DAFTAR PUSTAKA

Abdullah, S. E. A. N. (2021). Analisis Hubungan Indeks Nino 3.4 Dengan Curah Hujan Di Jawa Tengah. *Buletin Meteorologi, Klimatologi, Dan Geofisika*, *1*(1), 24–30.

Anderson, W. B., Han, E., Baethgen, W., Goddard, L., Muñoz, Á. G., & Robertson, A. W. (2020). The Madden-Julian Oscillation Affects Maize Yields Throughout the Tropics and Subtropics. *Geophysical Research Letters*, *47*(11), e2020GL087004. https://doi.org/10.1029/2020GL087004

Anderson, W. B., Seager, R., Baethgen, W., Cane, M., & You, L. (2019). Synchronous crop failures and climate-forced production variability. *Science Advances*, *5*(7), eaaw1976. https://doi.org/10.1126/sciadv.aaw1976

Arcodia, M. C., Kirtman, B. P., & Siqueira, L. S. P. (2020). How MJO Teleconnections and ENSO Interference Impacts U.S. Precipitation. *Journal of Climate*, *33*(11), 4621–4640. https://doi.org/10.1175/JCLI-D-19-0448.1

Arias, P. A., Rivera, J. A., Sörensson, A. A., Zachariah, M., Barnes, C., Philip, S., Kew, S., Vautard, R., Koren, G., Pinto, I., Vahlberg, M., Singh, R., Raju, E., Li, S., Yang, W., Vecchi, G. A., & Otto, F. E. L. (2024). Interplay between climate change and climate variability: The 2022 drought in Central South Amerika. *Climatic Change*, *177*(1), 6. https://doi.org/10.1007/s10584-023-03664-4

Ariska, A., Baeda, A. Y., & Umar, H. (2022). Telaah Hubungan El Nino-Southern Oscillation (Enso) Dengan Madden-Julian Oscillation (Mjo) Di Provinsi Aceh. *Zona Laut Jurnal Inovasi Sains Dan Teknologi Kelautan*, 1–6. https://doi.org/10.62012/zl.v3i1.20525

Bappenas. (2018). *Kaji Ulang RAN API: Kajian Basis Ilmiah Proyeksi Iklim Atmosferik*. Bappenas.

BMKG, B. (2024). *ENSO | Informasi Iklim BMKG* [Badan Meteorologi Klimatologi dan Geofisika]. https://iklim.bmkg.go.id/id/enso/

BPS, B. P. S. (2023). *Impor Kedelai menurut Negara Asal Utama, 2017-2023—Tabel Statistik*. Badan Pusat Statistik. https://www.bps.go.id/id/statistics-table/1/MjAxNSMx/impor-kedelai-menurut-negara-asal-utama--2017-2023.html

Chang, P., & Zebiak, S. E. (2015). Tropical Meteorology & Climate | El Niño and the Southern Oscillation. In *Encyclopedia of Atmospheric Sciences* (pp. 97–101). Elsevier. https://doi.org/10.1016/B978-0-12-382225-3.00149-3

CLIVAR. (n.d.). *Amerikan Monsoon*. Retrieved November 14, 2024, from https://www.clivar.org/Amerikan-monsoon

Firdaus, M., Hafiyusholeh, M., & Widodo, S. (2020). Prediksi Nilai Jual Objek Pajak (NJOP) Tanah di Kabupaten Gresik Menggunakan Regresi Polinomial. *Jurnal Matematika Algebra*, *1*(1), 81–89.

Gottschalck, J. (2014, December 31). *What is the MJO, and why do we care? | NOAA Climate.gov*. National Oceanic Atmospheric Administrations.

https://www.climate.gov/news-features/blogs/enso/what-mjo-and-why-do-we-care

Goulart, H. M. D., Van Der Wiel, K., Folberth, C., Boere, E., & Van Den Hurk, B. (2023). Increase of Simultaneous Soybean Failures Due To Climate Change. *Earth's Future*, *11*(4), e2022EF003106. https://doi.org/10.1029/2022EF003106

Grace, N., Nurjanah, R., & Mustika, C. (2021). Analisis faktor-faktor yang mempengaruhi impor kedelai di Indonesia. *E-Journal Perdagangan Industri Dan Moneter*, *9*(2), 97–106. https://doi.org/10.22437/pim.v9i2.6863

Hasibuan, M. A., Atmojo, D. A., Wahyujati, H., Hakim, F. N., & Giarno, G. (2023). Analisis Korelasi Statistikal Fenomena Kejadian ENSO dan MJO terhadap Kondisi Klimatologis di Provinsi Riau. *GeographiA : Jurnal Pendidikan Dan Penelitian Geografi*, *4*(2), 104–111. https://doi.org/10.53682/gjppg.v4i2.7243

Hayati, I. (2020). Perancangan Kursi Kerja Pada Stasiun Pengupasan Pisang Menggunakan Metode Antropometri di IKM Keripik Pisang Cipaku—Ciamis. *Jurnal Mahasiswa Industri Galuh*, *1*(1), 147–152.

He, C., Li, T., & Zhou, W. (2020). Drier North Amerikan Monsoon in Contrast to Asian–African Monsoon under Global Warming. *Journal of Climate*, *33*(22), 9801–9816. https://doi.org/10.1175/JCLI-D-20-0189.1

Herlina, N., Fajriani, S., & Rahman, F. A. (2019). Evaluasi Perubahan Iklim dan Pengaruhnya terhadap Pola Tanam, Waktu Tanam serta Produktivitas Kedelai (Glycine max L. Merrill) Di Kabupaten Malang Jawa Timur. *Jurnal Lahan Suboptimal*, *7*(2). https://doi.org/10.33230/JLSO.7.2.2018.351

Hermawan, E. (2015a). *Index Monsun Asia-Australia dan Aplikaasinya*. LIPI Press. https://karya.brin.go.id/id/eprint/11163/1/Buku_Edy%20Hermawan_PSTA_2015.pdf

Hermawan, E. (2015b). *Index Monsun Asia-Australia dan Aplikasinya*. LIPI Press. https://doi.org/10.14203/press.38

Hulu, A. (2023). Studi Inovasi Strategi Kebijakan Percepatan Pencapaian Swasembada Kedelai Indonesia Tahun 2035. *Matra Pembaruan*, *7*(1), 13–23. https://doi.org/10.21787/mp.7.1.2023.13-23

Jong, B.-T., Ting, M., & Seager, R. (2021). Assessing ENSO Summer Teleconnections, Impacts, and Predictability in North Amerika. *Journal of Climate*, *34*(9), 3629–3643. https://doi.org/10.1175/JCLI-D-20-0761.1

Lin, H., Brunet, G., & Mo, R. (2010). Impact of the Madden–Julian Oscillation on Wintertime Precipitation in Canada. *Monthly Weather Review*, *138*(10), 3822–3839. https://doi.org/10.1175/2010MWR3363.1

Madani, N., Hermawan, E., & Faqih, A. (2012). Pengembangan Model Prediksi Madden-Julian Oscillation (MJO) Berbasis Hasil Analisis Data Wind Profiler Radar (WPR). *Jurnal Meteorologi Dan Geofisika*, *13*(1). https://doi.org/10.31172/jmg.v13i1.117

Maharani, S., & Rejeki, H. A. (2021). Pengaruh Propagasi Madden Julian Oscillation (Mjo) Di Benua Maritim Indonesia (BMI) Terhadap Siklus Diurnal Dinamika

Atmosfer Dan Curah Hujan Di Provinsi Lampung Tahun 2018. *Jurnal Sains & Teknologi Modifikasi Cuaca*, *22*(2), 71–84.

Makhfudz, N., Susilowati, E., & Aspriyani, R. (2023). Implementasi Fuzzy Inference System (FIS) Tipe Mamdani Dan Sugeno Untuk Prakiraan Cuaca Menggunakan Matlab. *Jurnal Teknologika*, *13*(1), 52–62. https://doi.org/10.51132/teknologika.v13i1.257

Malau, L. R. E., Rambe, K. R., Ulya, N. A., & Purba, A. G. (2023). Dampak perubahan iklim terhadap produksi tanaman pangan di indonesia: Dampak Perubahan Iklim Terhadap Produksi Tanaman Pangan Di Indonesia. *Jurnal Penelitian Pertanian Terapan*, *23*(1), 34–46. https://doi.org/10.25181/jppt.v23i1.2418

Napitupulu, F., Monicasari, S., & Sundari, S. D. (2023). Pengaruh Propagasi Madden Julian Oscillation(Mjo) Di Benua Maritim Indonesia (Bmi) Terhadap Siklus Diurnal Dinamika Atmosfer Dan Curah Hujan Di Provinsi Papua Tahun 2018. *Buletin Meteorologi,Klimatologi, Dan Geofisika*, *4*(1), 10–21.

National Geographic. (2024). *La Niña*. National Geogrphic.https://education.nationalgeographic.org/resource/la-nina

NOAA, N. (2024). *El Niño/Southern Oscillation (ENSO)undefined*. National Oceanic AtmosphericAdministrations.https://www.ncei.noaa.gov/access/monitoring/enso/technical-discussion

Pandia, F. S., Sasmito, B., & Sukmono, A. (2019). Analisis Pengaruh Angin Monsun Terhadap Perubahan Curah Hujan Dengan Penginderaan Jauh (Studi Kasus: Provinsi Jawa Tengah). *Jurnal Geodesi Undip*, *8*(1), 278–287.

Pasha, W. A., Amron, A., & Pranowo, W. S. (2022). Pengaruh Enso (El Nino Southern Oscillation) Terhadap Suhu Dan Salinitas di Perairan Utara Aceh: The Effect of Enso (El Nino Southern Oscillation) on Temperature and Salinity in North Aceh Waters. *Jurnal Hidropilar*, *8*(2), 61–74. https://doi.org/10.37875/hidropilar.v8i2.247

Riya, A., No, G., Nugraheni, I. R., & Darmawan, Y. (2024). Accuracy of cumulonimbus cloud prediction using Rapidly Developing Cumulus Area (RDCA) products at Pattimura Ambon airport: AYUFITRIYA et al.: Accuracy Of Cumulonimbus Prediction Using Rdca. *Mausam*, *75*(2), 529–542. https://doi.org/10.54302/mausam.v75i2.6212

Roji, I. F. (2022). Penentuan Nilai Premi pada Asuransi Pertanian Berbasis Indeks Iklim di Kabupaten Bogor. *Jurnal Riset Statistika*, 65–72. https://doi.org/10.29313/jrs.vi.908

Rozci, F. (2024). Dampak Perubahan Iklim Terhadap Sektor Pertanian Padi. *Jurnal Ilmiah Sosio Agribis*, *23*(2), 108. https://doi.org/10.30742/jisa23220233476

Ruminta, R., Irwan, A. W., Nurmala, T., & Ramadayanty, G. (2020). Analisis dampak perubahan iklim terhadap produksi kedelai dan pilihan adaptasi strategisnya pada lahan tadah hujan di Kabupaten Garut. *Kultivasi*, *19*(2). https://doi.org/10.24198/kultivasi.v19i2.27998

Safril, A., Nuryanto, D. E., Chevi, N. L. C., Agustina, L., Ardi Z, K. A., Munawar, M., & Faturrahman, F. (2021). Prediksi Curah Hujan Bulanan Untuk Peringatan Dini Longsor Di Banjarnegara Bagian Selatan Dengan Statistical

Downscaling Dan Ensemble. *Jurnal Meteorologi Dan Geofisika*, *21*(2), 69. https://doi.org/10.31172/jmg.v21i2.698

Saputra, Y., Aliudin, & Mulyaningsih, A. (2023). Pengendalian Impor Kedelai Dalam Upaya Mewujudkan Ketahanan Pangan Nasional Di Kabupaten Serang. *Jurnal Agribisnis Terpadu*, *16*(2), 90–98.

Saranani, M., Ulyasniati, U., & Saleh, L. (2021). Analisis Efisiensi Usahatani Kedelai Di Kecamatan Pondidaha Kabupaten Konawe. *Intelektiva : Jurnal Ekonomi, Sosial & Humaniora*, *3*(1), 105–114.

Suhadi, S., Mabruroh, F., Wiyanto, A., & Ikra, I. (2023). Analisis Fenomena Perubahan Iklim Terhadap Curah Hujan Ekstrim. *Optika: Jurnal Pendidikan Fisika*, *7*(1), 94–100. https://doi.org/10.37478/optika.v7i1.2738

Swastika, D. K. S. (2022). Perjalanan Panjang Indonesia Menuju Swasembada Kedelai. *Forum Penelitian Agro Ekonomi*, *40*(1), 39. https://doi.org/10.21082/fae.v40n1.2022.39-53

Tseng, W.-L., Lee, Y.-C., Wang, Y.-C., Hsu, H.-H., & Keenlyside, N. (2023). Characterizing Atlantic interhemispheric teleconnection established by South Amerikan monsoon in austral summer. *Environmental Research Letters*, *18*(7), 074003. https://doi.org/10.1088/1748-9326/acdbdf

Ullum, I. T. N. H., Fitria, A., & Widodo, W. (2024). Variasi Hasil Analisis Data Hasil El Nino-Southern Oscillation (ENSO) terhadap Iklim Global. *JSN : Jurnal Sains Natural*, *2*(2), 40–47. https://doi.org/10.35746/jsn.v2i2.528

Wang, Z., Li, T., & Sun, Y. (2021). Interdecadal variability of intensity of the MADDEN–JULIAN oscillation. *Atmospheric Science Letters*, *22*(5), e1027. https://doi.org/10.1002/asl.1027

Yao, Y., & Wang, X. L. (1997). Influence of the North Amerikan Monsoon System on the U.S. Summer Precipitation Regime. *Journal of Climate*, *10*(00), 2600–2622.

Zhang, C. (2015). Climate And Climate Change | Global Impacts of the Madden–Julian Oscillation. In *Encyclopedia of Atmospheric Sciences* (pp. 73–79). Elsevier. https://doi.org/10.1016/B978-0-12-382225-3.00510-7

LAMPIRAN

Lampiran 1. Nilai PC Hasil Pemodelan Produksi Kedelai Amerika Serikat vs Prediktor ENSO, MJO, dan *Monsoon*

Amerika Serikat						
Bulan	**Polinomial Orde n**	***Percent Correct* (%)**		**Bulan**	**Polinomial Orde n**	***Percent Correct* (%)**
		ENSO	**MJO**			***Monsoon***
JFM	1	31.7073	26.8293	Desember	1	43.9024
	2	31.7073	34.1463		2	39.0244
	3	31.7073	26.8293		3	39.0244
FMA	1	21.9512	19.5122	Januari	1	21.9512
	2	26.8293	26.8293		2	24.3902
	3	24.3902	21.9512		3	24.3902
MAM	1	36.5854	31.7073	Februari	1	29.2683
	2	36.5854	31.7073		2	31.7073
	3	34.1463	29.2683		3	34.1463
AMJ	1	34.1463	34.1463	Maret	1	39.0244
	2	36.5854	26.8293		2	34.1463
	3	36.5854	29.2683		3	29.2683
MJJ	1	24.3902	26.8293	Juli	1	36.5854
	2	26.8293	26.8293		2	31.7073
	3	26.8293	29.2683		3	39.0244
JJA	1	19.5122	34.1463	Agustus	1	29.2683
	2	26.8293	34.1463		2	36.5854
	3	21.9512	26.8293		3	34.1463
JAS	1	24.3902	26.8293	September	1	34.1463
	2	21.9512	29.2683		2	39.0244
	3	21.9512	31.7073		3	34.1463
ASO	1	24.3902	31.7073			
	2	17.0732	39.0244			
	3	19.5122	41.4634			
SON	1	26.8293	29.2683			
	2	14.6341	31.7073			
	3	17.0732	36.5854			
OND	1	26.8293	34.146			
	2	17.0732	31.7073			
	3	19.5122	34.1463			
NDJ	1	24.3902	36.5854			
	2	19.5122	41.4634			
	3	17.0732	34.1463			
DJF	1	21.9512	26.8293			
	2	17.0732	26.8293			
	3	14.6341`	26.8293			

Lampiran 2. Nilai PC Hasil Pemodelan Produksi Kedelai Kanada vs Prediktor ENSO, MJO, dan *Monsoon*

Kanada						
Bulan	**Polinomial Orde n**	***Percent Correct* (%)**		**Bulan**	**Polinomial Orde n**	***Percent Correct* (%)**
		ENSO	**MJO**			***Monsoon***
JFM	1	39.0244	21.9512	Desember	1	29.2683
	2	39.0244	19.5122		2	34.1463
	3	43.9024	17.0732		3	34.1463
FMA	1	31.7073	29.2683	Januari	1	39.0244
	2	36.5854	26.8293		2	36.5854
	3	41.4634	24.3902		3	29.2683
MAM	1	29.2683	34.1463	Februari	1	31.7073
	2	34.1463	36.5854		2	24.3902
	3	36.5854	36.5854		3	21.9512
AMJ	1	34.1463	31.7073	Maret	1	26.8293
	2	39.0244	34.1463		2	24.3902
	3	36.5854	36.5854		3	26.8293
MJJ	1	34.1463	31.7073	Juli	1	36.5854
	2	34.1463	31.7073		2	36.5854
	3	34.1463	31.7073		3	31.7073
JJA	1	34.1463	24.3902	Agustus	1	31.7073
	2	34.1463	21.9512		2	39.0244
	3	29.2683	24.3902		3	43.9024
JAS	1	39.0244	34.1463	September	1	34.1463
	2	39.0244	31.7073		2	29.2683
	3	34.1463	26.8293		3	36.5854
ASO	1	36.5854	39.0244			
	2	34.1463	34.1463			
	3	31.7073	29.2683			
SON	1	34.1463	34.1463			
	2	31.7073	34.1463			
	3	29.2683	34.1463			
OND	1	31.7073	26.8293			
	2	34.1463	26.8293			
	3	31.7073	41.4634			
NDJ	1	29.2683	34.1463			
	2	31.7073	29.2683			
	3	29.2683	34.1463			
DJF	1	31.7073	31.7073			
	2	34.1463	29.2683			
	3	26.8293	31.7073			

Lampiran 3. Nilai PC Hasil Pemodelan Produksi Kedelai Argentina vs Prediktor ENSO, MJO, dan *Monsoon*

Argentina						
Bulan	**Polinomial Orde n**	***Percent Correct* (%)**		**Bulan**	**Polinomial Orde n**	***Percent Correct* (%)**
		ENSO	**MJO**			***Monsoon***
JFM	1	26.8293	36.5854	Desember	1	41.4634
	2	26.8293	36.5854		2	41.4634
	3	26.8293	39.0244		3	43.9024
FMA	1	26.8293	41.4634	Januari	1	34.1463
	2	26.8293	41.4634		2	34.1463
	3	26.8293	39.0244		3	36.5854
MAM	1	29.2683	36.5854	Februari	1	31.7073
	2	29.2683	36.5854		2	31.7073
	3	29.2683	34.1463		3	31.7073
AMJ	1	31.7073	36.5854	Maret	1	46.3415
	2	31.7073	36.5854		2	46.3415
	3	34.1463	34.1463		3	48.7805
MJJ	1	34.1463	24.3902	Juli	1	29.2683
	2	34.1463	24.3902		2	29.2683
	3	34.1463	21.9512		3	31.7073
JJA	1	36.5854	41.4634	Agustus	1	39.0244
	2	36.5854	41.4634		2	39.0244
	3	36.5854	39.0244		3	43.9024
JAS	1	36.5854	21.9512	September	1	34.1463
	2	36.5854	21.9512		2	34.1463
	3	39.0244	19.5122		3	39.0244
ASO	1	34.1463	29.2683			
	2	34.1463	29.2683			
	3	34.1463	34.1463			
SON	1	41.4634	24.3902			
	2	41.4634	24.3902			
	3	41.4634	29.2683			
OND	1	46.3415	41.4634			
	2	46.3415	41.4634			
	3	46.3415	41.4634			
NDJ	1	39.0244	46.3415			
	2	41.4634	46.3415			
	3	41.4634	46.3415			
DJF	1	41.4634	39.0244			
	2	41.4634	39.0244			
	3	41.4634	36.5854			

Lampiran 4. Data Produksi Kedelai Amerika Serikat, Kanada, dan Argentina

Tahun	Amerika Serikat	Kanada	Argentina
1982	21213	23297	20900
1983	17594	20192	17538
1984	18930	22642	24055
1985	22923	24988	19884
1986	22411	24969	21411
1987	22794	27542	18966
1988	18155	21625	22638
1989	21783	22589	16534
1990	22920	26096	21566
1991	23029	24415	22750
1992	25295	23363	22915
1993	21941	26005	21589
1994	27813	27447	20386
1995	23759	27882	20446
1996	25269	25168	21051
1997	26164	25837	17212
1998	26169	27922	26937
1999	24634	27698	24450
2000	25614	25483	23312
2001	26639	15298	25846
2002	25567	22814	26304
2003	22769	21679	28034
2004	28405	25939	22075
2005	28961	27082	27287
2006	28817	28850	26793
2007	28067	23010	29712
2008	26718	27906	28216
2009	29595	25371	18480
2010	29243	29515	29053
2011	28232	28738	26053
2012	26867	30010	22814
2013	29615	28716	25391
2014	31977	26786	27735
2015	32289	28920	31752
2016	34936	29557	30146
2017	33133	26293	31711
2018	33997	29204	23157
2019	31875	27065	33340
2020	34327	31151	29191
2021	34792	29922	28067
2022	33308	30893	27630

Lampiran 5. Data Prediktor ENSO

ENSO											
JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ	DJF
0.030	0.057	0.263	0.397	0.450	0.543	0.863	1.403	1.800	2.037	2.157	2.163
1.890	1.423	1.077	0.797	0.443	0.053	-0.300	-0.650	-0.990	-1.160	-0.997	-0.630
-0.460	-0.463	-0.643	-0.770	-0.710	-0.547	-0.360	-0.417	-0.733	-1.067	-1.230	-1.073
-0.890	-0.897	-1.000	-1.040	-0.893	-0.737	-0.667	-0.583	-0.520	-0.423	-0.480	-0.593
-0.597	-0.487	-0.427	-0.390	-0.317	-0.033	0.247	0.553	0.783	0.980	1.090	1.130
1.083	0.897	0.727	0.707	0.943	1.260	1.503	1.487	1.320	1.083	0.970	0.707
0.427	-0.020	-0.530	-1.143	-1.577	-1.557	-1.310	-1.363	-1.650	-1.970	-1.993	-1.800
-1.550	-1.253	-1.057	-0.850	-0.680	-0.563	-0.467	-0.410	-0.383	-0.327	-0.190	0.030
0.087	0.110	0.067	0.027	0.030	0.077	0.177	0.217	0.177	0.220	0.313	0.387
0.280	0.180	0.160	0.323	0.513	0.653	0.620	0.653	0.827	1.250	1.577	1.770
1.667	1.453	1.207	0.940	0.613	0.283	0.070	-0.103	-0.213	-0.243	-0.097	0.133
0.313	0.463	0.587	0.573	0.453	0.237	0.237	0.180	0.137	0.073	0.087	0.107
0.090	0.143	0.227	0.297	0.290	0.363	0.417	0.587	0.780	1.037	1.127	1.000
0.737	0.490	0.210	0.010	-0.153	-0.327	-0.560	-0.783	-0.940	-0.977	-0.970	-0.890
-0.777	-0.647	-0.487	-0.430	-0.420	-0.367	-0.370	-0.370	-0.433	-0.497	-0.527	-0.513
-0.383	-0.153	0.183	0.630	1.097	1.513	1.860	2.127	2.300	2.353	2.360	2.233
1.917	1.383	0.897	0.320	-0.270	-0.887	-1.177	-1.333	-1.393	-1.537	-1.613	-1.567
-1.320	-1.127	-1.070	-1.150	-1.170	-1.193	-1.160	-1.180	-1.300	-1.517	-1.697	-1.687
-1.433	-1.133	-0.903	-0.840	-0.773	-0.650	-0.560	-0.570	-0.670	-0.803	-0.813	-0.760
-0.613	-0.533	-0.437	-0.340	-0.190	-0.093	-0.097	-0.130	-0.237	-0.307	-0.310	-0.200
-0.060	-0.003	0.113	0.350	0.590	0.777	0.900	1.070	1.270	1.363	1.147	0.870
0.533	0.287	-0.130	-0.347	-0.230	0.060	0.247	0.317	0.340	0.393	0.343	0.310
0.207	0.140	0.083	0.087	0.227	0.460	0.687	0.767	0.733	0.710	0.687	0.587
0.490	0.357	0.337	0.200	0.037	-0.080	-0.107	-0.050	-0.230	-0.523	-0.807	-0.833
-0.763	-0.567	-0.373	-0.137	-0.027	0.107	0.307	0.537	0.763	0.943	0.943	0.657
0.217	-0.123	-0.323	-0.380	-0.470	-0.553	-0.807	-1.073	-1.347	-1.503	-1.600	-1.643
-1.520	-1.290	-1.013	-0.837	-0.607	-0.370	-0.227	-0.243	-0.353	-0.557	-0.737	-0.847
-0.790	-0.610	-0.327	0.007	0.283	0.450	0.573	0.710	1.010	1.363	1.573	1.503
1.223	0.843	0.353	-0.177	-0.660	-1.050	-1.353	-1.560	-1.643	-1.643	-1.593	-1.417
-1.193	-0.937	-0.740	-0.557	-0.443	-0.487	-0.627	-0.833	-1.013	-1.100	-1.040	-0.867
-0.717	-0.593	-0.477	-0.267	-0.017	0.247	0.367	0.370	0.267	0.057	-0.207	-0.433
-0.433	-0.340	-0.300	-0.357	-0.403	-0.397	-0.317	-0.253	-0.173	-0.170	-0.267	-0.427
-0.463	-0.273	0.040	0.210	0.163	0.047	0.067	0.233	0.493	0.633	0.657	0.547
0.467	0.530	0.697	0.933	1.187	1.523	1.867	2.167	2.430	2.580	2.650	2.497
2.150	1.597	0.943	0.393	-0.070	-0.363	-0.547	-0.633	-0.693	-0.667	-0.563	-0.337
-0.160	0.057	0.207	0.310	0.320	0.143	-0.113	-0.383	-0.653	-0.837	-0.977	-0.913
-0.853	-0.697	-0.503	-0.223	-0.013	0.083	0.227	0.487	0.757	0.897	0.813	0.750
0.723	0.713	0.660	0.540	0.450	0.280	0.140	0.183	0.343	0.507	0.547	0.497
0.483	0.403	0.190	-0.083	-0.303	-0.410	-0.573	-0.893	-1.170	-1.277	-1.190	-1.050
-0.933	-0.840	-0.660	-0.487	-0.377	-0.400	-0.490	-0.673	-0.810	-0.980	-0.980	-0.963
-0.933	-0.990	-1.063	-0.990	-0.850	-0.803	-0.910	-1.010	-0.987	-0.913	-0.897	-0.893

Lampiran 6. Data Anomali MJO

ANOMALI MJO											
JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ	DJF
-0.487	-0.384	-0.258	-0.062	-0.134	-0.207	-0.279	-0.272	-0.149	-0.093	-0.132	-0.308
-0.474	-0.444	-0.483	-0.282	-0.300	-0.079	0.068	0.136	0.080	-0.080	-0.159	-0.285
-0.317	-0.337	-0.484	-0.434	-0.366	0.081	0.124	0.180	0.268	0.244	0.140	-0.247
0.602	0.550	-0.152	-0.076	-0.230	-0.293	-0.562	-0.325	-0.022	0.017	-0.014	0.449
0.431	0.066	0.316	0.202	0.162	0.218	0.108	0.128	0.171	0.037	0.422	0.073
-0.037	0.063	0.022	-0.015	0.002	0.291	0.296	0.223	0.096	0.174	0.130	0.009
0.649	0.897	0.612	0.110	-0.239	-0.162	-0.065	0.172	-0.042	-0.216	-0.352	0.071
-0.057	-0.112	-0.059	-0.076	-0.171	-0.292	-0.192	-0.176	-0.073	-0.033	0.101	0.066
0.559	0.534	0.464	0.037	-0.276	-0.343	-0.318	-0.116	-0.016	0.139	0.275	0.311
-0.195	-0.121	-0.119	-0.025	-0.042	0.081	0.145	0.153	-0.065	0.010	-0.055	0.038
0.027	-0.059	-0.127	-0.178	-0.232	-0.174	-0.140	-0.088	-0.049	-0.204	-0.116	-0.146
0.234	-0.310	-0.424	-0.196	-0.129	-0.027	-0.375	-0.329	-0.272	-0.071	0.361	0.315
-0.208	-0.168	-0.343	-0.168	-0.037	-0.285	-0.053	0.056	0.222	0.159	-0.121	0.136
-0.100	-0.083	0.061	-0.043	0.024	0.063	0.123	-0.128	-0.194	-0.110	0.057	-0.060
-0.257	-0.152	0.108	0.130	0.353	0.266	0.095	-0.151	0.015	0.358	0.276	-0.064
0.721	0.867	0.792	0.541	0.557	0.264	-0.205	-0.430	-0.356	-0.234	-0.172	0.123
-0.425	-0.424	-0.144	0.024	-0.011	-0.232	-0.064	0.067	0.163	-0.098	-0.195	-0.349
0.082	0.044	-0.124	-0.033	-0.084	-0.108	-0.147	-0.083	0.032	-0.011	0.014	0.092
-0.525	-0.373	-0.446	-0.408	-0.141	0.182	0.376	0.350	0.272	0.203	-0.190	-0.363
-0.339	-0.502	-0.441	-0.253	0.053	0.119	0.245	0.187	-0.039	0.098	0.013	0.112
-0.050	-0.270	0.149	0.451	0.765	0.548	0.157	-0.137	0.059	0.414	0.612	0.215
-0.414	-0.239	0.247	0.419	0.391	-0.043	-0.329	-0.270	-0.386	-0.080	-0.286	-0.222
0.556	0.287	0.249	-0.028	0.117	0.167	0.308	0.270	-0.041	-0.311	-0.149	0.150
0.086	0.617	0.694	0.456	-0.046	-0.225	0.039	0.025	-0.034	-0.358	-0.372	-0.211
0.000	-0.198	-0.415	-0.203	-0.128	-0.072	0.059	0.259	0.259	0.214	0.137	0.299
-0.175	-0.279	-0.264	-0.145	0.083	0.077	0.019	-0.057	0.099	0.368	0.321	0.156
0.221	-0.047	0.091	-0.096	0.064	0.006	0.172	0.202	0.126	-0.087	-0.009	-0.013
-0.249	0.095	0.101	0.319	-0.187	-0.059	0.017	0.117	0.254	0.082	0.144	-0.127
-0.138	-0.194	-0.215	-0.087	0.180	0.106	-0.051	-0.165	-0.256	-0.229	-0.327	-0.141
-0.336	-0.504	-0.184	-0.221	-0.161	-0.225	-0.148	0.107	0.165	0.295	0.147	-0.166
0.363	0.516	0.008	-0.114	-0.208	0.211	0.080	0.082	-0.222	-0.355	-0.417	-0.022
0.199	-0.110	-0.280	-0.165	-0.136	-0.118	0.006	-0.033	-0.190	-0.405	-0.085	0.223
-0.014	0.084	0.060	0.011	-0.007	0.033	-0.119	-0.191	-0.188	0.027	0.020	0.001
0.253	0.089	0.025	-0.043	0.288	0.432	-0.021	-0.139	0.121	0.515	0.466	0.126
0.155	-0.040	-0.300	-0.086	0.067	0.185	-0.001	-0.128	-0.195	-0.358	-0.188	0.021
0.053	-0.038	-0.422	-0.227	-0.112	-0.263	-0.403	-0.085	-0.073	0.186	-0.156	0.367
0.532	0.331	0.082	0.179	0.208	0.116	0.109	0.061	0.050	0.416	0.637	0.988
0.129	-0.050	-0.038	0.134	0.105	-0.082	0.045	0.247	0.366	0.102	0.107	0.163
0.158	0.088	0.055	0.110	0.101	0.350	0.269	0.366	0.116	-0.001	-0.019	0.015
0.002	0.303	0.248	0.392	0.142	0.160	0.132	0.090	-0.081	0.189	0.181	0.388
-0.238	-0.345	-0.388	-0.055	0.086	0.107	-0.320	-0.167	-0.139	0.019	-0.167	-0.173

Lampiran 7. Data Anomali *Monsoon*

MONSOON AMERIKA						
DES	JAN	FEB	MAR	JUL	AGU	SEP
-0.769	1.239	-0.594	0.893	-0.676	-0.116	0.157
0.709	1.223	-0.201	-0.513	1.027	-1.123	0.648
-0.186	-0.715	-0.646	0.347	-1.075	-0.692	0.470
1.670	1.917	-0.039	0.293	0.325	0.143	-1.334
0.319	0.555	0.310	-0.621	-0.902	0.186	-1.956
0.092	-0.518	-1.588	0.277	-1.038	-1.147	-1.758
0.289	-0.691	0.218	0.525	-0.714	-0.586	0.187
2.394	-0.463	0.663	-0.696	1.165	-1.110	1.193
-1.345	-1.309	0.517	-0.677	-0.479	-2.073	-0.546
0.139	0.994	0.312	0.708	-1.600	-0.360	-0.205
0.597	0.628	-0.215	-1.245	-0.436	-0.321	1.456
0.261	-0.839	0.623	-0.387	-2.690	-0.189	-0.300
0.068	0.484	0.608	1.261	-0.403	0.600	0.158
0.942	0.920	1.628	0.816	1.505	0.258	-0.029
-0.916	-0.053	0.011	1.046	0.135	-0.154	-2.450
-0.520	0.780	-0.550	1.640	-0.750	-0.013	1.762
-0.352	-0.532	0.096	-0.947	2.304	1.705	0.654
-0.077	-0.775	-0.240	-0.005	0.264	1.423	0.131
-0.275	0.260	0.860	0.106	1.347	0.765	1.052
-1.564	-1.221	-0.327	-0.924	0.561	0.561	0.942
-0.076	-0.333	0.126	-0.481	0.618	0.612	0.082
-0.410	0.265	-0.597	-1.150	0.776	0.850	0.222
-0.785	1.211	1.014	0.056	0.057	-0.009	-0.229
-0.049	0.241	-0.352	0.394	1.303	-0.614	1.595
-0.085	-1.976	0.281	0.211	-0.502	-0.150	-1.337
-0.503	0.144	0.744	-1.405	-1.384	0.971	0.017
0.377	-0.050	0.438	-0.066	0.057	-1.342	-0.020
0.329	-0.820	-0.153	-0.378	1.322	0.348	-0.219
0.273	-0.353	-0.589	-0.144	0.483	1.857	0.722
-0.518	-0.458	-0.047	0.690	0.764	2.018	0.902
-0.722	0.255	-0.744	-1.240	0.517	1.666	1.085
0.989	0.020	-0.382	-0.277	0.028	1.673	-0.984
-0.402	-1.632	-0.426	-0.299	-0.736	-0.512	0.129
-1.418	-1.882	0.129	-0.031	-1.434	0.275	0.291
-1.059	0.643	-0.873	-1.102	1.042	-2.142	-0.549
-0.421	-1.265	-0.054	-0.655	-0.437	-0.133	-0.644
-0.834	-1.108	0.375	-0.441	0.446	0.033	0.449
-1.729	-1.926	0.164	-1.224	0.691	0.204	-0.710
-1.820	-0.206	0.393	-0.286	0.795	2.761	0.869
-0.004	-0.206	0.235	-0.681	-0.457	-0.206	-0.106
-0.004	-0.469	-0.561	-1.692	0.237	-0.182	1.506

Lampiran 8. Script Matlab Produksi Kedelai vs Prediktor ENSO

```
%Halmar Halide
%Lab. Hidrometeorologi, Dept. Geofisika Unhas
%Tugas Akhir: Magfira Damayanti (H061201008)

clear
clf
clc

%Memuat Data & Menginisialisasi Variabel
load enso_amerika.txt
soy= enso_amerika(:,1); %Data produksi Kedelai
enso= enso_amerika(:,2:end); %Data ENSO

%Plot Data Produksi Kedelai & Polinomial Fitting
y=enso_amerika(:,2);prod=enso_amerika(:,1);
meanProd=mean(soy)%rata-rata produksi Kedelai
year=1982:2022;year=year';
[baris,kolom]=size(y);
opol = 3;
[p,s] = polyfit(year,soy,opol);%fitting polinomial
f_y = polyval(p,year,s);
dt_prod = prod - f_y; %anomali produksi
%dt_prod=prod;
figure(1)
plot(year,prod,'o',year,f_y)
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun')

%Normalisasi Anomali Produksi Kedelai
mprod=mean(dt_prod); %rata-rata anomali produksi
sprod=std(dt_prod); %standar deviasi anomali produksi
aprod=(dt_prod-mprod)./sprod; %normalisasi anomali produksi
yy = prctile(aprod,[33.33 66.67]); %perhitungan persentil
low_limit=yy(1,1); %batas bawah
up_limit=yy(1,2); %batas atas

%Plot Anomali Produksi Kedelai Terstandar
atas=up_limit.*ones(baris); %garis batas atas
bawah=low_limit.*ones(baris);%garis batas bawah
figure(2)
subplot(121),plot(year,prod,'o',year,f_y),hold on
legend('Observasi','Polinomial orde
2','Location','NorthWest')
text(2014,50,'(a)')
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun'),hold off
```

```
subplot(122),plot(year,aprod,year,atas,':g',year,bawah,':r','
LineWidth',2), hold on
ylabel('Anomali Produksi Kedelai Terstandar')
text(2014,-1.7,'(b)')
xlabel('Tahun'),hold off
%exitt

%Menghitung Kategori Berdasarkan ENSO dan Anomali Produksi
Kedelai
figure(3)
enso=y;
x=0.5:2;y=-2.5:2.5;

n=baris;
A=zeros(n,1); %inisialisasi matriks untuk kategori A
for m=1:n; %loop untuk kategori A
    if enso(m,1)<-0.5
        if aprod(m,1)<low_limit
          A(m,1)=1;
        end
    end
end
A1=sum(A); %jumlah kejadian di kategori A

B=zeros(n,1);
for m=1:n;
    if enso(m,1)>=-0.5 & enso(m,1)<=0.5
        if aprod(m,1)<low_limit
          B(m,1)=1;
        end
    end
end
B1=sum(B);

C=zeros(n,1);
for m=1:n;
    if enso(m,1)>0.5
        if aprod(m,1)<low_limit
          C(m,1)=1;
        end
    end
end
C1=sum(C);

D=zeros(n,1);
for m=1:n;
    if enso(m,1)<-0.5
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          D(m,1)=1;
        end
```

```
    end
end
D1=sum(D);

E=zeros(n,1);
for m=1:n;
    if enso(m,1)>=-0.5 & enso(m,1)<=0.5
        if aprod(m,1)>low_limit & aprod(m,1)<up_limit
          E(m,1)=1;
        end
    end
end
E1=sum(E);

F=zeros(n,1);
for m=1:n;
    if enso(m,1)>0.5
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          F(m,1)=1;
        end
    end
end
F1=sum(F);

G=zeros(n,1);
for m=1:n;
    if enso(m,1)<-0.5
        if aprod(m,1)>up_limit
          G(m,1)=1;
        end
    end
end
G1=sum(G);

H=zeros(n,1);
for m=1:n;
    if enso(m,1)>=-0.5 & enso(m,1)<=0.5
        if aprod(m,1)>up_limit
          H(m,1)=1;
        end
    end
end
H1=sum(H);

I=zeros(n,1);
for m=1:n;
    if enso(m,1)>0.5
        if aprod(m,1)>up_limit
          I(m,1)=1;
        end
```

```
    end
end
I1=sum(I);

%Menghitung Persentase Kejadian Setiap kategori
ADG1=(A1+D1+G1);BEH1=(B1+E1+H1);CFI1=(C1+F1+I1); %total
kategori
PA=A1/ADG1*100; %persentase kategori A
PB=B1/BEH1*100;
PC=C1/CFI1*100;
PD=D1/ADG1*100;
PE=E1/BEH1*100;
PF=F1/CFI1*100;
PG=G1/ADG1*100;
PH=H1/BEH1*100;
PI=I1/CFI1*100;
PADG=PA+PD+PG;
PBEH=PB+PE+PH;

p=[PG PH PI;PD PE PF;PA PB PC]; %menggabungkan persentase ke
dalam satu matriks

%Fitting Polinomial Antara ENSO dan Anomali Produksi
Terstandar
opol1 = 1;
[p1,s1] = polyfit(enso,aprod,opol1); %fitting polinomial
gradien=p1(1,1) %gradien
kons=p1(1,2) %konstanta
[f_y1,delta] = polyval(p1,enso,s1); %nilai prediksi dan error
fitting
ensocontoh=[0.5 2];
[Y,delta] = polyval(p1,ensocontoh,s1);

%Menghitung Anomali Produksi Berdasarkan Prediksi
Yup=[Y+delta]; %batas atas prediksi
Ylow=[Y-delta] %batas bawah prediksi

%exitt
anom_max=Yup*sprod;
anom_mean=Y*sprod
anom_min=Ylow*sprod

%Menghitung Total Kejadian dan Nilai Percent Correct (PC)
Total=A1+B1+C1+D1+E1+F1+G1+H1+I1
Percent_Correct=100*(G1+E1+C1)/Total

%Plot Hasil Fitting dan Anomali Produksi
plot(enso,aprod,'o',enso,f_y1,'linewidth',2)
xlabel('ENSO (°C) ')
```

```
ylabel('Anomali Produksi Kedelai')
title('Produksi Kedelai vs ENSO JFM 1982-2022 (n=41,
PC=43.90)')
text(-2.0,2.65,'ANOMSTD=0.0311  * ENSO + 0.0014')
axis('square')
axis([-3.0 3.0 -3.0 3.0])
grid on

%Mengatur Label Sumbu X dan Y pada Plot
set(gca,'Xtick',[-3.0,-0.5,0.5,3.0])
set(gca,'Ytick',[-3,low_limit,up_limit,3])

%Menambahkan Teks pada Plot untuk Masing-masing Kategori
text(-2.05,-1.5,[num2str(PA,'%.2f'),'%'])
text(-2.05,-1.25,[num2str(A1)])
text(-2.05,0.1,[num2str(PD,'%.2f'),'%'])
text(-2.05,0.3,[num2str(D1)])
text(-2.05,1.6,[num2str(PG,'%.2f'),'%'])
text(-2.05,1.8,[num2str(G1)])

text(-.38,-1.5,[num2str(PB,'%.2f'),'%'])
text(-.38,-1.25,[num2str(B1)])
text(-.38,0.1,[num2str(PE,'%.2f'),'%'])
text(-.38,0.3,[num2str(E1)])
text(-.38,1.6,[num2str(PH,'%.2f'),'%'])
text(-.38,1.8,[num2str(H1)])

text(1.27,-1.5,[num2str(PC,'%.2f'),'%'])
text(1.27,-1.25,[num2str(C1)])
text(1.27,0.1,[num2str(PF,'%.2f'),'%'])
text(1.27,0.3,[num2str(F1)])
text(1.27,1.6,[num2str(PI,'%.2f'),'%'])
text(1.27,1.8,[num2str(I1)])
%exitt
```

Lampiran 9. Script Matlab Produksi Kedelai vs Prediktor MJO

```
%Halmar Halide
%Lab. Hidrometeorologi, Dept. Geofisika Unhas
%Tugas Akhir: Magfira Damayanti (H061201008)

clear
clf
clc

%Memuat Data & Menginisialisasi Variabel
load mjo_canada.txt
soy= mjo_canada(:,1); %Data produksi kedelai
mjo= mjo_canada(:,2:end); %Data MJO
```

```
%Plot Data Produksi Kedelai & Polinomial Fitting
y=mjo_canada(:,4);prod=mjo_canada(:,1);
meanProd=mean(soy)%rata-rata produksi kedelai
year=1982:2022;year=year';
[baris,kolom]=size(y);
opol = 1;
[p,s] = polyfit(year,soy,opol);%fitting polinomial
f_y = polyval(p,year,s);
dt_prod = prod - f_y; %anomali produksi
%dt_prod=prod;
figure(1)
plot(year,prod,'o',year,f_y)
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun')

%Normalisasi Anomali Produksi Kedelai
mprod=mean(dt_prod); %rata-rata anomali produksi
sprod=std(dt_prod); %standar deviasi anomali produksi
aprod=(dt_prod-mprod)./sprod; %normalisasi anomali produksi
yy = prctile(aprod,[33.33 66.67]); %perhitungan percentile
low_limit=yy(1,1); %batas bawah
up_limit=yy(1,2); %batas atas

%Plot Anomali Produksi Kedelai Terstandar
atas=up_limit.*ones(baris); %garis batas atas
bawah=low_limit.*ones(baris);%garis batas bawah
figure(2)
subplot(121),plot(year,prod,'o',year,f_y),hold on
legend('Observasi','Polinomial orde
2','Location','NorthWest')
text(2014,50,'(a)')
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun'),hold off

subplot(122),plot(year,aprod,year,atas,':g',year,bawah,':r','
LineWidth',2), hold on
ylabel('Anomali Produksi Kedelai Terstandar')
text(2014,-1.7,'(b)')
xlabel('Tahun'),hold off
%exitt

%Menghitung Kategori Berdasarkan MJO dan Anomali Produksi
Kedelai
figure(3)
mjo=y;
x=0.5:2;y=-2.5:2.5;

n=baris;
A=zeros(n,1); %inisialisasi matriks untuk kategori A
```

```
for m=1:n; %loop untuk kategori A
    if mjo(m,1)<-0.119
        if aprod(m,1)<low_limit
          A(m,1)=1;
        end
    end
end
A1=sum(A); %jumlah kejadian di kategori A

B=zeros(n,1);
for m=1:n;
    if mjo(m,1)>=-0.119 & mjo(m,1)<=0.097
        if aprod(m,1)<low_limit
          B(m,1)=1;
        end
    end
end
B1=sum(B);

C=zeros(n,1);
for m=1:n;
    if mjo(m,1)>0.097
        if aprod(m,1)<low_limit
          C(m,1)=1;
        end
    end
end
C1=sum(C);

D=zeros(n,1);
for m=1:n;
    if mjo(m,1)<-0.119
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          D(m,1)=1;
        end
    end
end
D1=sum(D);

E=zeros(n,1);
for m=1:n;
    if mjo(m,1)>=-0.119 & mjo(m,1)<=0.097
        if aprod(m,1)>low_limit & aprod(m,1)<up_limit
          E(m,1)=1;
        end
    end
end
E1=sum(E);

F=zeros(n,1);
```

```
for m=1:n;
    if mjo(m,1)>0.097
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          F(m,1)=1;
        end
    end
end
F1=sum(F);

G=zeros(n,1);
for m=1:n;
    if mjo(m,1)<-0.119
        if aprod(m,1)>up_limit
          G(m,1)=1;
        end
    end
end
G1=sum(G);

H=zeros(n,1);
for m=1:n;
    if mjo(m,1)>=-0.119 & mjo(m,1)<=0.097
        if aprod(m,1)>up_limit
          H(m,1)=1;
        end
    end
end
H1=sum(H);

I=zeros(n,1);
for m=1:n;
    if mjo(m,1)>0.097
        if aprod(m,1)>up_limit
          I(m,1)=1;
        end
    end
end
I1=sum(I);

%Menghitung Persentase Kejadian Setiap kategori
ADG1=(A1+D1+G1);BEH1=(B1+E1+H1);CFI1=(C1+F1+I1); %total
kategori
PA=A1/ADG1*100; %persentase kategori A
PB=B1/BEH1*100;
PC=C1/CFI1*100;
PD=D1/ADG1*100;
PE=E1/BEH1*100;
PF=F1/CFI1*100;
PG=G1/ADG1*100;
PH=H1/BEH1*100;
```

```
PI=I1/CFI1*100;
PADG=PA+PD+PG;
PBEH=PB+PE+PH;

p=[PG PH PI;PD PE PF;PA PB PC]; %menggabungkan persentase ke
dalam satu matriks

%Fitting Polinomial Antara MJO dan Anomali Produksi
Terstandar
opol1 = 1;
[p1,s1] = polyfit(mjo,aprod,opol1); %fitting polinomial
gradien=p1(1,1) %gradien
kons=p1(1,2) %konstanta
[f_y1,delta] = polyval(p1,mjo,s1); %nilai prediksi dan error
fitting
mjocontoh=[0.5 2];
[Y,delta] = polyval(p1,mjocontoh,s1);

%Menghitung Anomali Produksi Berdasarkan Prediksi
Yup=[Y+delta]; %batas atas prediksi
Ylow=[Y-delta] %batas bawah prediksi

%exitt
anom_max=Yup*sprod
anom_mean=Y*sprod
anom_min=Ylow*sprod

%Menghitung Total Kejadian dan Nilai Percent Correct (PC)
Total=A1+B1+C1+D1+E1+F1+G1+H1+I1
Percent_Correct=100*(G1+E1+C1)/Total

%Plot Hasil Fitting dan Anomali Produksi
plot(mjo,aprod,'o',mjo,f_y1,'linewidth',2)
xlabel('Anomali MJO ')
ylabel('Anomali Produksi Kedelai')
title('Produksi Kedelai vs MJO OND 1982-2022 (n=41,
PC=41.46)')
text(-0.5,3.5,'ANOMSTD=-0.7454 * MJO + 0.0169')
axis('square')
axis([-0.8 0.8 -4.25 4])
grid on

%Mengatur Label Sumbu X dan Y pada Plot
set(gca,'Xtick',[-0.8,-0.119,0.097,0.8])
set(gca,'Ytick',[-4.25,low_limit,up_limit,4])

%Menambahkan Teks pada Plot untuk Masing-masing Kategori
text(-0.53,-2.3,[num2str(PA,'%.2f'),'%'])
text(-0.53,-2,[num2str(A1)])
```

```
text(-0.53,0.1,[num2str(PD,'%.2f'),'%'])
text(-0.53,0.37,[num2str(D1)])
text(-0.53,2,[num2str(PG,'%.2f'),'%'])
text(-0.53,2.3,[num2str(G1)])

text(-0.1,-2.3,[num2str(PB,'%.2f'),'%'])
text(-0.1,-2,[num2str(B1)])
text(-0.1,0.1,[num2str(PE,'%.2f'),'%'])
text(-0.1,0.37,[num2str(E1)])
text(-0.1,2,[num2str(PH,'%.2f'),'%'])
text(-0.1,2.3,[num2str(H1)])

text(0.35,-2.3,[num2str(PC,'%.2f'),'%'])
text(0.35,-2,[num2str(C1)])
text(0.35,0.1,[num2str(PF,'%.2f'),'%'])
text(0.35,0.37,[num2str(F1)])
text(0.35,2,[num2str(PI,'%.2f'),'%'])
text(0.35,2.3,[num2str(I1)])
%exitt
```

Lampiran 10. Script Matlab Produksi Kedelai vs Prediktor *Monsoon*

```
%Halmar Halide
%Lab. Hidrometeorologi, Dept. Geofisika Unhas
%Tugas Akhir: Magfira Damayanti (H061201008)

clear
clf
clc

%Memuat Data & Menginisialisasi Variabel
load monsoon_argentina.txt
soy= monsoon_argentina(:,1); %Data produksi Kedelai
monsoon= monsoon_argentina(:,2:end); %Data Monsoon

%Plot Data Produksi Kedelai & Polinomial Fitting
y=monsoon_argentina(:,11);prod=monsoon_argentina(:,1);
meanProd=mean(soy)%rata-rata produksi Kedelai
year=1982:2022;year=year';
[baris,kolom]=size(y);
opol = 3;
[p,s] = polyfit(year,soy,opol);%fitting polinomial
f_y = polyval(p,year,s);
dt_prod = prod - f_y; %anomali produksi
%dt_prod=prod;
figure(1)
plot(year,prod,'o',year,f_y)
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun')
```

```
%Normalisasi Anomali Produksi Kedelai
mprod=mean(dt_prod); %rata-rata anomali produksi
sprod=std(dt_prod); %standar deviasi anomali produksi
aprod=(dt_prod-mprod)./sprod; %normalisasi anomali produksi
yy = prctile(aprod,[33.33 66.67]); %perhitungan percentile
low_limit=yy(1,1); %batas bawah
up_limit=yy(1,2); %batas atas

%Plot Anomali Produksi Kedelai Terstandar
atas=up_limit.*ones(baris); %garis batas atas
bawah=low_limit.*ones(baris);%garis batas bawah
figure(2)
subplot(121),plot(year,prod,'o',year,f_y),hold on
legend('Observasi','Polinomial orde
2','Location','NorthWest')
text(2014,50,'(a)')
ylabel('Produksi Kedelai (gr/ha)')
xlabel('Tahun'),hold off

subplot(122),plot(year,aprod,year,atas,':g',year,bawah,':r','
LineWidth',2), hold on
ylabel('Anomali Produksi Kedelai Terstandar')
text(2014,-1.7,'(b)')
xlabel('Tahun'),hold off
%exitt

%Menghitung Kategori Berdasarkan Monsoon dan Anomali Produksi
Kedelai
figure(3)
monsoon=y;
x=-2.5:2.5;y=-2.5:3;

n=baris;
A=zeros(n,1); %inisialisasi matriks untuk kategori A
for m=1:n; %loop untuk kategori A
    if monsoon(m,1)<-0.367
        if aprod(m,1)<low_limit
          A(m,1)=1;
        end
    end
end
A1=sum(A); %jumlah kejadian di kategori A

B=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>=-0.367 & monsoon(m,1)<=0.177
        if aprod(m,1)<low_limit
          B(m,1)=1;
        end
    end
```

```
end
B1=sum(B);

C=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>0.177
        if aprod(m,1)<low_limit
          C(m,1)=1;
        end
    end
end
C1=sum(C);

D=zeros(n,1);
for m=1:n;
    if monsoon(m,1)<-0.367
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          D(m,1)=1;
        end
    end
end
D1=sum(D);

E=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>=-0.367 & monsoon(m,1)<=0.177
        if aprod(m,1)>low_limit & aprod(m,1)<up_limit
          E(m,1)=1;
        end
    end
end
E1=sum(E);

F=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>0.177
        if aprod(m,1)>=low_limit & aprod(m,1)<=up_limit
          F(m,1)=1;
        end
    end
end
F1=sum(F);

G=zeros(n,1);
for m=1:n;
    if monsoon(m,1)<-0.367
        if aprod(m,1)>up_limit
          G(m,1)=1;
        end
    end
```

```
end
G1=sum(G);

H=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>=-0.367 & monsoon(m,1)<=0.177
        if aprod(m,1)>up_limit
          H(m,1)=1;
        end
    end
end
H1=sum(H);

I=zeros(n,1);
for m=1:n;
    if monsoon(m,1)>0.177
        if aprod(m,1)>up_limit
          I(m,1)=1;
        end
    end
end
I1=sum(I);

%Menghitung Persentase Kejadian Setiap kategori
ADG1=(A1+D1+G1);BEH1=(B1+E1+H1);CFI1=(C1+F1+I1); %total
kategori
PA=A1/ADG1*100; %persentase kategori A
PB=B1/BEH1*100;
PC=C1/CFI1*100;
PD=D1/ADG1*100;
PE=E1/BEH1*100;
PF=F1/CFI1*100;
PG=G1/ADG1*100;
PH=H1/BEH1*100;
PI=I1/CFI1*100;
PADG=PA+PD+PG;
PBEH=PB+PE+PH;
PCFI=PC+PF+PI;

p=[PG PH PI;PD PE PF;PA PB PC]; %menggabungkan persentase ke
dalam satu matriks

%Fitting Polinomial Antara Monsoon dan Anomali Produksi
Terstandar
opol1 = 1;
[p1,s1] = polyfit(monsoon,aprod,opol1); %fitting polinomial
gradien=p1(1,1) %gradien
kons=p1(1,2) %konstanta
[f_y1,delta] = polyval(p1,monsoon,s1); %nilai prediksi dan
error fitting
```

```
monsooncontoh=[0.5 2];
[Y,delta] = polyval(p1,monsooncontoh,s1);

%Menghitung Anomali Produksi Berdasarkan Prediksi
Yup=[Y+delta]; %batas atas prediksi
Ylow=[Y-delta] %batas bawah prediksi

%exitt
anom_max=Yup*sprod
anom_mean=Y*sprod
anom_min=Ylow*sprod

%Menghitung Total Kejadian dan Nilai Percent Correct (PC)
Total=A1+B1+C1+D1+E1+F1+G1+H1+I1
Percent_Correct=100*(G1+E1+C1)/Total

%Plot Hasil Fitting dan Anomali Produksi
plot(monsoon,aprod,'o',monsoon,f_y1,'linewidth',2)
xlabel('Anomali Monsoon (m/s) ')
ylabel('Anomali Produksi Kedelai')
title('Produksi Kedelai vs Monsoon Maret 1982-2022 (n=41,
PC=48.78)')
text(-1.3,1.8,'ANOMSTD=-0.2851 * Monsoon - 0.0577')
axis('square')
axis([-2 2 -3 2])
grid on

%Mengatur Label Sumbu X dan Y pada Plot
set(gca,'Xtick',[-2,-0.419,0.274,2])
set(gca,'Ytick',[-3,low_limit,up_limit,2])

%Menambahkan Teks pada Plot untuk Masing-masing Kategori
text(-1.4,-1.7,[num2str(PA,'%.2f'),'%'])
text(-1.4,-1.5,[num2str(A1)])
text(-1.4,0.1,[num2str(PD,'%.2f'),'%'])
text(-1.4,0.3,[num2str(D1)])
text(-1.4,1.1,[num2str(PG,'%.2f'),'%'])
text(-1.4,1.3,[num2str(G1)])

text(-0.3,-1.7,[num2str(PB,'%.2f'),'%'])
text(-0.3,-1.5,[num2str(B1)])
text(-0.3,0.1,[num2str(PE,'%.2f'),'%'])
text(-0.3,0.3,[num2str(E1)])
text(-0.3,1.1,[num2str(PH,'%.2f'),'%'])
text(-0.3,1.3,[num2str(H1)])

text(0.9,-1.7,[num2str(PC,'%.2f'),'%'])
text(0.9,-1.5,[num2str(C1)])
text(0.9,0.1,[num2str(PF,'%.2f'),'%'])
```

```
text(0.9,0.3,[num2str(F1)])
text(0.9,1.1,[num2str(PI,'%.2f'),'%'])
text(0.9,1.3,[num2str(I1)])
%exitt
```

Lampiran 11. Script Matlab Percentile MJO dan *Monsoon*

```
% Script untuk mengkategorisasikan data MJO berdasarkan
percentil dan menampilkan batas-batasnya

% 1. Muat data dari file txt menggunakan readtable
dataTable = readtable('persentilmjo.txt');  % Ganti
'persentilmjo.txt' dengan nama file Anda

% 2. Konversi tabel ke array numerik, jika data berupa angka
data = table2array(dataTable(:, 1:end));  % Asumsi data
numerik ada dari kolom ke-1 ke belakang

% 3. Hitung percentil untuk membagi data menjadi tiga
kategori
p33 = prctile(data(:), 33.33);  % Batas atas untuk MJO lemah
(33% dari data)
p66 = prctile(data(:), 66.67);  % Batas atas untuk MJO kuat
(66% dari data)

% 4. Tampilkan nilai 33% dan 66% dari data
percentile33 = 100 * length(find(data(:) <= p33)) /
length(data(:)); % Menghitung persentase di bawah p33
percentile66 = 100 * length(find(data(:) <= p66)) /
length(data(:)); % Menghitung persentase di bawah p66

% 5. Tampilkan batasan numerik untuk setiap kategori
disp(['Batas 33% dari data: ', num2str(p33), ' (MJO
Lemah)']);
disp(['Batas 66% dari data: ', num2str(p66), ' (MJO Kuat)']);
disp(['MJO Lemah: Nilai kurang dari ', num2str(p33), '
(hingga persentil ke-', num2str(percentile33), '%)']);
disp(['MJO Sedang: Nilai antara ', num2str(p33), ' dan ',
num2str(p66), ' (antara persentil ke-',
num2str(percentile33), '% dan ', num2str(percentile66),
'%)']);
disp(['MJO Kuat: Nilai lebih dari ', num2str(p66), ' (lebih
dari persentil ke-', num2str(percentile66), '%)']);
```

Lampiran 12. Script Matlab Plot Produksi Kedelai, ENSO, MJO, dan *Monsoon*

```
% Membersihkan workspace dan figure
clc;
clear;
close all;
```

```
% Load timeseriesus
timeseriesus = load('timeseriesus.txt'); % Ganti
'timeseriesus.txt' dengan nama file Anda
tahun = 1982:2022; % Rentang tahun
produksi = timeseriesus(:, 1); % Kolom 1: Produksi kedelai
enso = timeseriesus(:, 5); % Kolom 2: ENSO
mjo = timeseriesus(:, 24); % Kolom 3: MJO
monsoon = timeseriesus(:, 26); % Kolom 4: Monsoon

% Plot timeseriesus
figure;
hold on;
plot(tahun, produksi, '-o', 'LineWidth', 2, 'DisplayName',
'Anomali Produksi kedelai');
plot(tahun, enso, '--', 'LineWidth', 1, 'DisplayName', 'ENSO
AMJ');
plot(tahun, mjo, '--', 'LineWidth', 1, 'DisplayName', 'MJO
NDJ');
plot(tahun, monsoon, '--', 'LineWidth', 1, 'DisplayName',
'Monsoon Desember');
hold off;

% Menambahkan label, judul, dan legenda
xlabel('Tahun');
title('Produksi kedelai di Amerika Serikat, ENSO, MJO, dan
Monsoon (1982-2022)');
legend('Location', 'best');
grid on;
set(gca, 'FontSize', 9.5);
```