	0.1	0.256277	0.1	0.1	0.100633	0.584334	0.1	0.1	0.490391	0.216995
2	0.102001	0.1	0.139918	0.10713	0.117174	0.125234	0.131563	0.120366	0.1	0.112508	0.105389	0.1	0.227597	0.118512	0.114412	0.447715	0.172262
3	0.124744	0.103493	0.118578	0.125188	0.116563	0.127136	0.142851	0.105395	0.191912	0.109271	0.104299	0.135738	0.349513	0.136119	0.127723	0.510398	0.201013
4	0.107932	0.116959	0.1	0.144369	0.146678	0.138199	0.150815	0.105395	0.351734	0.122711	0.116108	0.14657	0.645617	0.148517	0.137772	0.424061	0.123017
5	0.1	0.131352	0.120932	0.158397	0.170933	0.143398	0.160423	0.107755	0.377781	0.12924	0.100545	0.160723	0.669805	0.178013	0.140637	0.363151	0.1
6	0.144049	0.162409	0.171489	0.174711	0.193641	0.148122	0.166195	0.141946	0.406418	0.142241	0.112898	0.165467	0.696023	0.19511	0.155755	0.423174	0.18442
7	0.195292	0.190605	0.220163	0.179283	0.203164	0.1809	0.179383	0.159344	0.456465	0.155681	0.114533	0.1661	0.748295	0.188939	0.166905	0.510398	0.29048
8	0.202207	0.207901	0.245991	0.191024	0.209309	0.187272	0.199694	0.176743	0.488102	0.164075	0.119378	0.172188	0.758523	0.191317	0.168712	0.489504	0.302638
9	0.276967	0.221662	0.266044	0.197612	0.212077	0.190823	0.200534	0.18814	0.516671	0.189145	0.127432	0.176221	0.787256	0.190864	0.180921	0.683171	0.460543
10	0.266086	0.230626	0.273074	0.201603	0.234785	0.197163	0.208498	0.201357	0.543263	0.188651	0.132821	0.178909	0.794237	0.197488	0.186298	0.62857	0.429191
11	0.295779	0.245018	0.291213	0.215902	0.242151	0.209906	0.213722	0.201964	0.543263	0.212844	0.153289	0.195118	0.805114	0.208924	0.191719	0.682284	0.475225
12	0.321998	0.278012	0.348611	0.250274	0.255662	0.217229	0.223878	0.206145	0.557513	0.22398	0.157043	0.225479	0.815341	0.21985	0.19313	0.679524	0.52447
13	0.339582	0.305197	0.414765	0.277166	0.261481	0.23514	0.246418	0.204392	0.46717	0.229082	0.169457	0.263985	0.491153	0.236551	0.217944	0.665923	0.563391
14	0.339091	0.303304	0.400894	0.281158	0.261481	0.241766	0.267277	0.206752	0.462533	0.235116	0.178056	0.294979	0.442045	0.237004	0.23196	0.668584	0.55001
15	0.313609	0.305534	0.397474	0.302625	0.262132	0.246489	0.272501	0.207359	0.471738	0.246252	0.173212	0.304467	0.442695	0.243175	0.235574	0.586781	0.488606
16	0.257662	0.287943	0.379774	0.309523	0.274382	0.267221	0.274693	0.214575	0.324188	0.229521	0.157588	0.32202	0.108279	0.256988	0.249237	0.463188	0.385758
17	0.2584	0.292741	0.38853	0.317544	0.283009	0.269821	0.275241	0.223544	0.304756	0.247679	0.156498	0.313244	0.100649	0.259819	0.253556	0.453135	0.384458
18	0.288339	0.319001	0.421387	0.350443	0.28423	0.292931	0.288429	0.239189	0.334893	0.268525	0.182356	0.330085	0.1	0.255063	0.253556	0.479549	0.43875
19	0.310135	0.330195	0.437392	0.363618	0.303561	0.310873	0.302164	0.246337	0.330802	0.285751	0.181266	0.334117	0.121672	0.256988	0.265765	0.516804	0.48096
20	0.32993	0.330826	0.424368	0.390782	0.305718	0.31864	0.321672	0.250586	0.320643	0.299685	0.190955	0.33815	0.126136	0.262197	0.276916	0.574067	0.515523
21	0.325227	0.339158	0.429703	0.400819	0.312473	0.329735	0.329928	0.252946	0.323165	0.308956	0.19259	0.362502	0.151055	0.277426	0.28053	0.540458	0.491206
22	0.305186	0.338527	0.412412	0.413412	0.349629	0.342225	0.340084	0.260769	0.327256	0.32289	0.201188	0.375944	0.165097	0.274142	0.291284	0.483196	0.436838

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
23	0.307397	0.353551	0.44188	0.424573	0.340716	0.347202	0.348048	0.261376	0.337961	0.322396	0.216267	0.361791	0.163799	0.282181	0.292033	0.454022	0.438138
24	0.323507	0.372783	0.467268	0.427169	0.349629	0.357569	0.364268	0.269738	0.344643	0.335397	0.186655	0.402273	0.170211	0.30126	0.320065	0.455895	0.438138
25	0.290339	0.400263	0.496297	0.448326	0.40583	0.379284	0.409603	0.301568	0.357394	0.350264	0.261502	0.409705	0.215503	0.311733	0.363214	0.294752	0.330778
26	0.279845	0.416718	0.514656	0.469523	0.423614	0.380932	0.420855	0.312358	0.385963	0.330789	0.257202	0.415082	0.232711	0.335963	0.381902	0.226648	0.294456
27	0.262085	0.420842	0.510388	0.481807	0.442985	0.384229	0.425531	0.322541	0.414054	0.342858	0.259867	0.415082	0.239123	0.347852	0.390188	0.165837	0.247352
28	0.245378	0.424629	0.500126	0.496997	0.462316	0.395546	0.424983	0.322541	0.410986	0.343791	0.268466	0.423858	0.235877	0.366874	0.399884	0.108969	0.190996
29	0.260751	0.432415	0.503766	0.506994	0.47367	0.400967	0.44007	0.330363	0.410509	0.36749	0.270646	0.436746	0.237825	0.376895	0.405261	0.135875	0.215236
30	0.286864	0.460821	0.533862	0.514163	0.549527	0.46253	0.475542	0.342367	0.445214	0.38093	0.286814	0.448211	0.260146	0.379273	0.406011	0.147702	0.261269
31	0.29434	0.485145	0.579303	0.518155	0.549201	0.469599	0.48705	0.366914	0.45851	0.374457	0.300257	0.458332	0.272321	0.396879	0.418925	0.115079	0.261575
32	0.317716	0.493014	0.584858	0.520751	0.557178	0.475749	0.49147	0.371769	0.49267	0.390201	0.313156	0.502135	0.278003	0.409221	0.425404	0.16426	0.299121
33	0.294095	0.491625	0.571834	0.53164	0.5538	0.480916	0.49695	0.381952	0.505421	0.389762	0.318	0.519688	0.286932	0.414486	0.439067	0.1	0.23787
34	0.31382	0.486533	0.543653	0.533345	0.550137	0.488017	0.507653	0.387954	0.551922	0.399966	0.337378	0.537952	0.302922	0.40973	0.451319	0.167513	0.26601
35	0.337757	0.487712	0.53813	0.541056	0.560271	0.494611	0.513973	0.387347	0.55499	0.39256	0.341193	0.548073	0.306088	0.423034	0.451319	0.233054	0.313726
36	0.354324	0.499537	0.560537	0.542218	0.568857	0.501458	0.517553	0.387954	0.566718	0.397168	0.343312	0.564281	0.304221	0.436848	0.451319	0.25385	0.345307
37	0.366503	0.522557	0.601491	0.543342	0.57838	0.518672	0.520841	0.467732	0.571354	0.399527	0.330959	0.562858	0.322727	0.481572	0.495526	0.237095	0.344236
38	0.376857	0.553151	0.643951	0.577985	0.593723	0.533761	0.555473	0.516893	0.581514	0.398594	0.356756	0.601364	0.349513	0.485875	0.505223	0.198756	0.346224
39	0.392019	0.563083	0.647591	0.591431	0.610327	0.5576	0.565629	0.536719	0.624947	0.391627	0.349247	0.620261	0.366071	0.507728	0.524307	0.219453	0.364882
40	0.413851	0.566744	0.643104	0.597166	0.615536	0.561595	0.584588	0.560727	0.632106	0.406494	0.362145	0.614173	0.396753	0.523919	0.532197	0.272478	0.394016
41	0.464744	0.573561	0.65142	0.600034	0.622291	0.565842	0.589264	0.564301	0.637697	0.409237	0.382613	0.614173	0.410795	0.527712	0.532197	0.39952	0.495183
42	0.481907	0.602094	0.69774	0.608055	0.646546	0.607117	0.591748	0.573877	0.653038	0.438037	0.396601	0.633781	0.426055	0.555339	0.533651	0.383947	0.514299
43	0.473904	0.633025	0.744029	0.616077	0.665592	0.613489	0.602708	0.623712	0.705608	0.422293	0.418159	0.647934	0.447159	0.55483	0.547667	0.29416	0.474613
44	0.468253	0.633446	0.728244	0.642117	0.670475	0.619861	0.610416	0.627893	0.711199	0.433429	0.422459	0.659399	0.464367	0.553414	0.547667	0.277603	0.456184
45	0.464884	0.624314	0.690899	0.650138	0.680934	0.622682	0.619768	0.625533	0.726063	0.457567	0.432692	0.670864	0.475812	0.585288	0.550884	0.288148	0.434162

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
46	0.469728	0.621494	0.661462	0.675016	0.681544	0.63048	0.62828	0.615283	0.734723	0.484009	0.45425	0.687073	0.500731	0.612915	0.552691	0.307663	0.422768
47	0.506862	0.626039	0.651012	0.691911	0.686753	0.63308	0.646399	0.6285	0.742359	0.519338	0.473083	0.693161	0.500731	0.614783	0.556305	0.400209	0.485395
48	0.519076	0.641652	0.672132	0.691911	0.68891	0.643446	0.658784	0.638076	0.753132	0.529102	0.482772	0.695849	0.530114	0.644788	0.579312	0.39952	0.485089
49	0.535958	0.66324	0.682802	0.711092	0.702747	0.663956	0.682127	0.649473	0.760223	0.563444	0.522073	0.747796	0.602192	0.666188	0.635375	0.398534	0.46039
50	0.513039	0.647207	0.633281	0.721981	0.708241	0.66868	0.694767	0.656689	0.782724	0.563005	0.519893	0.753173	0.630925	0.657639	0.65587	0.370839	0.409463
51	0.49391	0.630247	0.588279	0.723686	0.706735	0.675527	0.700539	0.660263	0.791383	0.558781	0.515048	0.760605	0.613068	0.684247	0.657677	0.355267	0.366259
52	0.485522	0.647165	0.626471	0.723686	0.706735	0.683769	0.698858	0.662084	0.801611	0.567174	0.522073	0.765349	0.621347	0.691381	0.657677	0.295343	0.34286
53	0.524551	0.678138	0.697521	0.732831	0.713491	0.698637	0.699151	0.663905	0.778156	0.564376	0.520983	0.776814	0.622646	0.699986	0.66019	0.334964	0.422615
54	0.519146	0.684282	0.707124	0.740271	0.718374	0.713726	0.715078	0.667479	0.780133	0.565748	0.522618	0.76867	0.621997	0.693758	0.661644	0.306973	0.413669
55	0.520726	0.680579	0.689204	0.74744	0.723909	0.721525	0.746678	0.689058	0.782178	0.57831	0.530126	0.774758	0.632792	0.702364	0.662702	0.319293	0.408928
56	0.542908	0.689542	0.697301	0.7586	0.745396	0.731669	0.73265	0.686091	0.800111	0.572715	0.532851	0.798399	0.653896	0.711875	0.662702	0.360392	0.450832
57	0.538661	0.667743	0.64075	0.761739	0.741734	0.739689	0.737618	0.689665	0.803111	0.58621	0.534426	0.786223	0.657062	0.718045	0.665258	0.395971	0.438826
58	0.556772	0.677128	0.653774	0.767474	0.754309	0.746537	0.740906	0.689665	0.803111	0.590379	0.548959	0.808519	0.660877	0.727556	0.674955	0.424948	0.465743
59	0.576848	0.691604	0.686851	0.772899	0.756466	0.750531	0.747226	0.69506	0.806179	0.615449	0.544115	0.80512	0.673052	0.738483	0.674955	0.44801	0.50497
60	0.603137	0.700316	0.689644	0.809286	0.760779	0.756903	0.751062	0.698095	0.808225	0.629877	0.551139	0.805831	0.692776	0.740861	0.674955	0.500345	0.554827
61	0.632549	0.73293	0.733987	0.829087	0.772622	0.780488	0.767391	0.736804	0.818179	0.649846	0.576028	0.811445	0.71737	0.760166	0.682712	0.554059	0.621353
62	0.672913	0.743872	0.748737	0.848075	0.775064	0.786194	0.765199	0.765801	0.818861	0.650943	0.579055	0.816189	0.718182	0.751107	0.684034	0.639805	0.701109
63	0.649046	0.756076	0.761604	0.855825	0.778319	0.801094	0.795886	0.815704	0.82568	0.670143	0.596011	0.843862	0.730357	0.773187	0.694171	0.548146	0.632671
64	0.653609	0.757338	0.76129	0.857375	0.784424	0.80046	0.802096	0.815704	0.829089	0.696475	0.599039	0.842281	0.740097	0.775451	0.696375	0.558002	0.637259
65	0.643079	0.755655	0.752817	0.860087	0.788493	0.813774	0.808306	0.817727	0.831134	0.714579	0.603278	0.843862	0.747403	0.774885	0.706512	0.533362	0.607742
66	0.649046	0.766597	0.766939	0.860087	0.79826	0.82265	0.825476	0.83661	0.836589	0.720064	0.614178	0.843862	0.755519	0.781112	0.724142	0.525477	0.609425
67	0.641324	0.780905	0.788279	0.863187	0.806399	0.830575	0.828399	0.845376	0.839998	0.716773	0.624472	0.849397	0.757955	0.787906	0.725905	0.473241	0.587555
68	0.660979	0.780905	0.780119	0.863575	0.815353	0.833428	0.848856	0.849423	0.836589	0.701961	0.645666	0.86442	0.762013	0.788472	0.739127	0.526463	0.613707

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
69	0.695727	0.786376	0.788592	0.863575	0.816166	0.835964	0.851413	0.849423	0.845453	0.703607	0.651722	0.865211	0.761201	0.793001	0.741331	0.607281	0.682068
70	0.685899	0.782588	0.77604	0.863962	0.819015	0.836282	0.852875	0.849423	0.846817	0.711287	0.65475	0.865211	0.762013	0.7947	0.765572	0.590526	0.650793
71	0.691515	0.784692	0.776353	0.863962	0.821864	0.838818	0.857989	0.855492	0.846817	0.72171	0.665044	0.865211	0.762013	0.79753	0.765572	0.600382	0.65584
72	0.708362	0.795213	0.791103	0.869	0.82634	0.841354	0.871506	0.861561	0.848862	0.740362	0.668678	0.865211	0.762013	0.800927	0.769098	0.62305	0.680845
73	0.698886	0.8091	0.805539	0.872487	0.833259	0.845158	0.874063	0.881118	0.85159	0.738168	0.728628	0.870745	0.770942	0.817345	0.783643	0.566872	0.6355
74	0.737143	0.833509	0.837863	0.872487	0.834887	0.846109	0.886849	0.880443	0.855681	0.742556	0.776467	0.884187	0.779058	0.823006	0.843144	0.615166	0.670522
75	0.762063	0.835613	0.838491	0.872875	0.838549	0.85023	0.889771	0.886513	0.861135	0.763951	0.777678	0.885768	0.791234	0.824705	0.845347	0.677258	0.71839
76	0.779261	0.857496	0.867362	0.874425	0.858897	0.857204	0.872601	0.891233	0.864544	0.76834	0.800689	0.887349	0.796916	0.836027	0.871792	0.675286	0.730855
77	0.798565	0.873067	0.887761	0.874812	0.866222	0.882248	0.894886	0.891233	0.86659	0.798512	0.809167	0.88814	0.803409	0.83999	0.888981	0.692041	0.757695
78	0.806638	0.870121	0.876149	0.8845	0.86785	0.885101	0.893059	0.891233	0.868635	0.792478	0.821883	0.897628	0.811526	0.850747	0.888981	0.719638	0.764653
79	0.794354	0.8798	0.888389	0.8845	0.867443	0.89049	0.898173	0.885838	0.870681	0.82265	0.838233	0.897628	0.809903	0.87509	0.896915	0.667402	0.725043
80	0.810148	0.890321	0.9	0.8845	0.875176	0.891124	0.9	0.885838	0.874772	0.88848	0.850344	0.899209	0.818019	0.881318	0.899119	0.685142	0.744313
81	0.832611	0.885271	0.889016	0.8845	0.878024	0.892709	0.9	0.895954	0.874772	0.886285	0.846106	0.898419	0.819643	0.885281	0.899119	0.755119	0.790652
82	0.859988	0.878538	0.870501	0.886437	0.885756	0.89366	0.898539	0.885164	0.879545	0.885737	0.855794	0.898419	0.856981	0.888677	0.899119	0.84185	0.839438
83	0.86806	0.884008	0.871442	0.898062	0.893489	0.898415	0.898539	0.9	0.890454	0.890125	0.887889	0.899209	0.9	0.898302	0.899119	0.850721	0.840509
84	0.9	0.9	0.895293	0.9	0.9	0.9	0.898173	0.9	0.9	0.9	0.9	0.9	0.878084	0.9	0.9	0.9	0.9

Lampiran 4. Rata-rata MAPE pengujian berdasarkan fungsi aktivasi dan jumlah *neuron* pada *hidden layer*

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 1							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	1.392424	1.382559	1.364473	1.379819	4.500921	4.458183	4.526285	4.49513
SigBiner	1.404283	1.395582	1.431778	1.410547	4.445948	4.44653	4.423905	4.438794
Tanh	1.476349	1.464692	1.462904	1.467981	4.368648	4.452046	4.404631	4.408442
Relu	1.244656	1.324571	1.175803	1.248343	4.875742	4.810292	4.944962	4.876999
Linear	1.259421	1.225189	1.245733	1.243448	4.849016	4.847196	4.873612	4.856608
LeakyRelu	1.234398	1.239774	1.275202	1.249791	4.83386	4.667363	4.933465	4.811563

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 5							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	1.050369	0.824405	0.84653	0.907101	5.061093	9.669353	4.683563	6.471337
SigBiner	1.073029	0.63714	0.586844	0.765671	5.556195	8.762626	11.88865	8.735824
Tanh	1.105161	1.130886	1.267109	1.167719	5.643875	9.677746	4.096295	6.472638
Relu	0.498316	0.347864	0.23006	0.358747	4.824391	3.989947	6.006242	4.940193
Linear	0.735064	0.396304	0.890876	0.674081	6.689486	3.795113	4.750691	5.07843
LeakyRelu	0.473738	0.10727	0.497589	0.359532	4.385572	5.430825	6.499187	5.438528

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 10							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	0.608741	0.609968	0.553149	0.590619	6.768909	8.522755	8.490112	7.927258
SigBiner	0.617464	0.555986	0.598133	0.590527	7.915794	8.058909	4.99193	6.988878
Tanh	0.843954	1.006386	0.759969	0.870103	17.69349	17.98598	30.83391	22.17112
Relu	0.077056	0.088567	0.068463	0.078029	6.413573	5.486533	6.696074	6.198727
Linear	0.123087	0.317501	0.251737	0.230775	4.880886	3.924051	4.808932	4.537956
LeakyRelu	0.087911	0.113658	0.088425	0.096665	7.509388	5.185506	6.551795	6.415563

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 15							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	0.426745	0.553953	0.470711	0.483803	7.454129	16.11103	8.32068	10.62861
SigBiner	0.448359	0.487849	0.413237	0.449815	3.497373	5.358517	5.215913	4.690601
Tanh	0.558349	0.699158	0.756305	0.67127	21.53852	21.54402	31.58947	24.89067
Relu	0.025104	0.04573	0.043869	0.038234	6.954566	6.706701	6.096101	6.585789
Linear	0.026459	0.042811	0.035979	0.035083	7.345378	6.621525	7.093884	7.020262
LeakyRelu	0.033484	0.02519	0.027717	0.028797	6.590709	6.727062	6.714905	6.677559

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 20							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	0.442966	0.367275	0.393795	0.401345	9.429283	15.78646	7.533444	10.9164
SigBiner	0.368115	0.403723	0.469585	0.413808	10.8326	7.469245	25.85015	14.71733
Tanh	0.555731	0.526355	0.569048	0.550378	28.78015	23.70687	55.27605	35.92102
Relu	0.024144	0.024144	0.024144	0.024144	7.055949	7.055949	7.055949	7.055949
Linear	0.024144	0.024144	0.024144	0.024144	7.055949	7.055949	7.055949	7.055949
LeakyRelu	0.024144	0.024144	0.024144	0.024144	7.055949	7.055949	7.055949	7.055949

Fungsi Aktivasi	MAPE pada percobaan i dengan <i>hidden neuron</i> sebanyak 30							
	Training				Testing			
	1	2	3	Rata-rata	1	2	3	Rata-rata
Sigbipolar	0.334106184	0.186506536	0.284762585	0.268458435	8.619583191	33.5204048	71.14376282	37.76125027
SigBiner	0.199887239	0.235345983	0.259948001	0.231727074	23.78235924	9.923666193	41.62828785	25.11143776
Tanh	0.481764368	0.498012785	0.472742086	0.48417308	52.84128897	27.01797409	257.9052249	112.5881627
Relu	0.024143557	0.024143557	0.024143557	0.024143557	7.055948575	7.055948575	7.055948575	7.055948575
Linear	0.024143557	0.024143557	0.024143557	0.024143557	7.055948575	7.055948575	7.055948575	7.055948575
LeakyRelu	0.024143557	0.024143557	0.024143557	0.024143557	7.055948575	7.055948575	7.055948575	7.055948575

Lampiran 5. Nilai MAPE berdasarkan kombinasi jumlah *neuron input* dan variasi jumlah data yang digunakan

Banyak Neuron Input	MAPE pada i-tahun terakhir											
	Training						Testing					
	7	6	5	4	3	2	7	6	5	4	3	2
1	0.948085	1.43562	1.064474	0.690144	0.859878	0.557516	4.748675	3.089774	3.307839	3.635821	2.948424	1.583082
2	0.589091	1.83753	1.176162	0.94361	1.158879	0.628148	5.446291	3.213568	3.078007	2.603652	2.062815	1.685998
3	0.220315	2.047677	1.257761	0.94361	1.162449	0.667763	6.6396	2.428226	2.89716	2.603652	2.064293	1.626789
4	0.207317	2.068443	1.261985	0.94361	1.170632	0.668585	6.507197	2.617012	2.93378	2.603652	1.989701	1.576583
5	0.204474	2.067294	1.262266	0.94361	1.315251	0.711829	6.628949	2.44943	2.970561	2.603652	2.906186	1.672562
6	0.158208	2.062578	1.288996	0.94361	1.315251	0.714785	6.351732	2.414594	4.170365	2.603652	2.906186	7.143287
7	0.085858	2.059028	1.287963	0.94361	1.315251	0.748832	6.04063	2.575118	3.650482	2.603652	2.906186	2.046218
8	0.075722	2.05849	1.299785	0.94361	1.315251	0.757467	5.811131	2.693867	3.67644	2.603652	2.906186	2.791721
9	0.070379	2.062002	1.292236	0.94361	1.315251	0.756681	6.091572	2.09193	3.365532	2.603652	2.906186	2.755249
10	0.148525	2.061846	1.293613	0.945427	1.315132	0.752351	5.859612	2.103933	3.41345	2.861013	2.950541	3.516426
11	0.053551	2.06197	1.292765	0.942123	1.318483	0.749642	6.02875	2.181334	3.199618	2.538064	2.473205	2.318759
12	0.068686	2.061713	1.298187	0.934665	1.311573	0.758123	6.331761	2.821641	3.62279	2.759132	3.251159	1.869371
13	0.069915	2.055517	1.295085	0.943359	1.309631	0.743735	6.889474	2.154065	3.5577	2.549451	3.053677	1.860547
14	0.056341	2.059095	1.310766	0.934128	1.31866	0.750247	6.035988	2.104805	4.045978	2.627581	2.283158	2.131903
15	0.156922	2.060753	1.305239	0.937772	1.287645	0.750402	7.186568	2.367296	3.746432	2.827067	3.782253	2.019831
16	0.102891	2.066459	1.295949	0.949596	1.308589	0.73798	6.460132	2.189813	4.164285	2.629553	3.077295	1.669113

Lampiran 6. Hasil peramalan keadaan setiap variabel *input*

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
1	85.98	89.14	85.55	84.27	88.48	86.45	87.02	95.63	95.73	91.82	95.44	93.03	101.78	92.34	90.92	95.99	91.92
2	86.20	89.02	85.04	84.22	88.20	85.95	86.46	95.56	96.24	91.70	95.37	92.91	103.08	92.12	90.80	96.13	92.10
3	85.30	88.52	84.16	84.35	88.52	86.52	87.11	95.93	93.90	91.90	95.41	92.83	99.07	92.37	91.14	95.68	91.43
4	86.10	88.91	83.54	84.92	88.50	86.69	87.53	95.62	94.69	91.85	95.40	93.27	99.41	92.72	91.49	96.38	91.94
5	85.62	89.49	83.03	85.51	89.26	87.01	87.77	95.57	97.39	92.08	95.56	93.50	103.26	92.97	91.72	95.49	90.73
6	85.30	89.93	84.78	85.89	90.00	87.20	88.02	95.62	98.39	92.23	95.40	93.69	104.66	93.54	91.72	94.63	90.32
7	86.91	90.96	87.36	86.31	90.65	87.33	88.16	96.30	98.88	92.50	95.50	93.75	105.20	93.89	92.09	95.29	91.86
8	88.90	91.67	89.01	86.33	90.90	88.33	88.48	96.65	99.56	92.77	95.56	93.72	105.78	93.72	92.38	96.52	93.84
9	89.12	91.88	89.23	86.60	90.98	88.74	89.07	96.92	100.01	92.95	95.64	93.77	105.87	93.65	92.36	96.46	94.03
10	91.56	92.10	89.61	86.74	90.95	88.85	89.15	97.04	100.37	93.43	95.78	93.80	106.07	93.57	92.64	98.65	96.45
11	91.06	92.19	89.44	86.79	91.46	88.98	89.31	97.22	100.70	93.44	95.89	93.82	106.07	93.66	92.75	98.23	95.80
12	91.72	92.62	90.26	87.21	91.69	89.32	89.42	97.16	100.62	93.86	96.21	94.03	106.09	93.89	92.84	98.58	96.18
13	92.48	93.75	93.19	88.34	92.01	89.57	89.66	97.17	100.70	94.11	96.36	94.46	106.13	94.13	92.83	98.46	96.83
14	92.93	94.39	95.71	89.19	92.14	90.12	90.30	97.10	99.24	94.18	96.57	95.04	102.14	94.46	93.53	98.18	97.34
15	92.71	93.80	93.19	89.12	92.08	90.40	90.97	97.12	98.78	94.24	96.73	95.53	100.45	94.48	93.92	98.09	96.94
16	91.58	93.79	93.01	89.65	92.02	90.54	91.19	97.12	98.86	94.42	96.70	95.67	100.22	94.55	93.94	97.08	95.72
17	89.39	93.02	92.05	89.75	92.30	91.13	91.20	97.26	96.70	94.06	96.43	95.84	96.36	94.79	94.24	95.49	93.87
18	89.35	93.43	92.98	89.88	92.55	91.29	91.13	97.43	95.97	94.33	96.29	95.68	95.46	94.85	94.29	95.25	93.86
19	90.68	94.53	94.79	90.92	92.59	91.97	91.41	97.71	96.44	94.79	96.60	95.81	95.60	94.72	94.21	95.71	95.03
20	91.70	94.65	94.97	91.27	93.06	92.63	91.81	97.83	96.66	95.18	96.69	95.84	96.25	94.70	94.52	96.36	95.94
21	92.46	94.43	93.71	92.04	93.17	92.94	92.40	97.85	96.66	95.49	96.85	95.87	96.74	94.78	94.82	97.19	96.54
22	92.20	94.69	94.23	92.22	93.30	93.25	92.70	97.86	96.76	95.65	96.92	96.17	97.31	95.09	94.89	96.90	96.04

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
23	91.30	94.55	93.15	92.45	94.29	93.62	92.96	97.97	96.89	95.89	97.05	96.39	97.72	95.06	95.13	96.11	94.98
24	91.27	95.16	95.25	92.70	94.16	93.76	93.16	97.96	97.11	95.85	97.28	96.20	97.84	95.19	95.11	95.64	94.93
25	91.89	95.74	96.14	92.66	94.27	94.03	93.59	98.09	97.27	96.04	96.94	96.68	97.95	95.56	95.88	95.64	95.02
26	90.74	96.59	97.18	93.28	95.75	94.69	94.88	98.72	97.49	96.33	97.83	96.85	98.52	95.80	97.14	93.82	93.27
27	90.26	96.83	97.48	93.95	96.41	94.84	95.41	98.90	97.96	95.93	98.10	96.91	98.86	96.28	97.61	92.84	92.63
28	89.69	96.64	96.71	94.26	96.90	94.88	95.52	99.02	98.46	96.05	98.18	96.87	98.98	96.53	97.64	92.18	92.03
29	89.16	96.67	96.11	94.62	97.35	95.16	95.39	98.94	98.48	96.09	98.29	96.95	98.92	96.87	97.74	91.64	91.26
30	89.83	96.92	96.55	94.83	97.57	95.34	95.67	99.02	98.40	96.55	98.32	97.11	98.88	97.04	97.78	92.11	91.86
31	90.95	97.97	98.28	94.94	99.53	97.23	96.65	99.22	98.86	96.90	98.51	97.27	99.11	97.03	97.69	92.51	92.87
32	91.29	98.58	100.27	94.98	99.73	97.88	97.13	99.69	99.13	96.77	98.75	97.41	99.29	97.31	98.02	92.27	92.98
33	92.07	98.48	99.46	94.97	99.75	98.09	97.24	99.73	99.65	97.01	98.98	98.00	99.38	97.55	98.17	92.86	93.57
34	91.15	98.20	98.37	95.29	99.46	98.14	97.30	99.85	99.90	97.01	99.10	98.32	99.48	97.63	98.52	92.21	92.51
35	91.68	97.95	96.98	95.31	99.18	98.23	97.52	99.91	100.59	97.18	99.37	98.56	99.66	97.49	98.83	92.91	92.86
36	92.56	98.05	97.32	95.52	99.33	98.36	97.66	99.85	100.70	97.02	99.49	98.67	99.72	97.69	98.76	93.81	93.73
37	93.14	98.55	98.87	95.51	99.55	98.53	97.73	99.82	100.80	97.04	99.52	98.84	99.68	97.97	98.67	94.14	94.29
38	93.49	99.36	100.82	95.50	99.82	99.03	97.78	101.38	100.82	97.09	99.32	98.80	99.87	98.88	99.94	93.89	94.19
39	93.74	100.29	102.30	96.67	100.23	99.58	98.70	102.34	100.91	97.07	99.58	99.25	100.22	99.05	100.22	93.32	94.10
40	94.16	100.19	101.40	97.11	100.70	100.38	99.17	102.54	101.54	96.90	99.56	99.56	100.48	99.40	100.65	93.44	94.34
41	94.85	100.08	100.86	97.15	100.86	100.62	99.72	102.79	101.74	97.17	99.70	99.49	100.89	99.69	100.76	94.09	94.80
42	96.61	100.25	101.42	97.10	100.98	100.70	99.87	102.69	101.79	97.28	100.02	99.41	101.11	99.71	100.62	95.68	96.48
43	97.16	101.33	103.97	97.28	101.58	101.89	99.87	102.73	101.97	97.87	100.32	99.60	101.30	100.18	100.56	95.64	96.77
44	96.60	102.22	105.61	97.49	102.14	102.32	100.08	103.63	102.75	97.63	100.69	99.81	101.55	100.17	100.93	94.40	95.87
45	96.13	101.71	103.47	98.35	102.28	102.49	100.28	103.66	102.96	97.76	100.85	99.98	101.76	100.06	100.90	93.93	95.35

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
46	95.87	101.18	101.43	98.54	102.48	102.50	100.53	103.47	103.14	98.25	101.00	100.12	101.90	100.63	100.93	94.01	94.93
47	96.00	101.15	100.57	99.26	102.44	102.64	100.76	103.17	103.23	98.84	101.32	100.33	102.18	101.23	100.95	94.31	94.75
48	97.37	101.41	100.77	99.73	102.49	102.67	101.26	103.38	103.30	99.59	101.66	100.41	102.21	101.28	101.03	95.47	95.87
49	97.86	102.02	102.37	99.56	102.50	102.94	101.67	103.59	103.42	99.83	101.87	100.42	102.51	101.80	101.69	95.61	95.96
50	98.35	102.69	102.58	100.08	102.84	103.59	102.34	103.79	103.50	100.45	102.44	101.09	103.43	102.23	103.36	95.51	95.47
51	97.40	101.68	99.36	100.37	103.02	103.84	102.76	103.89	103.81	100.43	102.57	101.26	103.97	102.02	103.90	95.09	94.54
52	96.50	101.09	97.78	100.30	102.96	104.05	102.91	103.92	103.98	100.21	102.49	101.33	103.80	102.43	103.72	94.80	93.79
53	96.15	102.06	101.20	100.19	102.90	104.28	102.79	103.91	104.12	100.26	102.50	101.35	103.75	102.57	103.50	94.06	93.47
54	97.64	103.21	104.73	100.46	103.04	104.73	102.68	103.92	103.74	100.16	102.45	101.45	103.68	102.69	103.45	94.46	94.97
55	97.61	103.00	103.57	100.68	103.18	105.25	103.05	103.96	103.65	100.14	102.42	101.33	103.61	102.52	103.43	94.25	94.99
56	97.57	102.65	102.01	100.87	103.33	105.55	103.97	104.38	103.65	100.37	102.49	101.35	103.69	102.61	103.43	94.40	94.85
57	98.33	103.01	102.82	101.20	103.91	105.85	103.75	104.31	103.93	100.28	102.54	101.66	103.95	102.79	103.41	94.94	95.51
58	98.17	101.99	99.38	101.24	103.88	106.09	103.75	104.32	104.03	100.51	102.55	101.54	104.03	102.92	103.46	95.44	95.31
59	98.72	102.63	101.38	101.37	104.15	106.29	103.78	104.29	104.04	100.63	102.75	101.78	104.07	103.09	103.74	95.81	95.67
60	99.41	103.20	103.26	101.50	104.20	106.39	103.91	104.38	104.06	101.12	102.74	101.77	104.19	103.30	103.74	96.05	96.31
61	100.31	103.35	102.66	102.72	104.28	106.54	104.01	104.43	104.08	101.48	102.82	101.75	104.45	103.34	103.70	96.63	97.12
62	101.29	104.53	105.06	103.34	104.57	107.25	104.46	105.18	104.23	101.88	103.18	101.80	104.79	103.69	103.91	97.26	98.16
63	102.61	104.51	104.91	103.82	104.65	107.56	104.47	105.73	104.26	101.89	103.34	101.86	104.85	103.52	103.94	98.24	99.38
64	101.59	104.74	105.15	103.90	104.70	108.02	105.28	106.62	104.35	102.21	103.60	102.23	104.97	103.89	104.21	97.16	98.04
65	101.42	104.57	104.77	103.77	104.83	108.04	105.60	106.50	104.41	102.73	103.71	102.27	105.08	103.97	104.26	96.96	97.80
66	100.94	104.42	104.22	103.74	104.93	108.37	105.77	106.36	104.43	103.12	103.78	102.26	105.16	103.92	104.51	96.62	97.26
67	101.09	104.88	105.23	103.67	105.18	108.66	106.21	106.62	104.51	103.20	103.92	102.23	105.25	104.00	105.01	96.47	97.26
68	100.83	105.34	106.20	103.74	105.41	108.91	106.32	106.74	104.56	103.06	104.09	102.28	105.27	104.12	105.02	95.86	96.94

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
69	101.53	105.11	105.19	103.73	105.65	108.99	106.83	106.75	104.50	102.66	104.42	102.48	105.29	104.12	105.32	96.45	97.42
70	102.85	105.27	105.78	103.71	105.67	109.03	106.96	106.69	104.61	102.58	104.59	102.52	105.27	104.19	105.33	97.55	98.64
71	102.50	105.03	104.88	103.71	105.69	108.99	106.94	106.66	104.65	102.73	104.66	102.50	105.25	104.21	105.98	97.49	98.14
72	102.51	105.15	105.15	103.71	105.73	109.01	107.01	106.76	104.64	102.97	104.79	102.48	105.24	104.25	105.94	97.51	98.08
73	103.04	105.57	106.05	103.88	105.83	109.06	107.35	106.87	104.66	103.38	104.86	102.46	105.22	104.31	105.94	97.72	98.45
74	102.67	106.00	106.57	104.00	106.01	109.17	107.46	107.24	104.70	103.38	105.68	102.52	105.32	104.64	106.31	97.04	97.68
75	103.95	106.79	108.09	103.97	106.06	109.21	107.79	107.20	104.76	103.42	106.62	102.71	105.44	104.78	108.05	97.47	98.20
76	104.88	106.50	107.34	103.96	106.14	109.32	107.90	107.26	104.85	103.82	106.93	102.76	105.61	104.80	108.07	98.29	99.08
77	105.40	107.28	108.88	104.00	106.67	109.55	107.39	107.32	104.91	103.95	107.27	102.77	105.71	104.99	108.62	98.34	99.28
78	105.93	107.61	109.42	104.00	106.94	110.36	107.84	107.29	104.94	104.53	107.44	102.77	105.80	105.07	108.98	98.47	99.64
79	106.06	107.19	108.17	104.33	106.97	110.63	107.89	107.27	104.97	104.46	107.59	102.88	105.90	105.26	108.82	98.74	99.67
80	105.44	107.56	109.05	104.32	106.90	110.80	108.02	107.14	104.99	104.98	107.81	102.89	105.88	105.75	108.90	98.11	98.90
81	105.85	107.86	109.49	104.28	107.05	110.79	108.07	107.14	105.05	106.35	107.99	102.90	105.95	105.91	108.89	98.17	99.12
82	106.65	107.48	108.54	104.25	107.12	110.77	108.05	107.35	105.05	106.45	107.94	102.88	105.98	105.94	108.82	99.02	99.95
83	107.62	107.22	107.65	104.31	107.31	110.75	107.98	107.14	105.11	106.30	108.00	102.87	106.42	105.95	108.78	100.15	100.80
84	107.84	107.54	108.16	104.71	107.53	110.86	107.95	107.42	105.28	106.23	108.43	102.87	107.04	106.10	108.76	100.33	100.75
85	108.82	108.17	109.61	104.76	107.70	110.91	107.93	107.43	105.46	106.35	108.72	102.88	106.90	106.12	108.77	100.78	101.61
86	109.45	108.48	110.25	104.88	107.86	111.00	107.93	107.48	105.56	106.51	108.96	102.89	107.07	106.22	108.79	101.21	102.09
87	110.07	108.79	110.89	105.00	108.02	111.09	107.94	107.53	105.66	106.68	109.19	102.90	107.24	106.32	108.80	101.63	102.57
88	110.70	109.10	111.53	105.12	108.18	111.18	107.94	107.58	105.76	106.84	109.43	102.91	107.40	106.42	108.81	102.05	103.04
89	111.33	109.41	112.16	105.24	108.34	111.27	107.95	107.63	105.86	107.01	109.66	102.91	107.57	106.52	108.83	102.47	103.52
90	111.95	109.72	112.80	105.36	108.50	111.36	107.95	107.68	105.96	107.17	109.90	102.92	107.74	106.61	108.84	102.90	104.00
91	112.58	110.03	113.44	105.48	108.66	111.45	107.96	107.73	106.06	107.34	110.14	102.93	107.91	106.71	108.86	103.32	104.48

t	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	Y
92	113.20	110.35	114.08	105.60	108.82	111.54	107.96	107.78	106.16	107.50	110.37	102.94	108.07	106.81	108.87	103.74	104.95
93	113.83	110.66	114.72	105.72	108.98	111.63	107.97	107.83	106.26	107.66	110.61	102.95	108.24	106.91	108.88	104.16	105.43
94	114.46	110.97	115.35	105.84	109.14	111.72	107.97	107.88	106.36	107.83	110.85	102.96	108.41	107.00	108.90	104.59	105.91
95	115.08	111.28	115.99	105.96	109.30	111.81	107.98	107.93	106.46	107.99	111.08	102.97	108.57	107.10	108.91	105.01	106.39
96	115.71	111.59	116.63	106.08	109.46	111.90	107.98	107.98	106.56	108.16	111.32	102.98	108.74	107.20	108.92	105.43	106.86

Lampiran 7. Source Code Program

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from scipy.linalg import pinv
#Import Data
from google.colab import drive
drive.mount('/content/drive')
df=pd.read_excel('/content/drive/MyDrive/Data Hasil/data input.xlsx')
df.head()
#set date as index
df.set_index('t', inplace=True)
plt.plot(df['Y'],'c') #'bo--'
#plt.title('Nilai Tukar Petani Sulawesi Selatan', fontsize=10)
# set label X dan Y
plt.xlabel('Periode')
plt.ylabel('Nilai Tukar Petani')
#plt.grid()
plt.show()
def normFunc(dataMentah):
    (m,n)=dataMentah.shape
    global x_max
    global x_min
    x_max = np.array(np.zeros([n, 1]))
    x_min = np.array(np.zeros([n, 1]))
    for i in range(0, n):
        x_max[i] = max(dataMentah[:, i])
        x_min[i] = min(dataMentah[:, i])
    x_norm = np.array(np.zeros([m, n]))
    for j in range(0, m):
        for j2 in range(0, n):
```

```

    x_norm[j, j2] = (0.8 * (dataMentah[j, j2] - x_min[j2]) / (x_max[j2] - x_min[j2])
) + 0.1
return x_norm
def sigBiner(x,sigma):
return (1/(1+np.exp(-(sigma*x))))
def sigBipolar(x,sigma):
return ((1 - np.exp(-(sigma*x)))/(1 + np.exp(-(sigma*x))))
def pseudoInverse(A):
ntpA = np.transpose(A)
ntpB = np.dot(ntpA, A)
ntpC = np.linalg.inv(ntpB)
return np.dot(ntpC, ntpA)
def MAPE(prediksi, aktual):
return (np.mean(np.abs((aktual - prediksi)/aktual)) * 100)
def elmlatih(datainput,target,hidden):
(m,n)=np.shape(datainput)
b=np.random.uniform(0.1,0.9,(1,hidden))
w=np.random.uniform(0.1,0.9,(n,hidden))
z=np.array(np.zeros([m,hidden]))
for i in range(len(datainput)):
z[i]=np.dot(datainput[i],w)+b
H=sigBipolar(z,1)
#H=sigBiner(z,1)
T=target
(m2,n2)=np.shape(H)
if m2==n2:
H_inv=np.linalg.inv(H)
else:
H_inv= pinv2(H)
beta=np.dot(H_inv,np.transpose(T))
Y=np.dot(H,beta)
return (beta,w,b,Y)

```

```

def elmtes(data,w,b,beta):
    z=np.dot(data,w)+b
    H_test=sigBipolar(z,1)
    #H_test=sigBiner(z,1)
    T=np.dot(H_test,beta)
    return T

def denormalisasi1(dataNorm,skalaMax,skalaMin):
    y = (np.dot(np.subtract(dataNorm,0.1),(skalaMax-skalaMin))/0.8)+skalaMin
    return y

# Splitting Train and Test Length
train_len = int(np.ceil(len(df) * 0.80))

train=df[0:train_len]
test=df[train_len:]
ltr = len(train)
lte = len(test)
print("Train data length :",ltr)
print("Test data length :",lte)

NTP=df
var = NTP.loc[:,['X1']]
varntp=np.array(var)
target1=NTP.loc[:, 'Y']
target=np.array(target1)
datalatihawal=varntp[:ltr]
datatestingawal=varntp[ltr:ltr+lte]
targetlatihawal=target[:ltr]
targettestingawal=target[ltr:ltr+lte]

datamax = max(target1)
datamin = min(target1)

```



```

#normalisasi
dataarray = np.array(NTP)
datafull = normFunc(dataarray)
datalatih=normFunc(datalatihawal)
datatesting=normFunc(datatestingawal)
target1=datafull[:,lte]
targetlatih=target1[:ltr]
targettesting=target1[ltr:ltr+lte]

#Training
(beta,w,b,Y)=elmlatih(datalatih,targetlatih,nh)
Ytrain=Y
eror_MAPE=MAPE(Ytrain,targetlatih)
print("error MAPE training", eror_MAPE)

#Testing
T=elmtes(datatesting,w,b,beta)
eror_MAPEI=MAPE(T,targettesting)
print("error MAPE testing", eror_MAPEI)

#Denorm
Tdenorm= denormalisasi1(T,datamax,datamin)
eror_MAPEI=MAPE(Tdenorm,targettestingawal)
print("error MAPE testing", eror_MAPEI)

#PlotTrain
plt.plot(targetlatihawal,'.:c',label='NILAI AKTUAL') #'bo--'
plt.plot(Ytrain,'b',label='NILAI PREDIKSI') #'bo--'
plt.ylabel('Nilai Tukar Petani')
plt.xlabel('Periode')
plt.grid()
plt.legend(loc='best')
plt.show()

```

```
#PlotTest
plt.plot(targettestingawal,':c',label='NILAI AKTUAL') #'bo--'
plt.plot(Tdenorm,'r',label='NILAI PREDIKSI') #'bo--'
plt.ylabel('Nilai Tukar Petani')
plt.xlabel('Periode')
plt.grid()
plt.legend(loc='best')
plt.show()
```

