

DAFTAR LAMPIRAN

Lampiran 1 Data Harian Harga Emas Dunia (USD/oz) (Januari 2010-April 2025)

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
31/12/2010	1.421,45	24/05/2023	1.957,01	11/04/2025	3.236,21
30/12/2010	1.404,45	23/05/2023	1.974,73	10/04/2025	3.173,92
29/12/2010	1.410,95	22/05/2023	1.969,43	09/04/2025	3.082,18
28/12/2010	1.406,39	19/05/2023	1.976,56	08/04/2025	2.983,78
27/12/2010	1.384,10	18/05/2023	1.958,05	07/04/2025	2.982,54
24/12/2010	1.384,75	17/05/2023	1.981,72	04/04/2025	3.037,36
23/12/2010	1.380,35	16/05/2023	1.988,60	03/04/2025	3.112,83
22/12/2010	1.385,00	15/05/2023	2.020,60	02/04/2025	3.133,57
21/12/2010	1.385,74	12/05/2023	2.011,15	01/04/2025	3.110,55
20/12/2010	1.384,65	11/05/2023	2.015,55	31/03/2025	3.123,05
17/12/2010	1.375,41	10/05/2023	2.029,51	28/03/2025	3.084,03
16/12/2010	1.369,70	09/05/2023	2.034,17	27/03/2025	3.056,10
15/12/2010	1.379,80	08/05/2023	2.021,39	26/03/2025	3.019,29
14/12/2010	1.396,25	05/05/2023	2.016,54	25/03/2025	3.019,85
13/12/2010	1.393,76	04/05/2023	2.051,11	24/03/2025	3.012,27
10/12/2010	1.386,05	03/05/2023	2.039,02	21/03/2025	3.023,63
09/12/2010	1.387,64	02/05/2023	2.016,28	20/03/2025	3.044,41
08/12/2010	1.382,10	01/05/2023	1.982,05	19/03/2025	3.047,18
07/12/2010	1.401,89	28/04/2023	1.989,65	18/03/2025	3.033,95
06/12/2010	1.423,55	27/04/2023	1.987,87	17/03/2025	3.001,47
03/12/2010	1.415,05	26/04/2023	1.989,48	14/03/2025	2.984,42
02/12/2010	1.384,65	25/04/2023	1.997,87	13/03/2025	2.987,75
01/12/2010	1.387,10	24/04/2023	1.988,88	12/03/2025	2.932,06
30/11/2010	1.384,85	21/04/2023	1.982,89	11/03/2025	2.916,04
29/11/2010	1.368,37	20/04/2023	2.004,34	10/03/2025	2.889,40
26/11/2010	1.364,42	19/04/2023	1.993,26	07/03/2025	2.910,79
25/11/2010	1.374,62	18/04/2023	2.004,93	06/03/2025	2.909,99
24/11/2010	1.374,90	17/04/2023	1.994,77	05/03/2025	2.918,84
23/11/2010	1.377,20	14/04/2023	2.003,04	04/03/2025	2.917,49
22/11/2010	1.366,35	13/04/2023	2.039,73	03/03/2025	2.893,71
19/11/2010	1.353,50	12/04/2023	2.014,67	28/02/2025	2.858,60
18/11/2010	1.353,85	11/04/2023	2.003,14	27/02/2025	2.876,19
17/11/2010	1.337,25	10/04/2023	1.989,95	26/02/2025	2.916,19
16/11/2010	1.340,85	06/04/2023	2.008,02	25/02/2025	2.915,12
15/11/2010	1.359,49	05/04/2023	2.020,35	24/02/2025	2.951,19
12/11/2010	1.368,95	04/04/2023	2.019,97	21/02/2025	2.936,03
11/11/2010	1.409,35	03/04/2023	1.984,11	20/02/2025	2.938,70
10/11/2010	1.403,75	31/03/2023	1.967,90	19/02/2025	2.932,64
09/11/2010	1.390,95	30/03/2023	1.980,25	18/02/2025	2.935,58
08/11/2010	1.409,45	29/03/2023	1.964,04	17/02/2025	2.897,66
05/11/2010	1.393,90	28/03/2023	1.973,69	14/02/2025	2.883,18
04/11/2010	1.392,75	27/03/2023	1.956,56	13/02/2025	2.929,03
03/11/2010	1.348,65	24/03/2023	1.977,22	12/02/2025	2.903,66
02/11/2010	1.357,50	23/03/2023	1.993,50	11/02/2025	2.898,34
01/11/2010	1.351,75	22/03/2023	1.969,58	10/02/2025	2.907,34
29/10/2010	1.359,55	21/03/2023	1.940,15	07/02/2025	2.860,39
28/10/2010	1.344,35	20/03/2023	1.978,71	06/02/2025	2.856,50
27/10/2010	1.325,30	17/03/2023	1.987,93	05/02/2025	2.865,09
26/10/2010	1.339,90	16/03/2023	1.919,12	04/02/2025	2.841,94
25/10/2010	1.340,45	15/03/2023	1.918,10	03/02/2025	2.813,49
22/10/2010	1.328,20	14/03/2023	1.902,12	31/01/2025	2.801,00
21/10/2010	1.325,50	13/03/2023	1.913,23	30/01/2025	2.793,88
20/10/2010	1.346,35	10/03/2023	1.867,83	29/01/2025	2.757,71

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
19/10/2010	1.335,45	09/03/2023	1.830,89	28/01/2025	2.763,11
18/10/2010	1.369,80	08/03/2023	1.813,59	27/01/2025	2.741,10
15/10/2010	1.369,15	07/03/2023	1.813,52	24/01/2025	2.771,30
14/10/2010	1.381,30	06/03/2023	1.846,85	23/01/2025	2.753,69
13/10/2010	1.372,10	03/03/2023	1.854,97	22/01/2025	2.755,02
12/10/2010	1.350,60	02/03/2023	1.836,00	21/01/2025	2.744,39
11/10/2010	1.353,95	01/03/2023	1.836,81	20/01/2025	2.708,06
08/10/2010	1.346,80	28/02/2023	1.827,15	17/01/2025	2.701,55
07/10/2010	1.333,70	27/02/2023	1.817,31	16/01/2025	2.713,77
06/10/2010	1.349,40	24/02/2023	1.810,81	15/01/2025	2.695,82
05/10/2010	1.340,75	23/02/2023	1.822,64	14/01/2025	2.677,16
04/10/2010	1.315,25	22/02/2023	1.825,04	13/01/2025	2.662,12
01/10/2010	1.318,80	21/02/2023	1.834,32	10/01/2025	2.689,63
30/09/2010	1.309,50	20/02/2023	1.841,14	09/01/2025	2.670,19
29/09/2010	1.309,90	17/02/2023	1.841,59	08/01/2025	2.662,06
28/09/2010	1.309,10	16/02/2023	1.837,44	07/01/2025	2.649,49
27/09/2010	1.295,00	15/02/2023	1.836,19	06/01/2025	2.635,33
24/09/2010	1.296,95	14/02/2023	1.854,29	03/01/2025	2.639,12
23/09/2010	1.292,55	13/02/2023	1.853,39	02/01/2025	2.657,16
22/09/2010	1.291,35	10/02/2023	1.864,67	31/12/2024	2.623,81
21/09/2010	1.286,95	09/02/2023	1.861,39	30/12/2024	2.605,39
20/09/2010	1.278,35	08/02/2023	1.875,59	27/12/2024	2.620,00
17/09/2010	1.274,90	07/02/2023	1.873,81	26/12/2024	2.634,43
16/09/2010	1.275,55	06/02/2023	1.867,36	24/12/2024	2.613,20
15/09/2010	1.268,05	03/02/2023	1.865,53	23/12/2024	2.612,93
14/09/2010	1.268,85	02/02/2023	1.912,37	20/12/2024	2.620,77
13/09/2010	1.245,45	01/02/2023	1.950,42	19/12/2024	2.593,85
10/09/2010	1.246,45	31/01/2023	1.927,88	18/12/2024	2.587,63
09/09/2010	1.244,10	30/01/2023	1.922,52	17/12/2024	2.645,54
08/09/2010	1.255,20	27/01/2023	1.927,34	16/12/2024	2.652,50
07/09/2010	1.255,40	26/01/2023	1.928,99	13/12/2024	2.648,39
06/09/2010	1.250,05	25/01/2023	1.945,93	12/12/2024	2.681,33
03/09/2010	1.247,10	24/01/2023	1.937,45	11/12/2024	2.717,93
02/09/2010	1.251,25	23/01/2023	1.931,30	10/12/2024	2.693,64
01/09/2010	1.244,35	20/01/2023	1.926,57	09/12/2024	2.658,78
31/08/2010	1.247,65	19/01/2023	1.931,39	06/12/2024	2.632,91
30/08/2010	1.236,80	18/01/2023	1.903,76	05/12/2024	2.632,05
27/08/2010	1.238,20	17/01/2023	1.908,39	04/12/2024	2.649,79
26/08/2010	1.236,05	16/01/2023	1.918,00	03/12/2024	2.643,44
25/08/2010	1.240,10	13/01/2023	1.920,21	02/12/2024	2.638,93
24/08/2010	1.229,75	12/01/2023	1.896,86	29/11/2024	2.653,55
23/08/2010	1.225,40	11/01/2023	1.876,38	28/11/2024	2.640,96
20/08/2010	1.228,05	10/01/2023	1.877,27	27/11/2024	2.635,51
19/08/2010	1.232,10	09/01/2023	1.871,59	26/11/2024	2.631,89
18/08/2010	1.229,55	06/01/2023	1.865,71	25/11/2024	2.625,26
17/08/2010	1.224,90	05/01/2023	1.833,19	22/11/2024	2.712,55
16/08/2010	1.224,85	04/01/2023	1.854,09	21/11/2024	2.669,69
13/08/2010	1.215,55	03/01/2023	1.839,49	20/11/2024	2.650,05
12/08/2010	1.213,20	02/01/2023	1.823,69	19/11/2024	2.631,68
11/08/2010	1.197,75	30/12/2022	1.824,40	18/11/2024	2.612,20
10/08/2010	1.203,85	29/12/2022	1.814,89	15/11/2024	2.561,24
09/08/2010	1.201,40	28/12/2022	1.804,09	14/11/2024	2.566,19
06/08/2010	1.205,30	27/12/2022	1.813,93	13/11/2024	2.573,78
05/08/2010	1.195,10	26/12/2022	1.797,61	12/11/2024	2.597,27
04/08/2010	1.195,75	23/12/2022	1.797,91	11/11/2024	2.620,20

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
03/08/2010	1.185,70	22/12/2022	1.792,57	08/11/2024	2.683,77
02/08/2010	1.181,85	21/12/2022	1.814,13	07/11/2024	2.706,99
30/07/2010	1.180,90	20/12/2022	1.817,41	06/11/2024	2.659,24
29/07/2010	1.166,93	19/12/2022	1.787,44	05/11/2024	2.743,59
28/07/2010	1.163,55	16/12/2022	1.792,34	04/11/2024	2.736,39
27/07/2010	1.162,30	15/12/2022	1.776,66	01/11/2024	2.735,16
26/07/2010	1.182,50	14/12/2022	1.807,27	31/10/2024	2.743,80
23/07/2010	1.189,10	13/12/2022	1.810,29	30/10/2024	2.786,19
22/07/2010	1.194,95	12/12/2022	1.781,15	29/10/2024	2.775,13
21/07/2010	1.186,00	09/12/2022	1.796,63	28/10/2024	2.741,98
20/07/2010	1.192,30	08/12/2022	1.789,23	25/10/2024	2.747,69
19/07/2010	1.183,70	07/12/2022	1.786,22	24/10/2024	2.735,70
16/07/2010	1.193,65	06/12/2022	1.770,91	23/10/2024	2.717,54
15/07/2010	1.208,55	05/12/2022	1.768,39	22/10/2024	2.748,38
14/07/2010	1.208,50	02/12/2022	1.797,82	21/10/2024	2.719,65
13/07/2010	1.211,65	01/12/2022	1.802,89	18/10/2024	2.720,25
12/07/2010	1.196,85	30/11/2022	1.768,45	17/10/2024	2.692,55
09/07/2010	1.212,00	29/11/2022	1.749,73	16/10/2024	2.673,24
08/07/2010	1.198,45	28/11/2022	1.740,75	15/10/2024	2.660,99
07/07/2010	1.202,35	25/11/2022	1.756,14	14/10/2024	2.651,05
06/07/2010	1.194,25	24/11/2022	1.754,96	11/10/2024	2.656,00
05/07/2010	1.208,95	23/11/2022	1.749,28	10/10/2024	2.629,48
02/07/2010	1.211,60	22/11/2022	1.740,24	09/10/2024	2.607,77
01/07/2010	1.199,65	21/11/2022	1.737,81	09/07/2024	2.363,58
30/06/2010	1.242,35	18/11/2022	1.749,74	08/07/2024	2.358,80
29/06/2010	1.240,95	17/11/2022	1.760,87	05/07/2024	2.391,46
28/06/2010	1.238,05	16/11/2022	1.773,77	04/07/2024	2.356,12
25/06/2010	1.255,50	15/11/2022	1.778,25	03/07/2024	2.356,06
24/06/2010	1.244,55	14/11/2022	1.771,80	02/07/2024	2.329,28
23/06/2010	1.237,20	11/11/2022	1.770,69	01/07/2024	2.331,70
22/06/2010	1.239,50	10/11/2022	1.754,75	28/06/2024	2.325,71
21/06/2010	1.232,15	09/11/2022	1.706,32	27/06/2024	2.327,45
18/06/2010	1.257,35	08/11/2022	1.712,52	26/06/2024	2.297,91
17/06/2010	1.245,35	07/11/2022	1.674,68	25/06/2024	2.319,01
16/06/2010	1.231,60	04/11/2022	1.680,27	24/06/2024	2.332,93
15/06/2010	1.234,45	03/11/2022	1.629,15	21/06/2024	2.320,34
14/06/2010	1.222,15	02/11/2022	1.634,89	20/06/2024	2.359,63
11/06/2010	1.227,40	01/11/2022	1.647,50	19/06/2024	2.327,48
10/06/2010	1.217,80	31/10/2022	1.633,12	18/06/2024	2.328,33
09/06/2010	1.232,35	28/10/2022	1.641,76	17/06/2024	2.318,87
08/06/2010	1.235,63	27/10/2022	1.662,94	14/06/2024	2.332,52
07/06/2010	1.240,05	26/10/2022	1.664,49	13/06/2024	2.303,19
04/06/2010	1.220,00	25/10/2022	1.652,52	12/06/2024	2.322,55
03/06/2010	1.208,05	24/10/2022	1.648,60	11/06/2024	2.316,27
02/06/2010	1.223,85	21/10/2022	1.656,66	10/06/2024	2.310,60
01/06/2010	1.225,30	20/10/2022	1.627,66	07/06/2024	2.292,71
31/05/2010	1.216,21	19/10/2022	1.628,49	06/06/2024	2.375,61
28/05/2010	1.214,81	18/10/2022	1.651,83	05/06/2024	2.354,78
27/05/2010	1.212,10	17/10/2022	1.649,94	04/06/2024	2.327,68
26/05/2010	1.210,90	14/10/2022	1.641,76	03/06/2024	2.350,35
25/05/2010	1.201,10	13/10/2022	1.665,80	31/05/2024	2.326,97
24/05/2010	1.192,05	12/10/2022	1.672,51	30/05/2024	2.343,00
21/05/2010	1.177,15	11/10/2022	1.665,31	29/05/2024	2.338,77
20/05/2010	1.183,10	10/10/2022	1.667,96	28/05/2024	2.360,95
19/05/2010	1.191,75	07/10/2022	1.694,52	27/05/2024	2.350,74

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
18/05/2010	1.221,70	06/10/2022	1.710,85	24/05/2024	2.333,76
17/05/2010	1.223,75	05/10/2022	1.715,81	23/05/2024	2.328,37
14/05/2010	1.233,05	04/10/2022	1.726,24	22/05/2024	2.378,25
13/05/2010	1.232,33	03/10/2022	1.699,22	21/05/2024	2.421,64
12/05/2010	1.237,35	30/09/2022	1.659,67	20/05/2024	2.425,12
11/05/2010	1.232,55	29/09/2022	1.660,29	17/05/2024	2.414,89
10/05/2010	1.202,40	28/09/2022	1.659,44	16/05/2024	2.376,44
07/05/2010	1.208,30	27/09/2022	1.628,80	15/05/2024	2.386,04
06/05/2010	1.208,75	26/09/2022	1.621,57	14/05/2024	2.357,97
05/05/2010	1.175,20	23/09/2022	1.643,09	13/05/2024	2.336,05
04/05/2010	1.171,65	22/09/2022	1.670,53	10/05/2024	2.360,14
03/05/2010	1.182,40	21/09/2022	1.673,74	09/05/2024	2.345,88
30/04/2010	1.179,25	20/09/2022	1.663,11	08/05/2024	2.308,65
29/04/2010	1.167,10	19/09/2022	1.675,78	07/05/2024	2.313,79
28/04/2010	1.165,45	16/09/2022	1.674,94	06/05/2024	2.323,57
27/04/2010	1.172,93	15/09/2022	1.663,74	03/05/2024	2.301,56
26/04/2010	1.154,88	14/09/2022	1.695,80	02/05/2024	2.303,29
23/04/2010	1.157,40	13/09/2022	1.701,55	01/05/2024	2.317,90
22/04/2010	1.141,45	12/09/2022	1.724,07	30/04/2024	2.285,57
21/04/2010	1.146,30	09/09/2022	1.716,05	29/04/2024	2.334,44
20/04/2010	1.140,50	08/09/2022	1.707,28	26/04/2024	2.337,72
19/04/2010	1.135,60	07/09/2022	1.717,69	25/04/2024	2.331,78
16/04/2010	1.137,45	06/09/2022	1.701,15	24/04/2024	2.315,82
15/04/2010	1.158,95	05/09/2022	1.710,21	23/04/2024	2.321,81
14/04/2010	1.154,90	02/09/2022	1.711,44	22/04/2024	2.326,29
13/04/2010	1.151,15	01/09/2022	1.696,09	19/04/2024	2.390,45
12/04/2010	1.152,00	31/08/2022	1.710,70	18/04/2024	2.378,25
09/04/2010	1.160,90	30/08/2022	1.723,55	17/04/2024	2.360,81
08/04/2010	1.151,15	29/08/2022	1.737,82	16/04/2024	2.382,83
07/04/2010	1.148,00	26/08/2022	1.736,86	15/04/2024	2.382,51
06/04/2010	1.134,20	25/08/2022	1.758,44	12/04/2024	2.343,43
05/04/2010	1.130,70	24/08/2022	1.750,89	11/04/2024	2.373,24
02/04/2010	1.120,50	23/08/2022	1.747,67	10/04/2024	2.332,79
01/04/2010	1.126,50	22/08/2022	1.735,70	09/04/2024	2.352,58
31/03/2010	1.113,80	19/08/2022	1.747,83	08/04/2024	2.338,89
30/03/2010	1.103,60	18/08/2022	1.758,20	05/04/2024	2.329,50
29/03/2010	1.109,20	17/08/2022	1.761,05	04/04/2024	2.289,43
26/03/2010	1.106,60	16/08/2022	1.775,54	03/04/2024	2.299,17
25/03/2010	1.091,35	15/08/2022	1.778,91	02/04/2024	2.280,10
24/03/2010	1.087,50	12/08/2022	1.801,76	01/04/2024	2.250,36
23/03/2010	1.102,65	11/08/2022	1.789,45	28/03/2024	2.232,38
22/03/2010	1.102,30	10/08/2022	1.792,13	27/03/2024	2.194,02
19/03/2010	1.107,55	09/08/2022	1.794,08	26/03/2024	2.178,58
18/03/2010	1.125,95	08/08/2022	1.788,52	25/03/2024	2.171,45
17/03/2010	1.125,05	05/08/2022	1.774,15	22/03/2024	2.164,15
16/03/2010	1.125,70	04/08/2022	1.790,97	21/03/2024	2.180,81
15/03/2010	1.109,10	03/08/2022	1.764,90	20/03/2024	2.185,96
12/03/2010	1.102,45	02/08/2022	1.759,75	19/03/2024	2.157,23
11/03/2010	1.109,45	01/08/2022	1.771,73	18/03/2024	2.159,99
10/03/2010	1.108,20	29/07/2022	1.765,22	15/03/2024	2.155,54
09/03/2010	1.120,10	28/07/2022	1.755,11	14/03/2024	2.161,01
08/03/2010	1.122,40	27/07/2022	1.733,89	13/03/2024	2.174,40
05/03/2010	1.132,05	26/07/2022	1.717,00	12/03/2024	2.157,99
04/03/2010	1.132,00	25/07/2022	1.718,78	11/03/2024	2.182,47
03/03/2010	1.139,50	22/07/2022	1.726,46	08/03/2024	2.177,51
02/03/2010	1.134,65	21/07/2022	1.718,49	07/03/2024	2.159,16
01/03/2010	1.117,35	20/07/2022	1.696,43	06/03/2024	2.148,29
26/02/2010	1.116,50	19/07/2022	1.711,07	05/03/2024	2.127,55
25/02/2010	1.106,10	18/07/2022	1.709,01	04/03/2024	2.114,99

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
24/02/2010	1.096,40	15/07/2022	1.706,78	01/03/2024	2.083,39
23/02/2010	1.102,05	14/07/2022	1.709,45	29/02/2024	2.043,24
22/02/2010	1.113,70	13/07/2022	1.735,23	28/02/2024	2.034,62
19/02/2010	1.118,85	12/07/2022	1.725,81	27/02/2024	2.029,64
18/02/2010	1.123,90	11/07/2022	1.733,67	26/02/2024	2.030,66
17/02/2010	1.115,20	08/07/2022	1.741,82	23/02/2024	2.035,72
16/02/2010	1.119,95	07/07/2022	1.739,61	22/02/2024	2.024,11
15/02/2010	1.101,00	06/07/2022	1.738,30	21/02/2024	2.024,99
12/02/2010	1.093,40	05/07/2022	1.764,35	20/02/2024	2.023,53
11/02/2010	1.095,35	04/07/2022	1.809,12	19/02/2024	2.017,63
10/02/2010	1.072,85	01/07/2022	1.810,18	16/02/2024	2.013,10
09/02/2010	1.077,30	30/06/2022	1.806,89	15/02/2024	2.004,09
08/02/2010	1.063,75	29/06/2022	1.817,11	14/02/2024	1.992,39
05/02/2010	1.065,45	28/06/2022	1.819,69	13/02/2024	1.992,13
04/02/2010	1.063,45	27/06/2022	1.822,73	12/02/2024	2.019,79
03/02/2010	1.109,65	24/06/2022	1.826,18	09/02/2024	2.024,16
02/02/2010	1.115,20	23/06/2022	1.822,43	08/02/2024	2.033,18
01/02/2010	1.107,35	22/06/2022	1.837,39	07/02/2024	2.034,22
29/01/2010	1.081,55	21/06/2022	1.832,56	06/02/2024	2.035,46
28/01/2010	1.086,30	20/06/2022	1.838,29	05/02/2024	2.024,67
27/01/2010	1.086,85	17/06/2022	1.839,35	02/02/2024	2.038,59
26/01/2010	1.098,05	16/06/2022	1.856,71	01/02/2024	2.054,89
25/01/2010	1.098,25	15/06/2022	1.833,38	31/01/2024	2.037,19
22/01/2010	1.093,00	14/06/2022	1.808,10	30/01/2024	2.036,12
21/01/2010	1.095,15	13/06/2022	1.818,77	29/01/2024	2.031,75
20/01/2010	1.111,70	10/06/2022	1.870,96	26/01/2024	2.018,34
19/01/2010	1.138,10	09/06/2022	1.847,61	25/01/2024	2.019,75
18/01/2010	1.133,00	08/06/2022	1.853,26	24/01/2024	2.012,59
15/01/2010	1.130,90	07/06/2022	1.851,97	23/01/2024	2.028,69
14/01/2010	1.143,25	06/06/2022	1.841,00	22/01/2024	2.020,99
13/01/2010	1.138,80	03/06/2022	1.850,77	19/01/2024	2.029,09
12/01/2010	1.127,70	02/06/2022	1.868,13	18/01/2024	2.022,67
11/01/2010	1.153,00	01/06/2022	1.845,55	17/01/2024	2.005,72
08/01/2010	1.136,60	31/05/2022	1.837,09	16/01/2024	2.027,59
07/01/2010	1.132,30	30/05/2022	1.856,21	15/01/2024	2.054,49
06/01/2010	1.138,90	27/05/2022	1.852,73	12/01/2024	2.048,72
05/01/2010	1.119,05	26/05/2022	1.850,02	11/01/2024	2.028,09
04/01/2010	1.120,40	25/05/2022	1.852,83	10/01/2024	2.023,40
01/01/2010	1.097,35	24/05/2022	1.865,90	09/01/2024	2.029,59
30/12/2011	1.564,30	23/05/2022	1.853,22	08/01/2024	2.027,84
29/12/2011	1.546,70	20/05/2022	1.845,68	05/01/2024	2.045,50
28/12/2011	1.553,00	19/05/2022	1.841,72	04/01/2024	2.043,26
27/12/2011	1.592,90	18/05/2022	1.815,61	03/01/2024	2.040,78
26/12/2011	1.605,82	17/05/2022	1.814,67	02/01/2024	2.058,88
23/12/2011	1.606,60	16/05/2022	1.823,79	29/12/2023	2.062,59
22/12/2011	1.604,70	13/05/2022	1.811,15	28/12/2023	2.064,86
21/12/2011	1.615,15	12/05/2022	1.821,72	27/12/2023	2.077,16
20/12/2011	1.615,65	11/05/2022	1.852,12	26/12/2023	2.066,60
19/12/2011	1.594,10	10/05/2022	1.838,14	25/12/2023	2.054,93
16/12/2011	1.597,95	09/05/2022	1.853,92	22/12/2023	2.052,98

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
15/12/2011	1.570,70	06/05/2022	1.882,96	21/12/2023	2.045,49
14/12/2011	1.575,10	05/05/2022	1.876,84	20/12/2023	2.029,19
13/12/2011	1.632,10	04/05/2022	1.880,92	19/12/2023	2.040,12
12/12/2011	1.666,30	03/05/2022	1.867,79	18/12/2023	2.027,00
09/12/2011	1.711,10	02/05/2022	1.862,77	15/12/2023	2.018,19
08/12/2011	1.708,80	29/04/2022	1.896,40	14/12/2023	2.035,53
07/12/2011	1.742,10	28/04/2022	1.894,34	13/12/2023	2.026,39
06/12/2011	1.728,20	27/04/2022	1.886,12	12/12/2023	1.979,44
05/12/2011	1.721,64	26/04/2022	1.905,56	11/12/2023	1.981,30
02/12/2011	1.745,25	25/04/2022	1.897,69	08/12/2023	2.003,39
01/12/2011	1.745,25	22/04/2022	1.929,73	07/12/2023	2.028,34
30/11/2011	1.745,70	21/04/2022	1.951,49	06/12/2023	2.024,90
29/11/2011	1.716,75	20/04/2022	1.957,41	05/12/2023	2.019,42
28/11/2011	1.712,30	19/04/2022	1.949,84	04/12/2023	2.029,74
25/11/2011	1.680,13	18/04/2022	1.978,50	01/12/2023	2.070,90
24/11/2011	1.694,75	15/04/2022	1.974,54	30/11/2023	2.035,75
23/11/2011	1.693,30	14/04/2022	1.973,52	29/11/2023	2.044,59
22/11/2011	1.699,20	13/04/2022	1.977,72	28/11/2023	2.040,89
21/11/2011	1.680,85	12/04/2022	1.966,59	27/11/2023	2.013,64
18/11/2011	1.723,05	11/04/2022	1.953,43	24/11/2023	2.001,97
17/11/2011	1.719,10	08/04/2022	1.945,85	23/11/2023	1.991,79
16/11/2011	1.762,35	07/04/2022	1.932,17	22/11/2023	1.989,72
15/11/2011	1.781,40	06/04/2022	1.925,48	21/11/2023	1.998,37
14/11/2011	1.781,00	05/04/2022	1.923,76	20/11/2023	1.977,19
11/11/2011	1.788,99	04/04/2022	1.932,44	17/11/2023	1.980,01
10/11/2011	1.759,20	01/04/2022	1.924,30	16/11/2023	1.980,85
09/11/2011	1.772,24	31/03/2022	1.937,23	15/11/2023	1.959,09
08/11/2011	1.785,00	30/03/2022	1.933,06	14/11/2023	1.962,67
07/11/2011	1.795,86	29/03/2022	1.919,19	13/11/2023	1.945,89
04/11/2011	1.754,15	28/03/2022	1.923,20	10/11/2023	1.936,79
03/11/2011	1.763,15	25/03/2022	1.957,40	09/11/2023	1.958,19
02/11/2011	1.737,00	24/03/2022	1.957,48	08/11/2023	1.949,79
01/11/2011	1.720,30	23/03/2022	1.943,38	07/11/2023	1.968,40
31/10/2011	1.715,25	22/03/2022	1.921,44	06/11/2023	1.977,68
28/10/2011	1.742,95	21/03/2022	1.935,95	03/11/2023	1.992,27
27/10/2011	1.744,45	18/03/2022	1.921,09	02/11/2023	1.985,51
26/10/2011	1.725,75	17/03/2022	1.942,64	01/11/2023	1.982,15
25/10/2011	1.705,35	16/03/2022	1.927,93	31/10/2023	1.982,70
24/10/2011	1.652,68	15/03/2022	1.917,84	30/10/2023	1.995,88
21/10/2011	1.641,02	14/03/2022	1.951,11	27/10/2023	2.005,78
20/10/2011	1.619,10	11/03/2022	1.985,29	26/10/2023	1.984,82
19/10/2011	1.641,80	10/03/2022	1.995,86	25/10/2023	1.979,62
18/10/2011	1.655,15	09/03/2022	1.991,49	24/10/2023	1.970,11
17/10/2011	1.670,65	08/03/2022	2.052,41	23/10/2023	1.972,59
14/10/2011	1.679,95	07/03/2022	1.998,11	20/10/2023	1.981,04
13/10/2011	1.666,70	04/03/2022	1.968,45	19/10/2023	1.973,70
12/10/2011	1.677,20	03/03/2022	1.935,21	18/10/2023	1.947,69
11/10/2011	1.663,10	02/03/2022	1.926,11	17/10/2023	1.923,07
10/10/2011	1.675,44	01/03/2022	1.943,22	16/10/2023	1.919,44
07/10/2011	1.639,45	28/02/2022	1.907,90	13/10/2023	1.931,70
06/10/2011	1.650,63	25/02/2022	1.887,56	12/10/2023	1.868,65
05/10/2011	1.640,90	24/02/2022	1.903,14	11/10/2023	1.873,61
04/10/2011	1.624,30	23/02/2022	1.907,55	10/10/2023	1.860,09
03/10/2011	1.660,95	22/02/2022	1.898,13	09/10/2023	1.860,88
30/09/2011	1.623,75	21/02/2022	1.905,63	06/10/2023	1.832,26
29/09/2011	1.614,55	18/02/2022	1.897,87	05/10/2023	1.820,01

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
28/09/2011	1.608,80	17/02/2022	1.897,27	04/10/2023	1.821,08
27/09/2011	1.649,95	16/02/2022	1.868,37	03/10/2023	1.822,81
26/09/2011	1.627,35	15/02/2022	1.853,06	02/10/2023	1.827,40
23/09/2011	1.656,59	14/02/2022	1.870,29	29/09/2023	1.848,31
22/09/2011	1.735,83	11/02/2022	1.859,96	28/09/2023	1.864,56
21/09/2011	1.781,79	10/02/2022	1.826,57	27/09/2023	1.874,70
20/09/2011	1.803,75	09/02/2022	1.832,43	26/09/2023	1.900,49
19/09/2011	1.778,75	08/02/2022	1.825,48	25/09/2023	1.915,66
16/09/2011	1.811,95	07/02/2022	1.820,31	22/09/2023	1.924,99
15/09/2011	1.789,14	04/02/2022	1.807,49	21/09/2023	1.919,57
14/09/2011	1.819,70	03/02/2022	1.804,40	20/09/2023	1.929,68
13/09/2011	1.833,80	02/02/2022	1.806,50	19/09/2023	1.930,94
12/09/2011	1.813,75	01/02/2022	1.800,65	18/09/2023	1.933,14
09/09/2011	1.857,81	31/01/2022	1.796,47	15/09/2023	1.923,57
08/09/2011	1.868,76	28/01/2022	1.791,03	14/09/2023	1.910,32
07/09/2011	1.816,96	27/01/2022	1.796,51	13/09/2023	1.906,30
06/09/2011	1.873,72	26/01/2022	1.818,12	12/09/2023	1.913,26
05/09/2011	1.900,49	25/01/2022	1.847,56	11/09/2023	1.921,66
02/09/2011	1.884,20	24/01/2022	1.843,06	08/09/2023	1.917,81
01/09/2011	1.825,05	21/01/2022	1.833,24	07/09/2023	1.919,19
31/08/2011	1.823,80	20/01/2022	1.838,36	06/09/2023	1.916,28
30/08/2011	1.835,30	19/01/2022	1.839,96	05/09/2023	1.925,81
29/08/2011	1.788,45	18/01/2022	1.813,54	04/09/2023	1.938,19
26/08/2011	1.828,55	17/01/2022	1.818,99	01/09/2023	1.938,80
25/08/2011	1.771,60	14/01/2022	1.817,22	31/08/2023	1.939,74
24/08/2011	1.751,05	13/01/2022	1.822,09	30/08/2023	1.942,24
23/08/2011	1.830,15	12/01/2022	1.825,32	29/08/2023	1.937,12
22/08/2011	1.898,10	11/01/2022	1.822,01	28/08/2023	1.919,66
19/08/2011	1.852,45	10/01/2022	1.801,41	25/08/2023	1.914,53
18/08/2011	1.824,35	07/01/2022	1.795,63	24/08/2023	1.917,43
17/08/2011	1.788,65	06/01/2022	1.788,68	23/08/2023	1.914,31
16/08/2011	1.786,30	05/01/2022	1.809,53	22/08/2023	1.897,47
15/08/2011	1.765,50	04/01/2022	1.814,56	21/08/2023	1.893,94
12/08/2011	1.746,60	03/01/2022	1.800,85	18/08/2023	1.888,19
11/08/2011	1.767,90	31/12/2021	1.828,39	17/08/2023	1.888,89
10/08/2011	1.795,00	30/12/2021	1.815,01	16/08/2023	1.891,76
09/08/2011	1.743,90	29/12/2021	1.803,66	15/08/2023	1.901,56
08/08/2011	1.717,35	28/12/2021	1.805,37	14/08/2023	1.907,90
05/08/2011	1.665,00	27/12/2021	1.810,90	11/08/2023	1.913,32
04/08/2011	1.648,40	24/12/2021	1.808,11	10/08/2023	1.912,06
03/08/2011	1.661,20	23/12/2021	1.807,91	09/08/2023	1.914,59
02/08/2011	1.659,75	22/12/2021	1.803,40	08/08/2023	1.924,82
01/08/2011	1.620,10	21/12/2021	1.788,36	07/08/2023	1.936,39
29/07/2011	1.626,64	20/12/2021	1.789,32	04/08/2023	1.941,62
28/07/2011	1.616,85	17/12/2021	1.797,68	03/08/2023	1.933,74
27/07/2011	1.613,50	16/12/2021	1.799,03	02/08/2023	1.933,56
26/07/2011	1.619,30	15/12/2021	1.777,06	01/08/2023	1.944,08
25/07/2011	1.614,55	14/12/2021	1.770,18	31/07/2023	1.964,19
22/07/2011	1.599,25	13/12/2021	1.786,94	28/07/2023	1.959,20
21/07/2011	1.589,90	10/12/2021	1.782,51	27/07/2023	1.944,99
20/07/2011	1.602,10	09/12/2021	1.774,46	26/07/2023	1.972,10
19/07/2011	1.588,35	08/12/2021	1.782,06	25/07/2023	1.964,58
18/07/2011	1.605,40	07/12/2021	1.784,04	24/07/2023	1.954,51
15/07/2011	1.594,10	06/12/2021	1.778,11	21/07/2023	1.960,23
14/07/2011	1.587,25	03/12/2021	1.783,74	20/07/2023	1.969,62
13/07/2011	1.582,25	02/12/2021	1.768,64	19/07/2023	1.977,25
12/07/2011	1.567,20	01/12/2021	1.782,66	18/07/2023	1.978,71
11/07/2011	1.554,10	30/11/2021	1.773,78	17/07/2023	1.954,74

Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)	Tanggal	Harga (USD/oz)
08/07/2011	1.544,25	29/11/2021	1.785,01	14/07/2023	1.954,93
07/07/2011	1.532,55	26/11/2021	1.791,81	13/07/2023	1.960,19
06/07/2011	1.529,50	25/11/2021	1.788,45	12/07/2023	1.957,09
05/07/2011	1.516,30	24/11/2021	1.788,50	11/07/2023	1.931,99
04/07/2011	1.495,95	23/11/2021	1.789,73	10/07/2023	1.924,99
01/07/2011	1.486,50	22/11/2021	1.805,04	07/07/2023	1.924,28
30/06/2011	1.500,10	19/11/2021	1.844,60	06/07/2023	1.910,80
29/06/2011	1.512,05	18/11/2021	1.858,46	05/07/2023	1.917,32
28/06/2011	1.501,00	17/11/2021	1.866,96	04/07/2023	1.925,09
27/06/2011	1.497,00	16/11/2021	1.849,91	03/07/2023	1.921,43
24/06/2011	1.502,15	15/11/2021	1.862,46	30/06/2023	1.919,57
23/06/2011	1.520,85	12/11/2021	1.864,04	29/06/2023	1.908,15
22/06/2011	1.547,80	11/11/2021	1.861,52	28/06/2023	1.907,42
21/06/2011	1.546,20	10/11/2021	1.849,57	27/06/2023	1.913,35
20/06/2011	1.540,45	09/11/2021	1.831,48	26/06/2023	1.922,85
17/06/2011	1.539,50	08/11/2021	1.824,26	23/06/2023	1.921,36
16/06/2011	1.528,85	05/11/2021	1.816,73	22/06/2023	1.913,52
15/06/2011	1.530,70	04/11/2021	1.791,70	21/06/2023	1.932,26
14/06/2011	1.524,10	03/11/2021	1.769,52	20/06/2023	1.935,91
13/06/2011	1.515,23	02/11/2021	1.787,28	19/06/2023	1.950,12
10/06/2011	1.531,90	01/11/2021	1.793,05	16/06/2023	1.957,36
09/06/2011	1.544,35	29/10/2021	1.782,81	15/06/2023	1.957,65
08/06/2011	1.537,55	28/10/2021	1.798,62	14/06/2023	1.942,99
07/06/2011	1.544,25	27/10/2021	1.796,69	13/06/2023	1.943,33
06/06/2011	1.544,00	26/10/2021	1.792,63	12/06/2023	1.956,92
03/06/2011	1.542,50	25/10/2021	1.807,47	09/06/2023	1.960,60
02/06/2011	1.533,90	22/10/2021	1.792,48	08/06/2023	1.967,76
01/06/2011	1.540,70	21/10/2021	1.782,76	07/06/2023	1.939,63
31/05/2011	1.535,35	20/10/2021	1.781,83	06/06/2023	1.962,85
30/05/2011	1.538,45	19/10/2021	1.768,87	05/06/2023	1.961,76
27/05/2011	1.536,65	18/10/2021	1.764,60	02/06/2023	1.947,63
26/05/2011	1.519,05	15/10/2021	1.767,26	01/06/2023	1.977,88
25/05/2011	1.525,95	14/10/2021	1.795,56	31/05/2023	1.962,30
24/05/2011	1.526,40	13/10/2021	1.792,65	30/05/2023	1.959,14
...	...	12/10/2021	1.759,93	29/05/2023	1.942,84
10/11/2021	1.849,57	11/10/2021	1.753,86	26/05/2023	1.946,33
09/11/2021	1.831,48	10/11/2021	1.849,57	25/05/2023	1.940,34

Lampiran 2 Kode Python Statistika Deskriptif

```
>>> import pandas as pd
>>>
>>> # Baca file Excel
>>> file_path = "D:/BISMILLAH OLAH DATA/Hasil/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>>
>>> # Tampilkan nama kolom
>>> print(df.columns)
Index(['Tanggal', 'Terakhir'], dtype='object')
>>>
>>> # Ubah kolom 'Terakhir' menjadi numerik
>>> df['Terakhir'] = df['Terakhir'].astype(str).str.replace('.', '', regex=False).str.replace(',', '.', r
>>> df['Terakhir'] = pd.to_numeric(df['Terakhir'], errors='coerce')
>>>
>>> # Hitung statistik deskriptif hanya untuk kolom harga
>>> summary_stats = pd.DataFrame({
...     'N (Jumlah Data)': [df['Terakhir'].count()],
...     'Mean': [df['Terakhir'].mean()],
...     'Standar Deviasi': [df['Terakhir'].std()],
...     'Nilai Minimum': [df['Terakhir'].min()],
...     'Nilai Maksimum': [df['Terakhir'].max()]
... })
>>>
>>> # Simpan ke Excel
>>> summary_stats.to_excel("D:/BISMILLAH OLAH DATA/Hasil/Statistik_Deskriptif_Harga_Emas_Baru.xlsx", inde
>>>
>>> print(summary_stats)
      N (Jumlah Data)      Mean  Standar Deviasi  Nilai Minimum  Nilai Maksimum
0              3977  1569.44651          391.69172         1051.74          3236.21
>>>
```

Lampiran 3 Plot Pergerakan Harga Emas

```
>>> import pandas as pd
>>> import matplotlib.pyplot as plt
>>> import matplotlib.dates as mdates
>>>
>>> # Baca file Excel Anda
>>> file_path = "D:/BISMILLAH OLAH DATA/Hasil/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>>
>>> # Konversi Tanggal
>>> df['Tanggal'] = pd.to_datetime(df['Tanggal'], errors='coerce')
>>>
>>> # Konversi harga
>>> df['Terakhir'] = df['Terakhir'].astype(str).str.replace('.', '', regex=False).str.replace(',', '.', re
>>> df['Terakhir'] = pd.to_numeric(df['Terakhir'], errors='coerce')
>>>
>>> # Bersihkan data
>>> df = df.dropna(subset=['Tanggal', 'Terakhir'])
>>>
>>> # Plot
>>> plt.figure(figsize=(12,6))
<Figure size 1200x600 with 0 Axes>
>>> plt.plot(df['Tanggal'], df['Terakhir'], label='Harga Emas Dunia')
[<matplotlib.lines.Line2D object at 0x00000289276DCBB0>]
>>>
>>> # Atur format sumbu x hanya tahun
>>> plt.gca().xaxis.set_major_locator(mdates.YearLocator())
>>> plt.gca().xaxis.set_major_formatter(mdates.DateFormatter('%Y'))
>>>
>>> plt.xlabel('Tahun')
```

```
>>> plt.xlabel('Tahun')
Text(0.5, 0, 'Tahun')
>>> plt.ylabel('Harga Emas')
Text(0, 0.5, 'Harga Emas')
>>> plt.title('Pergerakan Harga Emas Dunia')
Text(0.5, 1.0, 'Pergerakan Harga Emas Dunia')
>>> plt.legend()
<matplotlib.legend.Legend object at 0x000002892A561640>
>>> plt.grid(True)
>>> plt.tight_layout()
>>> plt.show()
```

Lampiran 4 Kode Python Data Cleaning

```
>>> import pandas as pd
>>>
>>> # Ganti path ini sesuai lokasi file Anda
>>> file_path = "D:/BISMILLAH OLAH DATA/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>>
>>> # Mengecek jumlah missing value di setiap kolom
>>> missing_values = df.isnull().sum()
>>> print("Jumlah missing value per kolom:")
Jumlah missing value per kolom:
>>> print(missing_values)
Tanggal      0
Terakhir     0
dtype: int64
>>>
>>> # Mengecek persentase missing value
>>> percent_missing = df.isnull().mean() * 100
>>> print("\nPersentase missing value per kolom:")

Persentase missing value per kolom:
>>> print(percent_missing)
Tanggal      0.0
Terakhir     0.0
dtype: float64
>>>
>>> # Menampilkan baris yang mengandung missing value
>>> print("\nBaris yang mengandung missing value:")

Baris yang mengandung missing value:
>>> print(df[df.isnull().any(axis=1)])
```

Lampiran 5 Kode Python dan Hasil Untuk Data Latih dan Data Uji

```
>>> import pandas as pd
>>>
>>> # === 1. Baca file Excel ===
>>> file_path = "D:/OLAH DATA BARU/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>>
>>> # Pastikan nama kolom sesuai file Anda
>>> # Misalnya kolom 'Tanggal' dan 'Terakhir'
>>> print(df.head())
   Tanggal  Terakhir
0 2025-04-11    3.236,21
1 2025-04-10    3.173,92
2 2025-04-09    3.082,18
3 2025-04-08    2.983,78
4 2025-04-07    2.982,54
>>>
>>> # === 2. Tentukan indeks pembagian 80%-20% ===
>>> train_size = int(len(df) * 0.8)
>>>
>>> # === 3. Bagi data ===
>>> train_df = df.iloc[:train_size]
>>> test_df = df.iloc[train_size:]
>>>
>>> # === 4. Simpan hasil pembagian ke file baru ===
>>> train_df.to_excel("D:/OLAH DATA BARU/Harga_Emas_Train.xlsx", index=False)
>>> test_df.to_excel("D:/OLAH DATA BARU/Harga_Emas_Test.xlsx", index=False)
>>>
>>> print(f"Jumlah data latih: {len(train_df)} baris")
Jumlah data latih: 3181 baris
>>> print(f"Jumlah data uji: {len(test_df)} baris")
```

Hasil Data Latih (3182) dan Data Uji (797)

Data Latih	Data Uji
3.236,21	1.683,95
3.173,92	1.687,64
3.082,18	1.679,50
2.983,78	1.678,90
2.982,54	1.667,20
3.037,36	1.663,05
3.112,83	1.675,25
3.133,57	1.657,90
3.110,55	1.659,00
3.123,05	1.647,25
3.084,03	1.656,85
3.056,10	1.663,35
3.019,29	1.686,75
3.019,85	1.675,15
3.012,27	1.674,95
3.023,63	1.655,40
3.044,41	1.663,90
3.047,18	1.660,14
3.033,95	1.658,90
3.001,47	1.657,48
2.984,42	1.656,99
2.987,75	1.647,75
2.932,06	1.666,94
2.916,04	1.670,15
2.889,40	1.697,93
2.910,79	1.695,47
2.909,99	1.697,30
2.918,84	1.711,95
2.917,49	1.710,10
2.893,71	1.710,25
2.858,60	1.703,65
2.876,19	1.699,14
2.916,19	1.693,99
2.915,12	1.697,35
2.951,19	1.715,25
2.936,03	1.714,80
2.938,70	1.725,40
2.932,64	1.719,69
2.935,58	1.742,05
2.897,66	1.749,10
2.883,18	1.753,00
2.929,03	1.729,55
2.903,66	1.729,11
2.898,34	1.728,65
2.907,34	1.731,94
2.860,39	1.713,70
2.856,50	1.715,80
2.865,09	1.726,45
2.841,94	1.725,50
2.813,49	1.728,35
2.801,00	1.731,24
2.793,88	1.730,99
2.757,71	1.716,69
2.763,11	1.715,95
2.741,10	1.684,60
2.771,30	1.677,85

Data Latih	Data Uji
2.753,69	1.714,70
2.755,02	1.720,55
2.744,39	1.709,49
2.708,06	1.709,85
2.701,55	1.711,35
2.713,77	1.711,80
2.695,82	1.702,43
2.677,16	1.708,70
2.662,12	1.729,45
2.689,63	1.720,90
2.670,19	1.741,70
2.662,06	1.750,30
2.649,49	1.747,80
2.635,33	1.736,10
2.639,12	1.754,25
2.657,16	1.768,80
2.623,81	1.762,55
2.605,39	1.764,15
2.620,00	1.774,90
2.634,43	1.780,98
2.613,20	1.790,55
2.612,93	1.779,15
2.620,77	1.778,00
2.593,85	1.774,40
2.587,63	1.771,22
2.645,54	1.777,90
2.652,50	1.752,20
2.648,39	1.760,65
2.681,33	1.764,15
2.717,93	1.773,05
2.693,64	1.766,70
2.658,78	1.769,80
2.632,91	1.770,95
2.632,05	1.761,45
2.649,79	1.772,48
2.643,44	1.766,90
2.638,93	1.731,50
2.653,55	1.731,75
2.640,96	1.725,80
2.635,51	1.736,50
2.631,89	1.701,65
2.625,26	1.693,65
2.712,55	1.696,40
2.669,69	1.692,40
2.650,05	1.691,15
2.631,68	1.656,15
2.612,20	1.656,55
2.561,24	1.667,03
2.566,19	1.664,10
2.573,78	1.670,35
2.597,27	1.670,65
2.620,20	1.654,00
2.683,77	1.638,50
2.706,99	1.620,70
2.659,24	1.615,80
2.743,59	1.614,80
2.736,39	1.603,38
2.735,16	1.598,65
2.743,80	1.610,15
2.786,19	1.620,05

Data Latih	Data Uji
2.775,13	1.617,70
2.741,98	1.611,90
2.747,69	1.611,18
2.735,70	1.611,00
2.717,54	1.604,30
2.748,38	1.590,35
2.719,65	1.599,20
2.720,25	1.613,90
2.692,55	1.621,10
2.673,24	1.623,28
2.660,99	1.616,20
2.651,05	1.605,38
2.656,00	1.580,50
2.629,48	1.576,90
2.607,77	1.583,63
2.621,94	1.582,05
2.643,58	1.573,80
2.652,25	1.582,75
2.655,90	1.589,35
2.657,75	1.589,05
2.662,82	1.572,40
2.634,49	1.576,90
2.657,97	1.566,50
2.670,20	1.587,15
2.656,82	1.582,90
2.656,70	1.604,75
2.628,40	1.615,63
2.621,96	1.616,65
2.586,48	1.596,35
2.558,80	1.598,60
2.569,52	1.551,90
2.582,58	1.574,30
2.576,50	1.572,15
2.558,75	1.584,60
2.511,44	1.572,15
2.516,12	1.565,30
2.505,25	1.605,90
2.497,03	1.618,07
2.516,32	1.628,40
...	...
1.573,70	1.122,40
1.582,00	1.132,05
1.553,32	1.132,00
1.557,85	1.139,50
1.575,85	1.134,65
1.598,90	1.117,35
1.596,74	1.116,50
1.605,40	1.106,10
1.599,20	1.096,40
1.605,40	1.102,05
1.608,45	1.113,70
1.614,70	1.118,85
1.606,50	1.123,90
1.613,40	1.115,20
1.605,30	1.119,95
1.592,45	1.101,00
1.590,30	1.093,40
1.587,80	1.095,35
1.592,70	1.072,85

Lampiran 6 Kode Python dan Hasil Normalisasi

```
>>> import pandas as pd
>>> from sklearn.preprocessing import MinMaxScaler
>>>
>>> # === 1. Baca file Excel ===
>>> file_path = "D:/OLAH DATA BARU/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>>
>>> # === 2. Bersihkan kolom harga ===
>>> # Hapus titik ribuan, ganti koma jadi titik, lalu ubah ke float
>>> df['Terakhir'] = df['Terakhir'].astype(str) \
...                 .str.replace('.', '', regex=False) \
...                 .str.replace(',', '.', regex=False) \
...                 .astype(float)
>>>
>>> # === 3. Bagi 80% data latih dan 20% data uji ===
>>> train_size = int(len(df) * 0.8)
>>> train_data = df[['Terakhir']].iloc[:train_size]
>>> test_data = df[['Terakhir']].iloc[train_size:]
>>>
>>> # === 4. MinMaxScaler (0-1) ===
>>> scaler = MinMaxScaler(feature_range=(0, 1))
>>>
>>> # Fit hanya pada data latih
>>> scaler.fit(train_data)
MinMaxScaler()
>>>
>>> # Transformasi
>>> train_scaled = scaler.transform(train_data)
>>> test_scaled = scaler.transform(test_data)
>>>
>>> # === 5. Simpan hasil ===
>>> pd.DataFrame(train_scaled, columns=['Harga_Normalisasi']) \
...   .to_excel("D:/OLAH DATA BARU/Harga_Emas_Train_Normalisasi.xlsx", index=False)
>>> pd.DataFrame(test_scaled, columns=['Harga_Normalisasi']) \
...   .to_excel("D:/OLAH DATA BARU/Harga_Emas_Test_Normalisasi.xlsx", index=False)
>>>
>>> print("Normalisasi selesai.")
Normalisasi selesai.
>>> print(f"Min data latih: {scaler.data_min_[0]}, Max data latih: {scaler.data_max_[0]}")
Min data latih: 1051.74, Max data latih: 3236.21
```

Hasil Normalisasi Data Latih dan Data Uji

Normalisasi Data Latih	Normalisasi Data Uji
1	0.289411
0.971485	0.2911
0.929489	0.287374
0.884443	0.287099
0.883876	0.281743
0.908971	0.279844
0.943519	0.285429
0.953014	0.277486
0.942476	0.27799
0.948198	0.272611
0.930336	0.277005
0.91755	0.279981
0.900699	0.290693
0.900955	0.285383
0.897485	0.285291
0.902686	0.276342
0.912198	0.280233
0.913466	0.278511
0.90741	0.277944
0.892541	0.277294
0.884736	0.277069
0.886261	0.27284
0.860767	0.281624
0.853434	0.283094

Normalisasi Data Latih	Normalisasi Data Uji
0.841238	0.295811
0.85103	0.294685
0.850664	0.295522
0.854715	0.302229
0.854097	0.301382
0.843211	0.301451
0.827139	0.298429
0.835191	0.296365
0.853502	0.294007
0.853012	0.295545
0.721759	0.258136
0.718811	0.258603
0.702569	0.24931
0.689897	0.25034
0.694805	0.228962
0.700783	0.239216
0.698	0.238232
0.689874	0.243931
0.668217	0.238232
0.670359	0.235096
0.665383	0.253682
0.66162	0.259253
0.670451	0.263982
0.66032	0.263231
0.659666	0.261656
0.662655	0.259381
0.664367	0.255581
0.672676	0.249356
0.66401	0.24844
0.674228	0.245945
0.670712	0.260319
0.668505	0.258809
0.655331	0.259404
0.66845	0.262997
0.66927	0.23299
0.664775	0.233791
0.666313	0.230724
0.642884	0.238772
0.639011	0.238827
0.646972	0.232212
0.650277	0.233585
0.631361	0.236767
0.629448	0.247616
0.608747	0.247818
0.612336	0.239079
0.620704	0.223537
0.63702	0.225551
0.637995	0.231228
0.639221	0.241848
0.621061	0.248078
0.609667	0.246101
0.610597	0.25327
0.600951	0.268903
0.616099	0.270587
0.621418	0.267351
0.616127	0.275472
0.617564	0.279409
0.637789	0.280443
0.643927	0.279386
0.648592	0.277028

Normalisasi Data Latih	Normalisasi Data Uji
0.627305	0.271443
0.622361	0.26975
0.623968	0.268697
0.603959	0.270528
0.60053	0.27094
0.598342	0.270239
0.613293	0.273824
0.597115	0.274831
0.597088	0.27799
0.584828	0.285534
0.585936	0.277509
0.583194	0.278608
0.583991	0.269878
0.570468	0.269058
0.580127	0.265286
0.586499	0.260242
0.580736	0.271732
0.598722	0.286573
0.584004	0.282522
0.584393	0.279079
0.580063	0.279445
0.586312	0.287626
0.572885	0.292172
0.581748	0.279482
0.578873	0.271512
0.576277	0.274099
0.568087	0.27403
0.606037	0.28053
0.596502	0.278745
0.584096	0.277637
0.594474	0.27094
0.583771	0.285543
0.591109	0.297001
0.589173	0.302751
0.599326	0.297056
0.594652	0.289869
0.501975	0.24828
0.492481	0.250042
0.486731	0.237568
0.472266	0.239582
0.453886	0.265675
0.44994	0.281331
0.44766	0.30184
0.448127	0.300787
0.450443	0.316031
0.445129	0.309668
0.445531	0.306665
0.444863	0.317473
0.442162	0.317473
0.440088	0.317679
0.435964	0.304426
0.430608	0.302389
0.430489	0.287662
0.443151	0.294355
0.445151	0.293691
0.449281	0.296392
0.449757	0.287992
0.392155	0.137338
0.396554	0.140908
0.397566	0.13395

Normalisasi Data Latih	Normalisasi Data Uji
0.386876	0.125229
0.377501	0.131913
0.377909	0.132165
0.375308	0.126557
...	...
0.243514	0.093231
0.239738	0.090782
0.239056	0.089431
0.239646	0.091331
0.241889	0.088172
0.249882	0.089683
0.257156	0.084716
0.248344	0.085357
0.242146	0.084373
0.240017	0.086227
0.233997	0.081489
0.253087	0.079498
0.255581	0.080711
0.255302	0.082565
0.266934	0.081397
0.270546	0.079269
0.274236	0.079246
0.273751	0.074988
0.281881	0.073913
0.28362	0.06684
0.286454	0.069632
0.284399	0.068511
0.285039	0.070296
0.281721	0.065627

Lampiran 7 Kode Python dan Dekomposisi IMF 1 – IMF 11

```
>>> import pandas as pd
>>> import numpy as np
>>> from sklearn.preprocessing import MinMaxScaler
>>> from PyEMD import EEMD
>>> import os
>>> import matplotlib.pyplot as plt
>>>
>>> # === 1. Lokasi file harga emas asli ===
>>> file_path = "D:/BISMILLAH FIX DATA OLAH/HARGA EMAS DUNIA.xlsx"
>>> df = pd.read_excel(file_path)
>>> # Pastikan kolom harga benar
>>> # Jika formatnya 3.234,56 → ubah ke float
>>> df['Terakhir'] = df['Terakhir'].astype(str) \
...                 .str.replace('.', '', regex=False) \
...                 .str.replace(',', '.', regex=False) \
...                 .astype(float)
>>>
>>> harga_asli = df['Terakhir'].values.reshape(-1, 1)
>>> # === 2. Normalisasi Min-Max untuk seluruh data ===
>>> scaler = MinMaxScaler(feature_range=(0, 1))
>>> harga_norm = scaler.fit_transform(harga_asli).flatten()
>>>
>>> # Simpan data normalisasi gabungan
>>> df_norm = pd.DataFrame({'Harga_Normalisasi': harga_norm})
>>> norm_file = "D:/BISMILLAH FIX DATA OLAH/Harga_Emas_Normalisasi.xlsx"
>>> df_norm.to_excel(norm_file, index=False)
>>>
>>> # === 3. Fungsi EEMD ===
>>> def eemd_decompose(data, num_ensembles=100, noise_width=0.2):
...     eemd = EEMD()
...     eemd.noise_width = noise_width
...     eemd.trials = num_ensembles
...     imfs = eemd.eemd(data)
...     return imfs
>>>
>>> # === 4. Lakukan EEMD sekali untuk seluruh data normalisasi ===
>>> imfs = eemd_decompose(harga_norm)
>>> print(f"Jumlah IMF: {imfs.shape[0]}")
>>> # === 5. Tentukan indeks split train/test ===
>>> train_size = int(len(harga_norm) * 0.8)
>>>
>>> # === 6. Folder output ===
>>> output_folder = "D:/BISMILLAH FIX DATA OLAH/EEMD_Result_Single/"
>>> os.makedirs(output_folder, exist_ok=True)
>>>
>>> # === 7. Simpan semua IMF gabungan ===
>>> imf_df = pd.DataFrame(imfs).T
>>> imf_df.columns = [f'IMF_{i+1}' for i in range(imf_df.shape[1])]
>>> imf_df.to_excel(os.path.join(output_folder, "All_IMF.xlsx"), index=False)
>>>
>>> # === 8. Simpan setiap IMF dalam 2 file (train & test) ===
>>> for i in range(imfs.shape[0]):
...     # Train IMF
...     pd.DataFrame(imfs[i][:train_size], columns=[f'IMF_{i+1}']) \
...     .to_excel(os.path.join(output_folder, f"Train_IMF_{i+1}.xlsx"), index=False)
...     # Test IMF
...     pd.DataFrame(imfs[i][train_size:], columns=[f'IMF_{i+1}']) \
...     .to_excel(os.path.join(output_folder, f"Test_IMF_{i+1}.xlsx"), index=False)
>>>
>>> # === 9. Plot semua IMF untuk skripsi ===
>>> plt.figure(figsize=(12, 2*(imfs.shape[0]+1)))
<Figure size 1200x2400 with 0 Axes>
>>> plt.subplot(imfs.shape[0]+1, 1, 1)
<Axes: >
>>> plt.plot(harga_norm, color='blue')
[<matplotlib.lines.Line2D object at 0x0000020A6532C5B0>]
>>> plt.ylabel("Data")
```

```

Text(0, 0.5, 'Data')
>>> plt.title("Hasil EEMD - Seluruh Data (Normalisasi)")
Text(0.5, 1.0, 'Hasil EEMD - Seluruh Data (Normalisasi)')
>>>
>>> for i in range(imfs.shape[0]):
...     plt.subplot(imfs.shape[0]+1, 1, i+2)
...     plt.plot(imfs[i], color='green')
...     plt.ylabel(f"IMF {i+1}")
...
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A635CD730>]
Text(0, 0.5, 'IMF 1')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A62524C10>]
Text(0, 0.5, 'IMF 2')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A634D2790>]
Text(0, 0.5, 'IMF 3')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A62594EE0>]
Text(0, 0.5, 'IMF 4')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A63547D00>]
Text(0, 0.5, 'IMF 5')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A6238B50>]
Text(0, 0.5, 'IMF 6')
<Axes: >
[<matplotlib.lines.Line2D object at 0x0000020A6343E4C0>]
>>> plt.tight_layout()
>>> plt.savefig(os.path.join(output_folder, "EEMD_All_IMF.png"), dpi=300, bbox_inches='tight')
>>> plt.show()

```

Hasil IMF 1 – IMF 11 (Data Training = 3181 Data)

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
-0.00625	-0.00016	0.003008	0.014811	0.013086	-0.01245	-0.03193	-0.28718	0.159461	0.364896	0.191221	-0.36346
0.034706	0.017041	0.006548	0.017305	0.013139	-0.01264	-0.03206	-0.28738	0.159535	0.364918	0.191294	-0.40457
-0.012	0.021329	-0.00372	0.018759	0.012895	-0.01284	-0.03217	-0.28757	0.159611	0.364939	0.191368	-0.35408
-0.00513	0.01683	-0.02246	0.019358	0.012366	-0.01306	-0.03228	-0.28775	0.159687	0.36496	0.191442	-0.31784
0.016126	0.01209	-0.04	0.01936	0.011577	-0.01329	-0.03237	-0.28792	0.159765	0.364981	0.191516	-0.32223
-0.00128	-0.0094	-0.04664	0.018927	0.010548	-0.01354	-0.03245	-0.28809	0.159844	0.365002	0.19159	-0.27067
0.000425	-0.02877	-0.03921	0.018198	0.009302	-0.01379	-0.03251	-0.28824	0.159925	0.365022	0.191664	-0.24196
0.002696	-0.00273	-0.0194	0.017237	0.007867	-0.01406	-0.03256	-0.28838	0.160007	0.365042	0.191738	-0.3124
-0.01391	0.036501	0.006927	0.016079	0.006277	-0.01434	-0.0326	-0.28852	0.160089	0.365062	0.191813	-0.34735
0.00882	0.030092	0.029106	0.014724	0.004575	-0.01464	-0.03263	-0.28864	0.160174	0.365081	0.191887	-0.37813
-0.08907	-0.00781	0.040532	0.013203	0.002802	-0.01494	-0.03265	-0.28876	0.160259	0.3651	0.191962	-0.26242
0.039085	-0.02569	0.04181	0.011379	0.000998	-0.01525	-0.03265	-0.28886	0.160346	0.365119	0.192036	-0.36802
0.056688	-0.01782	0.033922	0.009032	-0.00079	-0.01557	-0.03265	-0.28896	0.160434	0.365138	0.192111	-0.3762
-0.00218	-0.00084	0.020191	0.006026	-0.00252	-0.0159	-0.03263	-0.28905	0.160523	0.365156	0.192186	-0.34173
0.011445	0.00798	0.005879	0.002439	-0.00412	-0.01623	-0.0326	-0.28912	0.160613	0.365174	0.192261	-0.36083
0.019251	0.008167	-0.0044	-0.00158	-0.00555	-0.01657	-0.03255	-0.28919	0.160705	0.365192	0.192336	-0.35504
-0.04078	0.000638	-0.00567	-0.00571	-0.00676	-0.01691	-0.0325	-0.28925	0.160798	0.365209	0.192411	-0.27553
0.006121	-0.01342	0.00299	-0.00969	-0.0077	-0.01724	-0.03243	-0.28929	0.160893	0.365226	0.192486	-0.31218
-0.0443	-0.01066	0.013981	-0.01325	-0.00833	-0.01757	-0.03236	-0.28933	0.160988	0.365243	0.192561	-0.28228
0.054064	-0.01053	0.019155	-0.01609	-0.00863	-0.0179	-0.03227	-0.28936	0.161085	0.36526	0.192637	-0.38328
-0.06446	-0.01223	0.01625	-0.01811	-0.00858	-0.01821	-0.03217	-0.28938	0.161183	0.365276	0.192712	-0.26282
0.045613	-0.0024	0.007548	-0.01958	-0.00818	-0.01851	-0.03206	-0.28939	0.161283	0.365292	0.192788	-0.34745
-0.01542	0.012875	-0.00289	-0.02065	-0.00743	-0.01879	-0.03194	-0.28939	0.161383	0.365308	0.192863	-0.28322
0.001234	0.002236	-0.01268	-0.02132	-0.00635	-0.01905	-0.03181	-0.28938	0.161485	0.365324	0.192939	-0.2854
-0.00647	-0.01237	-0.0216	-0.02146	-0.00496	-0.01929	-0.03167	-0.28936	0.161589	0.365339	0.193015	-0.30119
0.010136	-0.00234	-0.02834	-0.02103	-0.00332	-0.01951	-0.03152	-0.28933	0.161693	0.365354	0.193091	-0.32134
-0.00694	-0.005	-0.03084	-0.01993	-0.00149	-0.01971	-0.03136	-0.28929	0.161799	0.365368	0.193167	-0.3039
-0.00264	-0.00747	-0.02873	-0.01805	0.000471	-0.01988	-0.03119	-0.28925	0.161906	0.365383	0.193243	-0.29854
-0.00753	0.009203	-0.02027	-0.01528	0.002504	-0.02002	-0.03101	-0.28919	0.162014	0.365397	0.193319	-0.32828
0.003673	0.012898	-0.0094	-0.01189	0.004559	-0.02013	-0.03083	-0.28912	0.162124	0.365411	0.193396	-0.33761
-0.00273	0.004606	0.000473	-0.00831	0.006576	-0.02021	-0.03063	-0.28905	0.162235	0.365424	0.193472	-0.34069
-0.0266	-0.00349	0.007862	-0.00479	0.00849	-0.02026	-0.03042	-0.28896	0.162347	0.365437	0.193549	-0.31447
-0.04325	-0.01211	0.009766	-0.00144	0.010239	-0.02028	-0.03021	-0.28887	0.162461	0.36545	0.193625	-0.27799
0.031108	-0.00986	0.007358	0.001679	0.011762	-0.02026	-0.02999	-0.28877	0.162575	0.365463	0.193702	-0.36207
-0.04407	0.00151	0.00287	0.004432	0.013009	-0.02021	-0.02975	-0.28866	0.162691	0.365476	0.193779	-0.28977
0.057387	0.000393	-0.00124	0.006888	0.013951	-0.02013	-0.02951	-0.28853	0.162808	0.365488	0.193855	-0.39504
-0.01219	0.002615	-0.00131	0.009174	0.014583	-0.02001	-0.02926	-0.2884	0.162927	0.365499	0.193932	-0.33634
0.009611	0.013976	0.003665	0.011318	0.014913	-0.01985	-0.02901	-0.28827	0.163047	0.365511	0.194009	-0.38922

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
-0.06164	0.015689	0.013904	0.013202	0.014946	-0.01966	-0.02874	-0.28812	0.163168	0.365522	0.194087	-0.33823
-0.03097	0.026468	0.023766	0.014422	0.014696	-0.01943	-0.02847	-0.28796	0.16329	0.365533	0.194164	-0.38179
0.033236	0.01952	0.026291	0.014668	0.014188	-0.01917	-0.0282	-0.28779	0.163414	0.365544	0.194241	-0.43195
-0.02467	-0.01476	0.018396	0.013713	0.013445	-0.01889	-0.02791	-0.28762	0.163538	0.365554	0.194318	-0.33028
0.041096	-0.03553	0.004438	0.011451	0.012506	-0.01858	-0.02762	-0.28744	0.163664	0.365565	0.194396	-0.34204
-0.04294	-0.01944	-0.00952	0.008192	0.011401	-0.01824	-0.02732	-0.28724	0.163792	0.365574	0.194474	-0.25201
0.035815	0.017515	-0.0181	0.004559	0.010152	-0.01787	-0.02702	-0.28704	0.16392	0.365584	0.194551	-0.36276
-0.01585	0.030561	-0.01971	0.000996	0.00878	-0.01748	-0.02671	-0.28683	0.16405	0.365593	0.194629	-0.31868
-0.00053	0.018603	-0.01546	-0.00208	0.007331	-0.01705	-0.02639	-0.28662	0.164181	0.365602	0.194707	-0.33247
0.042364	-0.0029	-0.00649	-0.00425	0.005851	-0.0166	-0.02607	-0.28639	0.164313	0.365611	0.194785	-0.36267
-0.03141	-0.02134	0.003659	-0.0054	0.00437	-0.01613	-0.02575	-0.28616	0.164447	0.365619	0.194863	-0.29099
0.019648	-0.0317	0.012234	-0.00553	0.002906	-0.01562	-0.02542	-0.28591	0.164581	0.365627	0.194941	-0.33874
0.020808	-0.02677	0.016775	-0.00473	0.001472	-0.01508	-0.02509	-0.28566	0.164717	0.365635	0.195019	-0.35699
-0.06689	-0.00585	0.018027	-0.00322	7.94E-05	-0.01452	-0.02475	-0.2854	0.164854	0.365643	0.195098	-0.2864
0.097373	0.014541	0.017209	-0.00116	-0.00127	-0.01392	-0.02441	-0.28513	0.164993	0.36565	0.195176	-0.45596
-0.06693	0.003183	0.013376	0.001111	-0.00256	-0.0133	-0.02407	-0.28486	0.165132	0.365657	0.195255	-0.27957
0.035859	-0.01624	0.005441	0.003089	-0.00377	-0.01264	-0.02372	-0.28457	0.165273	0.365664	0.195333	-0.35638
-0.0227	0.004184	-0.00658	0.00443	-0.00492	-0.01196	-0.02338	-0.28428	0.165415	0.36567	0.195412	-0.32614
0.04561	0.023393	-0.01761	0.005071	-0.00598	-0.01125	-0.02303	-0.28398	0.165558	0.365676	0.195491	-0.409
-0.02714	0.004444	-0.02356	0.004928	-0.00695	-0.01051	-0.02267	-0.28367	0.165703	0.365682	0.195569	-0.31152
-0.00799	-0.00811	-0.02159	0.003937	-0.00783	-0.00975	-0.02232	-0.28336	0.165848	0.365688	0.195648	-0.33483
0.025593	0.006944	-0.01242	0.002006	-0.00864	-0.00896	-0.02196	-0.28303	0.165995	0.365693	0.195728	-0.38781
-0.01007	0.014637	-0.00022	-0.00079	-0.0094	-0.00814	-0.02161	-0.2827	0.166143	0.365698	0.195807	-0.35514
-0.03646	0.011101	0.010292	-0.00412	-0.01012	-0.00729	-0.02125	-0.28236	0.166292	0.365702	0.195886	-0.3309
-0.01381	-0.00623	0.016676	-0.00761	-0.01081	-0.00641	-0.0209	-0.28201	0.166443	0.365707	0.195965	-0.34577
0.047878	-0.02051	0.017125	-0.01109	-0.01149	-0.00551	-0.02054	-0.28166	0.166594	0.365711	0.196045	-0.38124
0.015659	-0.00896	0.010587	-0.01446	-0.01214	-0.00458	-0.02018	-0.2813	0.166747	0.365715	0.196124	-0.33935
-0.02761	0.004968	-0.00096	-0.01762	-0.01278	-0.00362	-0.01983	-0.28093	0.166901	0.365718	0.196204	-0.30251
0.040571	-0.01349	-0.00971	-0.02032	-0.0134	-0.00264	-0.01948	-0.28055	0.167056	0.365721	0.196283	-0.33203
-0.04717	-0.03483	-0.01026	-0.0222	-0.014	-0.00163	-0.01912	-0.28016	0.167212	0.365724	0.196363	-0.21845
0.034324	-0.02579	-0.00169	-0.02297	-0.01459	-0.0006	-0.01878	-0.27977	0.16737	0.365727	0.196443	-0.30457
0.010495	-0.00456	0.013538	-0.0225	-0.01517	0.00045	-0.01843	-0.27937	0.167528	0.365729	0.196523	-0.31602
-0.06129	0.020003	0.027174	-0.02079	-0.01573	0.001522	-0.01808	-0.27896	0.167688	0.365731	0.196603	-0.276
0.003688	0.036364	0.03299	-0.01795	-0.01625	0.002613	-0.01774	-0.27855	0.167849	0.365733	0.196683	-0.37636
-0.02084	0.016238	0.029722	-0.01428	-0.01673	0.003721	-0.0174	-0.27813	0.168011	0.365734	0.196764	-0.33458
0.04512	-0.02199	0.017995	-0.01014	-0.01715	0.004845	-0.01707	-0.2777	0.168174	0.365736	0.196844	-0.35274
0.035109	-0.03654	0.004217	-0.00599	-0.01745	0.005982	-0.01673	-0.27727	0.168338	0.365736	0.196924	-0.31639
-0.0562	-0.01724	-0.00528	-0.00226	-0.0176	0.007129	-0.0164	-0.27682	0.168504	0.365737	0.197005	-0.26187
-0.02154	0.01693	-0.00919	0.000701	-0.01755	0.008283	-0.01607	-0.27638	0.16867	0.365737	0.197085	-0.33381
0.033045	0.029568	-0.00641	0.002603	-0.01728	0.009438	-0.01575	-0.27592	0.168838	0.365737	0.197166	-0.40333
-0.00138	0.013554	0.000437	0.0034	-0.0168	0.010589	-0.01543	-0.27546	0.169007	0.365737	0.197247	-0.35747
-0.01982	-0.00955	0.008086	0.003459	-0.01611	0.01173	-0.01511	-0.27499	0.169177	0.365736	0.197328	-0.33129
0.07418	-0.01805	0.01184	0.003273	-0.01523	0.012857	-0.01479	-0.27451	0.169348	0.365735	0.197409	-0.40765
-0.05538	0.008789	0.008334	0.003077	-0.01417	0.013963	-0.01448	-0.27403	0.16952	0.365734	0.19749	-0.30694
-0.01563	0.036245	5.34E-05	0.002981	-0.01293	0.015046	-0.01417	-0.27354	0.169693	0.365733	0.197571	-0.3513
0.012211	0.019296	-0.00944	0.003086	-0.01154	0.016101	-0.01387	-0.27304	0.169868	0.365731	0.197652	-0.3637
-0.01562	-0.0205	-0.01516	0.003472	-0.01004	0.017124	-0.01357	-0.27254	0.170043	0.365729	0.197733	-0.29269
0.054174	-0.01221	-0.01506	0.004355	-0.00846	0.018111	-0.01327	-0.27203	0.17022	0.365727	0.197815	-0.36337
-0.06187	0.004655	-0.01057	0.005925	-0.00683	0.019057	-0.01297	-0.27152	0.170397	0.365724	0.197896	-0.2708
-0.00749	-0.0222	-0.00252	0.007872	-0.00519	0.019955	-0.01268	-0.27099	0.170576	0.365721	0.197978	-0.32255
0.030022	-0.04199	0.008078	0.009655	-0.00357	0.020799	-0.01239	-0.27047	0.170756	0.365718	0.19806	-0.35268
0.051235	-0.00762	0.017707	0.010726	-0.00203	0.021584	-0.0121	-0.26993	0.170937	0.365714	0.198141	-0.38923
-0.06497	0.028586	0.02129	0.010764	-0.00062	0.022304	-0.01182	-0.26939	0.171119	0.36571	0.198223	-0.3165
0.028049	0.020853	0.016115	0.009859	0.000623	0.022955	-0.01154	-0.26885	0.171302	0.365706	0.198305	-0.40452
-0.04057	0.010104	0.00584	0.008113	0.0017	0.023534	-0.01126	-0.26829	0.171486	0.365702	0.198387	-0.28609
0.039227	0.024107	-0.00372	0.005844	0.00261	0.02404	-0.01098	-0.26774	0.171671	0.365697	0.198469	-0.36583
-0.01819	0.012166	-0.00966	0.00354	0.003348	0.024469	-0.01071	-0.26717	0.171858	0.365692	0.198552	-0.29546
-0.02122	-0.01261	-0.01097	0.001554	0.003912	0.024821	-0.01044	-0.2666	0.172045	0.365687	0.198634	-0.26566
0.064929	-0.0121	-0.00842	9.83E-05	0.004323	0.025095	-0.01017	-0.26602	0.172233	0.365681	0.198716	-0.3644
-0.01219	-0.00655	-0.00486	-0.0008	0.0046	0.025291	-0.00991	-0.26544	0.172423	0.365675	0.198799	-0.2991
-0.00402	-0.01072	-0.00054	-0.00132	0.004775	0.025408	-0.00965	-0.26485	0.172613	0.365669	0.198881	-0.33791
-0.03111	-0.01023	0.004406	-0.00189	0.004899	0.02545	-0.00939	-0.26426	0.172804	0.365662	0.198964	-0.32551
-0.01377	-0.00468	0.007433	-0.00284	0.005021	0.025417	-0.00913	-0.26366	0.172997	0.365656	0.199047	-0.35758
-0.00251	0.001097	0.005299	-0.0041	0.005184	0.025313	-0.00887	-0.26306	0.17319	0.365648	0.19913	-0.35769
0.023722	0.000128	-0.00261	-0.0058	0.00542	0.025138	-0.00862	-0.26245	0.173385	0.365641	0.199213	-0.3656
0.043165	-0.00581	-0.01144	-0.0078	0.005759	0.024895	-0.00836	-0.26183	0.173581	0.365633	0.199296	-0.35981
-0.04162	0.000707	-0.0142	-0.00996	0.006234	0.024586	-0.00811	-0.26121	0.173777	0.365625	0.199379	-0.27675
0.004898	0.011701	-0.00939	-0.01208	0.006872	0.024216	-0.00786	-0.26058	0.173975	0.365617	0.199462	-0.3357

Hasil IMF 1 – IMF 11 (Data Testing = 797 Data)

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
0.037647	0.007906	-0.01698	-0.03283	0.004805	0.052563	0.065533	-0.07257	0.335574	0.779686	0.659039	-0.94671
-0.00288	0.018173	0.006092	-0.03595	0.004255	0.053517	0.065735	-0.07312	0.335665	0.780261	0.659184	-0.95161
-0.05469	0.01118	0.022346	-0.03707	0.004041	0.05435	0.065899	-0.07367	0.335758	0.780836	0.659328	-0.8873
-0.00894	-0.00376	0.027097	-0.0363	0.004152	0.055059	0.066023	-0.07422	0.335852	0.781411	0.659473	-0.9109
0.020394	-0.0059	0.022173	-0.03384	0.004562	0.055642	0.066107	-0.07478	0.335946	0.781986	0.659617	-0.93705
0.052735	-0.02966	0.011984	-0.03015	0.005235	0.056098	0.066151	-0.07534	0.336042	0.78256	0.659762	-0.97435
-0.00154	-0.03579	0.000794	-0.02558	0.006115	0.056428	0.066155	-0.0759	0.336138	0.783134	0.659906	-0.91275
0.013942	-0.00133	-0.00606	-0.02034	0.00714	0.056631	0.066119	-0.07647	0.336236	0.783708	0.660051	-0.94882
-0.02227	0.012111	-0.00653	-0.01454	0.008246	0.056707	0.066041	-0.07704	0.336335	0.784282	0.660195	-0.9286
0.007152	0.002059	-0.00588	-0.00852	0.009365	0.056655	0.065923	-0.07761	0.336434	0.784855	0.660339	-0.96863
-0.02866	0.003054	-0.00657	-0.00268	0.01043	0.056476	0.065763	-0.07818	0.336535	0.785428	0.660484	-0.93188
0.041496	0.009703	-0.00916	0.002551	0.011375	0.05617	0.065563	-0.07876	0.336637	0.786001	0.660628	-1.02059
-0.04446	0.011435	-0.01421	0.00689	0.012136	0.05574	0.065322	-0.07934	0.336739	0.786574	0.660772	-0.93429
0.025901	0.003463	-0.01989	0.010357	0.012678	0.055189	0.06504	-0.07992	0.336843	0.787147	0.660916	-0.98779
-0.03971	-0.00345	-0.02224	0.013152	0.012981	0.054518	0.064717	-0.08051	0.336948	0.787719	0.66106	-0.90174
0.040405	0.000579	-0.01995	0.015414	0.013033	0.053731	0.064353	-0.08109	0.337054	0.788291	0.661204	-0.98209
-0.00094	0.009722	-0.01177	0.017241	0.012825	0.052832	0.063949	-0.08169	0.337161	0.788863	0.661348	-0.94561
0.016549	0.010421	-0.00182	0.018811	0.01235	0.051826	0.063505	-0.08228	0.337269	0.789435	0.661492	-0.96262
-0.01898	-0.01079	0.006247	0.02022	0.011601	0.050716	0.06302	-0.08287	0.337378	0.790007	0.661636	-0.91739
-0.02011	-0.03395	0.012451	0.021418	0.010585	0.049509	0.062495	-0.08347	0.337488	0.790578	0.66178	-0.89697
0.033616	-0.00467	0.018187	0.022419	0.009324	0.04821	0.061929	-0.08407	0.337599	0.791149	0.661923	-0.97991
-0.00917	0.04079	0.0243	0.023153	0.007847	0.046826	0.061324	-0.08468	0.337712	0.79172	0.662067	-1.0145
-0.03831	0.051547	0.028599	0.023285	0.00616	0.045364	0.06068	-0.08528	0.337825	0.792291	0.662211	-0.9895
0.011228	0.03434	0.026734	0.022535	0.004267	0.043831	0.059996	-0.08589	0.33794	0.792861	0.662354	-1.02117
0.007224	0.001402	0.016009	0.020732	0.002187	0.042233	0.059272	-0.0865	0.338055	0.793431	0.662498	-0.98902
-0.01429	-0.02121	-0.00339	0.017899	-4.4E-05	0.040576	0.058511	-0.08711	0.338172	0.794001	0.662641	-0.94989
-0.01417	-0.01395	-0.02666	0.014204	-0.00238	0.038866	0.057711	-0.08773	0.33829	0.794571	0.662785	-0.9179
0.040413	0.013305	-0.04353	0.010062	-0.00479	0.037108	0.056873	-0.08835	0.338409	0.79514	0.662928	-0.99314
-0.04084	0.009883	-0.04587	0.00592	-0.00724	0.035311	0.055997	-0.08897	0.338529	0.79571	0.663072	-0.88895
0.029411	-0.02087	-0.03381	0.001956	-0.00974	0.03348	0.055085	-0.08959	0.33865	0.796279	0.663215	-0.92948
0.053452	-0.03963	-0.01333	-0.00173	-0.0123	0.031622	0.054136	-0.09021	0.338773	0.796848	0.663358	-0.97963
-0.06229	-0.0191	0.006859	-0.00499	-0.01488	0.029743	0.053152	-0.09084	0.338896	0.797416	0.663501	-0.89116
-0.02184	0.012995	0.019907	-0.00797	-0.0174	0.027851	0.052132	-0.09147	0.339021	0.797984	0.663644	-0.95557
0.023214	0.036834	0.022805	-0.01087	-0.01977	0.02595	0.051077	-0.0921	0.339146	0.798553	0.663788	-1.02337
0.032115	0.037118	0.013892	-0.01386	-0.02192	0.024048	0.049988	-0.09273	0.339273	0.79912	0.663931	-1.00968
-0.01782	0.016735	-0.00155	-0.01701	-0.02377	0.022151	0.048865	-0.09336	0.339401	0.799688	0.664074	-0.94478
-0.04977	0.00364	-0.01496	-0.02015	-0.02528	0.020264	0.047709	-0.094	0.33953	0.800256	0.664216	-0.89444
0.018316	0.01408	-0.02071	-0.02292	-0.02638	0.018395	0.046521	-0.09463	0.339661	0.800823	0.664359	-0.94667
0.03232	-0.00069	-0.01831	-0.02494	-0.02705	0.01655	0.045301	-0.09527	0.339792	0.80139	0.664502	-0.97279
0.012089	-0.03572	-0.01046	-0.02594	-0.02726	0.014734	0.04405	-0.09591	0.339925	0.801956	0.664645	-0.93176
-0.00057	-0.03373	-0.00296	-0.02585	-0.027	0.012952	0.04277	-0.09656	0.340059	0.802523	0.664788	-0.91357
0.043594	-0.00528	-0.0003	-0.02462	-0.02627	0.011207	0.04146	-0.0972	0.340194	0.803089	0.66493	-0.99698
-0.06392	-0.00567	-0.00034	-0.0223	-0.02502	0.009503	0.040121	-0.09784	0.34033	0.803655	0.665073	-0.88882
0.015245	-0.02417	0.000629	-0.0192	-0.02327	0.00784	0.038754	-0.09849	0.340467	0.804221	0.665216	-0.92669
0.039222	0.000872	0.00538	-0.01569	-0.02103	0.006223	0.03736	-0.09914	0.340606	0.804786	0.665358	-0.97948
0.04278	0.051435	0.011943	-0.01224	-0.01836	0.004653	0.03594	-0.09979	0.340746	0.805351	0.665501	-1.03604
-0.03659	0.049444	0.013142	-0.00894	-0.01531	0.003132	0.034493	-0.10044	0.340887	0.805916	0.665643	-0.94692
0.021257	7.71E-06	0.008637	-0.00595	-0.01195	0.001661	0.033022	-0.10109	0.341029	0.806481	0.665786	-0.96735
-0.05126	-0.02114	-8.6E-05	-0.0034	-0.00834	0.000243	0.031527	-0.10174	0.341172	0.807046	0.665928	-0.87119
2.11E-05	-0.00707	-0.00858	-0.00115	-0.00455	-0.00112	0.030008	-0.10239	0.341317	0.80761	0.66607	-0.92872
0.109678	0.001689	-0.01177	0.000934	-0.00064	-0.00243	0.028467	-0.10305	0.341462	0.808174	0.666212	-1.04385
-0.07078	-0.01045	-0.00868	0.002657	0.003319	-0.00369	0.026905	-0.1037	0.341609	0.808738	0.666355	-0.87629
0.024695	-0.01203	-0.00144	0.003762	0.007238	-0.00489	0.025322	-0.10436	0.341758	0.809301	0.666497	-0.97152
-0.01939	-0.00104	0.004938	0.004155	0.01103	-0.00603	0.023719	-0.10502	0.341907	0.809864	0.666639	-0.92412
0.040181	-0.01721	0.008003	0.003776	0.014614	-0.00711	0.022098	-0.10567	0.342058	0.810427	0.666781	-0.98844
-0.0188	-0.03819	0.00726	0.002755	0.017923	-0.00813	0.020458	-0.10633	0.342209	0.81099	0.666923	-0.91722
-0.03923	-0.02814	0.004756	0.001299	0.020908	-0.00909	0.018803	-0.10699	0.342362	0.811552	0.667065	-0.8926
-0.00246	0.015986	0.002641	-0.00034	0.023513	-0.00999	0.017131	-0.10765	0.342517	0.812115	0.667207	-0.9687
0.060878	0.044037	0.001211	-0.00197	0.025673	-0.01082	0.015445	-0.10831	0.342672	0.812677	0.667348	-1.06246
-0.01872	0.027578	-0.00228	-0.00355	0.02733	-0.01159	0.013746	-0.10897	0.342829	0.813238	0.66749	-0.93765
-0.05996	-0.01637	-0.00883	-0.00507	0.028434	-0.01229	0.012034	-0.10963	0.342987	0.8138	0.667632	-0.89485
-0.00667	-0.02443	-0.01647	-0.00648	0.028957	-0.01292	0.01031	-0.11029	0.343146	0.814361	0.667773	-0.93994

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
0.017367	-0.00345	-0.02074	-0.00764	0.028893	-0.01349	0.008577	-0.11095	0.343307	0.814922	0.667915	-0.9524
0.041945	0.006459	-0.01741	-0.0083	0.02825	-0.01399	0.006834	-0.11161	0.343469	0.815482	0.668057	-0.96381
-0.06521	0.014153	-0.00744	-0.00822	0.027054	-0.01443	0.005082	-0.11227	0.343632	0.816043	0.668198	-0.88838
-0.02427	0.022992	0.004119	-0.00701	0.025334	-0.0148	0.003324	-0.11294	0.343796	0.816603	0.66834	-0.94832
0.009486	0.020625	0.010375	-0.00457	0.023117	-0.0151	0.00156	-0.1136	0.343961	0.817163	0.668481	-0.98999
-0.01467	5.92E-05	0.007435	-0.00102	0.020417	-0.01533	-0.00021	-0.11426	0.344128	0.817722	0.668622	-0.93661
-0.03405	-0.02773	-0.00199	0.003362	0.017259	-0.01551	-0.00198	-0.11492	0.344296	0.818282	0.668764	-0.89428
0.01841	-0.03914	-0.012	0.008252	0.013675	-0.01561	-0.00376	-0.11558	0.344466	0.818841	0.668905	-0.92125
0.059736	-0.02823	-0.01717	0.013139	0.009699	-0.01566	-0.00554	-0.11624	0.344636	0.8194	0.669046	-0.97103
-0.0113	-0.00367	-0.01125	0.017268	0.005392	-0.01564	-0.00732	-0.1169	0.344808	0.819958	0.669187	-0.93175
0.044942	0.019119	0.003727	0.020177	0.000827	-0.01555	-0.0091	-0.11756	0.344981	0.820516	0.669328	-1.02517
-0.02818	0.027964	0.018839	0.021852	-0.0039	-0.01541	-0.01087	-0.11822	0.345155	0.821074	0.669469	-0.98163
-0.03124	0.027055	0.02417	0.022397	-0.0087	-0.01521	-0.01265	-0.11887	0.345331	0.821632	0.66961	-0.97414
0.027193	0.022003	0.015181	0.021829	-0.01345	-0.01495	-0.01442	-0.11953	0.345508	0.822189	0.669751	-1.01296
-0.04373	0.006901	0.000929	0.020247	-0.01805	-0.01465	-0.01619	-0.12019	0.345686	0.822746	0.669892	-0.94949
-0.01536	-0.01034	-0.00712	0.017866	-0.0224	-0.0143	-0.01795	-0.12084	0.345866	0.823303	0.670033	-0.97039
0.069083	-0.02123	-0.00449	0.014819	-0.02641	-0.0139	-0.01971	-0.1215	0.346047	0.82386	0.670174	-1.03707
-0.00035	-0.02262	0.005713	0.011338	-0.03001	-0.01346	-0.02145	-0.12215	0.346229	0.824416	0.670314	-0.96611
-0.04521	-0.01714	0.016794	0.007435	-0.03316	-0.01298	-0.02319	-0.12281	0.346412	0.824972	0.670455	-0.93778
-0.00848	0.000155	0.020851	0.002838	-0.03578	-0.01247	-0.02492	-0.12346	0.346597	0.825528	0.670596	-0.99542
0.03809	0.019968	0.014308	-0.00255	-0.03784	-0.01193	-0.02664	-0.12411	0.346783	0.826084	0.670736	-1.03756
-0.08701	0.017291	0.00162	-0.00849	-0.03926	-0.01137	-0.02835	-0.12476	0.34697	0.826639	0.670877	-0.91429
0.060552	-0.0075	-0.01135	-0.01453	-0.04	-0.01078	-0.03005	-0.12541	0.347159	0.827194	0.671017	-1.01907
-0.03662	-0.02115	-0.02033	-0.02039	-0.04002	-0.01019	-0.03173	-0.12606	0.347348	0.827748	0.671158	-0.89035
0.074323	-0.00823	-0.02289	-0.02586	-0.03928	-0.00958	-0.03339	-0.1267	0.34754	0.828303	0.671298	-1.00405
-0.01788	0.018988	-0.02116	-0.03061	-0.03781	-0.00898	-0.03504	-0.12735	0.347732	0.828857	0.671438	-0.95119
-0.00367	0.036049	-0.01652	-0.03413	-0.03561	-0.00838	-0.03668	-0.12799	0.347926	0.829411	0.671579	-0.96318
0.022584	0.019565	-0.01166	-0.03576	-0.03275	-0.0078	-0.03829	-0.12863	0.348121	0.829964	0.671719	-0.97039
0.015348	-0.00963	-0.00894	-0.03503	-0.02925	-0.00723	-0.03989	-0.12927	0.348317	0.830517	0.671859	-0.94772
-0.0412	-0.02572	-0.00771	-0.03168	-0.02522	-0.00668	-0.04147	-0.12991	0.348515	0.83107	0.671999	-0.88467
0.048194	-0.01715	-0.00692	-0.02574	-0.02075	-0.00616	-0.04303	-0.13055	0.348714	0.831623	0.672139	-0.97636
0.038344	-0.01435	-0.00524	-0.01765	-0.01595	-0.00567	-0.04456	-0.13118	0.348914	0.832175	0.672279	-0.96212
0.000844	-0.01503	-0.00127	-0.00808	-0.01092	-0.00522	-0.04608	-0.13181	0.349116	0.832727	0.672419	-0.93173
-0.05752	-0.0022	0.00438	0.002006	-0.00577	-0.00481	-0.04757	-0.13244	0.349319	0.833279	0.672559	-0.89982
0.029	0.0228	0.00975	0.011694	-0.00062	-0.00445	-0.04903	-0.13307	0.349523	0.83383	0.672699	-1.04256
-0.00432	0.044599	0.013023	0.020136	0.004429	-0.00414	-0.05047	-0.1337	0.349728	0.834382	0.672838	-1.04185
0.038437	0.023274	0.013726	0.026785	0.009267	-0.00388	-0.05188	-0.13432	0.349935	0.834932	0.672978	-1.04883
-0.01791	-0.02071	0.012433	0.031281	0.013801	-0.00368	-0.05327	-0.13494	0.350144	0.835483	0.673118	-0.97196
0.000641	-0.03188	0.007611	0.03374	0.017953	-0.00354	-0.05462	-0.13556	0.350353	0.836033	0.673257	-0.96599
0.013698	-0.01839	-1.8E-05	0.034359	0.021657	-0.00346	-0.05595	-0.13618	0.350564	0.836583	0.673397	-0.98277
-0.01972	-0.01422	-0.00579	0.033194	0.024873	-0.00344	-0.05725	-0.13679	0.350776	0.837133	0.673536	-0.95073
-0.02529	-0.01054	-0.00728	0.030463	0.027575	-0.0035	-0.05852	-0.13741	0.35099	0.837682	0.673676	-0.94894
0.010838	0.001324	-0.00504	0.02653	0.029745	-0.00362	-0.05976	-0.13802	0.351205	0.838232	0.673815	-0.98418
-0.0271	0.016647	-0.00342	0.02183	0.031369	-0.00382	-0.06096	-0.13862	0.351421	0.83878	0.673955	-0.98158
0.063216	0.017028	-0.0043	0.016785	0.032446	-0.0041	-0.06213	-0.13923	0.351639	0.839329	0.674094	-1.06962
-0.02162	-0.00136	-0.00809	0.011628	0.032982	-0.00446	-0.06327	-0.13983	0.351858	0.839877	0.674233	-0.9711
0.023345	0.003624	-0.01302	0.006449	0.032997	-0.00489	-0.06437	-0.14043	0.352078	0.840425	0.674372	-1.01255
0.001402	0.011432	-0.01521	0.001308	0.032535	-0.00542	-0.06544	-0.14102	0.352299	0.840973	0.674511	-0.99958
-0.0017	-0.00019	-0.01156	-0.00368	0.031643	-0.00602	-0.06647	-0.14162	0.352522	0.84152	0.67465	-0.99329
-0.032	-0.01694	-0.00333	-0.00852	0.030368	-0.0067	-0.06747	-0.1422	0.352747	0.842067	0.674789	-0.93518
0.023284	-0.01953	0.003614	-0.01328	0.028752	-0.00747	-0.06843	-0.14279	0.352972	0.842613	0.674928	-0.98385
-0.04421	0.00863	0.005407	-0.01794	0.026848	-0.00831	-0.06936	-0.14337	0.3532	0.84316	0.675067	-0.93085
-0.0116	0.02213	0.005056	-0.02228	0.024714	-0.00923	-0.07024	-0.14395	0.353428	0.843706	0.675206	-0.98998
0.010961	-0.00017	0.002968	-0.02589	0.02241	-0.01023	-0.07109	-0.14453	0.353658	0.844252	0.675345	-0.97978
0.002931	-0.01562	-0.00141	-0.02829	0.019992	-0.0113	-0.07191	-0.1451	0.353889	0.844797	0.675484	-0.95967
0.073744	-0.00207	-0.00598	-0.02899	0.017511	-0.01244	-0.07268	-0.14567	0.354121	0.845342	0.675622	-1.04741
-0.0647	0.019816	-0.00956	-0.02786	0.015022	-0.01364	-0.07341	-0.14624	0.354355	0.845887	0.675761	-0.93877
0.00809	0.032216	-0.01052	-0.02497	0.012579	-0.0149	-0.07411	-0.1468	0.35459	0.846432	0.6759	-1.00667
-0.01192	0.020258	-0.00626	-0.02057	0.010229	-0.01622	-0.07476	-0.14736	0.354827	0.846976	0.676038	-0.98062
0.028886	-0.01857	0.000281	-0.01507	0.008013	-0.01759	-0.07537	-0.14792	0.355065	0.84752	0.676177	-0.99976
-0.00396	-0.02995	0.007055	-0.009	0.005956	-0.01901	-0.07595	-0.14847	0.355304	0.848063	0.676315	-0.94835
-0.02882	-0.00393	0.013085	-0.00309	0.00407	-0.02047	-0.07648	-0.14902	0.355545	0.848606	0.676453	-0.96823
0.021361	0.019339	0.017339	0.00194	0.002343	-0.02196	-0.07697	-0.14956	0.355787	0.849149	0.676592	-1.03897
0.017652	0.018746	0.020309	0.005468	0.000751	-0.02349	-0.07741	-0.1501	0.35603	0.849692	0.67673	-1.03006

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
0.058902	-0.00886	0.020451	0.007281	-0.00071	-0.02504	-0.07782	-0.15064	0.356275	0.850234	0.676868	-1.06489
-0.0526	-0.03086	0.017452	0.00756	-0.00203	-0.0266	-0.07818	-0.15117	0.356521	0.850776	0.677006	-0.9315
-0.00919	-0.0185	0.011446	0.006749	-0.00321	-0.02818	-0.07849	-0.1517	0.356769	0.851318	0.677144	-1.00944
0.005751	-0.01228	0.003772	0.005346	-0.00428	-0.02976	-0.07877	-0.15223	0.357018	0.851859	0.677282	-1.00794
-0.03037	-0.02571	-0.0046	0.004045	-0.00525	-0.03134	-0.079	-0.15275	0.357268	0.8524	0.67742	-0.94552
-0.06828	-0.01451	-0.01266	0.003473	-0.00613	-0.0329	-0.07919	-0.15326	0.35752	0.852941	0.677558	-0.92049
0.068282	0.025934	-0.02057	0.004069	-0.00693	-0.03445	-0.07933	-0.15378	0.357773	0.853481	0.677696	-1.0776
-0.00713	0.041463	-0.02795	0.005997	-0.00767	-0.03598	-0.07943	-0.15428	0.358027	0.854021	0.677834	-1.0135
-0.00674	0.010074	-0.03392	0.009141	-0.00834	-0.03747	-0.07948	-0.15479	0.358283	0.854561	0.677972	-1.005
0.025382	-0.02619	-0.03711	0.013108	-0.00894	-0.03892	-0.07949	-0.15529	0.35854	0.8551	0.678109	-1.02126
0.005841	-0.0303	-0.03476	0.017315	-0.00949	-0.04032	-0.07946	-0.15578	0.358799	0.85564	0.678247	-0.99555
-0.01319	-0.02411	-0.02491	0.021074	-0.01004	-0.04167	-0.07938	-0.15627	0.359059	0.856178	0.678385	-0.96466
0.054097	-0.02478	-0.00795	0.023827	-0.01061	-0.04296	-0.07926	-0.15676	0.35932	0.856717	0.678522	-1.04888
-0.09414	-0.01902	0.012322	0.02518	-0.01121	-0.04417	-0.07909	-0.15724	0.359583	0.857255	0.67866	-0.92744
-0.00971	0.017547	0.030711	0.024865	-0.01188	-0.04531	-0.07888	-0.15772	0.359847	0.857793	0.678797	-1.0263
0.039631	0.042729	0.04159	0.022805	-0.01262	-0.04637	-0.07862	-0.1582	0.360113	0.85833	0.678935	-1.08186
0.007812	0.035325	0.038045	0.019056	-0.01346	-0.04735	-0.07832	-0.15867	0.36038	0.858867	0.679072	-1.04461
0.003797	0.003718	0.022822	0.013941	-0.01441	-0.04823	-0.07798	-0.15913	0.360648	0.85944	0.679209	-0.99254
0.004694	-0.03811	0.004848	0.008125	-0.01549	-0.04902	-0.07759	-0.15959	0.360918	0.85994	0.679346	-0.94296
-0.02329	-0.05025	-0.00666	0.00241	-0.01671	-0.0497	-0.07716	-0.16005	0.361189	0.860476	0.679483	-0.91087
0.0294	-0.02487	-0.00644	-0.00235	-0.01806	-0.05029	-0.07668	-0.1605	0.361462	0.861012	0.679621	-0.98605
-0.06362	0.008271	0.001942	-0.00578	-0.01953	-0.05077	-0.07616	-0.16095	0.361736	0.861547	0.679758	-0.92308
0.044923	0.017585	0.010615	-0.0081	-0.02107	-0.05115	-0.0756	-0.16139	0.362011	0.862083	0.679895	-1.05307
-0.02436	0.003572	0.010464	-0.00962	-0.02264	-0.05142	-0.07499	-0.16183	0.362288	0.862617	0.680031	-0.99113
0.032477	-0.01534	0.001121	-0.01054	-0.02418	-0.05159	-0.07434	-0.16226	0.362566	0.863152	0.680168	-1.01016
0.059801	-0.01636	-0.01164	-0.01118	-0.02564	-0.05164	-0.07365	-0.16269	0.362846	0.863686	0.680305	-1.02091
-0.07201	0.005321	-0.02105	-0.01196	-0.02694	-0.05158	-0.07291	-0.16311	0.363127	0.864219	0.680442	-0.92367
0.045941	0.019915	-0.0203	-0.01344	-0.02801	-0.05141	-0.07214	-0.16353	0.363409	0.864753	0.680579	-1.05671
-0.03681	0.012471	-0.0108	-0.01591	-0.0288	-0.05113	-0.07132	-0.16395	0.363693	0.865286	0.680715	-0.94574
0.084378	-0.01168	0.002744	-0.01915	-0.02925	-0.05073	-0.07046	-0.16436	0.363979	0.865819	0.680852	-1.0624
-0.01762	-0.03026	0.015728	-0.02268	-0.02931	-0.05022	-0.06956	-0.16477	0.364265	0.866351	0.680988	-0.9493
-0.02857	-0.02376	0.024118	-0.02594	-0.02897	-0.04959	-0.06862	-0.16517	0.364553	0.866883	0.681125	-0.94062
-0.02412	0.010684	0.026537	-0.02832	-0.02822	-0.04885	-0.06764	-0.16557	0.364843	0.867415	0.681261	-0.9841
0.040605	0.04303	0.019221	-0.02919	-0.02707	-0.048	-0.06662	-0.16596	0.365134	0.867946	0.681398	-1.09751
0.015701	0.045234	0.001154	-0.02803	-0.02553	-0.04704	-0.06557	-0.16635	0.365426	0.868477	0.681534	-1.07056
-0.04669	0.016217	-0.02149	-0.02469	-0.02361	-0.04598	-0.06447	-0.16673	0.36572	0.869007	0.68167	-0.95029
0.01201	-0.01995	-0.0411	-0.01956	-0.02133	-0.04481	-0.06334	-0.16711	0.366015	0.869538	0.681806	-0.97597
-0.02969	-0.03274	-0.0527	-0.013	-0.01872	-0.04355	-0.06218	-0.16749	0.366311	0.870068	0.681943	-0.92774
-0.00811	-0.0176	-0.05112	-0.00531	-0.01582	-0.0422	-0.06098	-0.16786	0.366609	0.870597	0.682079	-0.92927
0.019565	-0.00673	-0.0327	0.002864	-0.01268	-0.04076	-0.05975	-0.16822	0.366909	0.871126	0.682215	-1.00633
-0.02567	0.014017	-0.00154	0.010649	-0.00939	-0.03924	-0.05848	-0.16858	0.367209	0.871655	0.682351	-0.99009
0.014109	0.027432	0.028706	0.01731	-0.00601	-0.03764	-0.05718	-0.16894	0.367511	0.872184	0.682487	-1.0932
0.008071	0.021766	0.045833	0.022175	-0.00263	-0.03598	-0.05585	-0.16929	0.367815	0.872712	0.682622	-1.06262
-0.01401	0.013854	0.045563	0.024786	0.000683	-0.03425	-0.05449	-0.16964	0.36812	0.87324	0.682758	-1.02625
0.001816	0.015226	0.032003	0.025212	0.003857	-0.03246	-0.0531	-0.16998	0.368426	0.873767	0.682894	-1.03618
0.042258	0.005465	0.012298	0.023787	0.00684	-0.03063	-0.05168	-0.17032	0.368734	0.874294	0.68303	-1.04623
-0.0614	-0.00372	-0.00769	0.020826	0.009585	-0.02875	-0.05024	-0.17065	0.369044	0.874821	0.683165	-0.92157
0.046954	-0.02191	-0.02183	0.016651	0.012055	-0.02683	-0.04877	-0.17098	0.369354	0.875347	0.683301	-1.01267

Lampiran 8 Kode Python Tuning Hyperparameter dan Prediksi Model Per IMF (EEMD-LSTM)

```
>>> import os
>>> import math
>>> import numpy as np
>>> import pandas as pd
>>> from sklearn.metrics import mean_squared_error
>>> from keras.models import Sequential
>>> from keras.layers import LSTM, Dense
>>> from keras.callbacks import EarlyStopping, ReduceLROnPlateau
>>>
>>> # ===== KONFIGURASI =====
>>> BASE = r"D:/FXx OLAH DATA/EEMD_SPLIT" # << ganti sesuai lokasi hasil EEMD split kamu
>>> f_train = os.path.join(BASE, "IMF_Train_Normalized.xlsx")
>>> f_test = os.path.join(BASE, "IMF_Test_Normalized.xlsx")
>>>
>>> OUT_PRED = os.path.join(BASE, "PREDIKSI_IMF_LSTM") # folder output prediksi
>>> OUT_MODEL = os.path.join(BASE, "MODEL_IMF_LSTM") # folder penyimpanan model
>>> os.makedirs(OUT_PRED, exist_ok=True)
>>> os.makedirs(OUT_MODEL, exist_ok=True)
>>>
>>> # Grid "tuning cepat" (16 kombinasi)
>>> TIME_STEPS = [5, 10]
>>> UNITS = [32, 64]
>>> BATCHES = [8, 16]
>>> EPOCHS = [50, 100]
>>>
>>> VAL_RATIO = 0.1 # 10% data train jadi validasi saat pemilihan hyperparameter
>>> # =====
>>>
>>> # ----- Utility -----
>>> def create_supervised(series, time_step):
>>>     """Bikin X,y sliding-window dari 1D array."""
>>>     X, y = [], []
>>>     for i in range(time_step, len(series)):
>>>         for j in range(time_step, len(series)):
>>>             X.append(series[i-time_step:j])
>>>             y.append(series[j])
>>>     X = np.array(X).reshape(-1, time_step, 1)
>>>     y = np.array(y).reshape(-1, 1)
>>>     return X, y
>>>
>>> def build_model(time_step, units):
>>>     model = Sequential()
>>>     model.add(LSTM(units, input_shape=(time_step, 1)))
>>>     model.add(Dense(1))
>>>     model.compile(optimizer="adam", loss="mse")
>>>     return model
>>>
>>> def mape(y_true, y_pred):
>>>     # hindari div0
>>>     eps = 1e-8
>>>     return np.mean(np.abs((y_true - y_pred) / (np.abs(y_true) + eps))) * 100.0
>>>
>>> def rolling_predict_test(train_series, test_series, time_step, model):
>>>     """
>>>     Prediksi test secara autoregresif:
>>>     - Buffer awal = tail terakhir train (length=time_step)
>>>     - Geser jendela sambil menambahkan prediksi aktual test sebagai input berikutnya?
>>>     Di sini kita gunakan nilai aktual sebagai input (teacher forcing) untuk evaluasi jujur.
>>>     """
>>>     buffer = list(train_series[-time_step:]) # start dari ekor train
>>>     preds = []
>>>     for t in range(len(test_series)):
>>>         x = np.array(buffer[-time_step:]).reshape(1, time_step, 1)
>>>         yhat = model.predict(x, verbose=0)[0, 0]
>>>         preds.append(yhat)
>>>         # untuk evaluasi yang fair terhadap error step-ahead, masukkan aktual test sebagai konteks berikutnya
```

```
...     # untuk evaluasi yang fair terhadap error step-ahead, masukkan aktual test sebagai konteks berikutnya
...     buffer.append(test_series[t])
...     return np.array(preds)
>>>
>>> # ----- Load data -----
>>> df_tr = pd.read_excel(f_train)
>>> df_te = pd.read_excel(f_test)
>>>
>>> # Deteksi kolom tanggal & komponen
>>> date_col = "Tanggal" if "Tanggal" in df_tr.columns else df_tr.columns[0]
>>> imf_cols = [c for c in df_tr.columns if c.startswith("IMF_")]
>>> if "Residual" in df_tr.columns:
>>>     imf_cols += ["Residual"]
>>>
>>> if not imf_cols:
>>>     raise ValueError("Tidak menemukan kolom IMF_ atau Residual pada file train/test. Cek kembali inputnya.")
>>>
>>> summary_rows = []
>>>
>>> # ----- Loop setiap komponen -----
>>> for comp in imf_cols:
>>>     print(f"\n=== Proses komponen: {comp} ===")
>>>     # Ambil seri train/test (skala normalisasi)
>>>     s_train = df_tr[comp].values.astype(float)
>>>     s_test = df_te[comp].values.astype(float)
>>>     # Bagi train menjadi train_sub & val untuk pemilihan hyperparam
>>>     n_train = len(s_train)
>>>     n_val = max(1, int(math.floor(n_train * VAL_RATIO)))
>>>     s_train_sub = s_train[:n_train - n_val]
>>>     s_val = s_train[n_train - n_val:]
>>>     best_cfg = None
>>>     best_rmse = float("inf")
>>>     # ----- TUNING CEPAT (mini-grid) -----
```

```

... # ----- TUNING CEPAT (mini-grid) -----
... for ts in TIME_STEPS:
...     # pastikan cukup panjang
...     if len(s_train_sub) <= ts or len(s_val) <= ts:
...         continue
...     X_tr, y_tr = create_supervised(s_train_sub, ts)
...     X_v, y_v = create_supervised(np.concatenate([s_train_sub[-ts:], s_val]), ts)
...     # Catatan: X_v dibuat dengan menyambung tail train_sub agar panjang val memadai dan konteks berkelanjutan.
...     for u in UNITS:
...         for bs in BATCHES:
...             for ep in EPOCHS:
...                 model = build_model(ts, u)
...                 es = EarlyStopping(monitor="val_loss", patience=10, restore_best_weights=True, verbose=0)
...                 rdrop = ReduceLROnPlateau(monitor="val_loss", factor=0.5, patience=5, verbose=0, min_lr=1e-5)
...                 hist = model.fit(
...                     X_tr, y_tr,
...                     validation_data=(X_v, y_v),
...                     epochs=ep,
...                     batch_size=bs,
...                     verbose=0,
...                     callbacks=[es, rdrop]
...                 )
...                 # RMSE pada val
...                 yv_pred = model.predict(X_v, verbose=0).ravel()
...                 rmse_v = math.sqrt(mean_squared_error(y_v.ravel(), yv_pred))
...                 if rmse_v < best_rmse:
...                     best_rmse = rmse_v
...                     best_cfg = {"time_step": ts, "units": u, "batch_size": bs, "epochs": ep}
...             if best_cfg is None:
...                 # fallback kalau data terlalu pendek untuk kombinasi tertentu
...                 best_cfg = {"time_step": 5, "units": 32, "batch_size": 8, "epochs": 50}
...             print("⚠ Data pendek; pakai konfigurasi default:", best_cfg)
...         else:
...             print("✅ Hyperparameter terbaik:", best_cfg, f"(val RMSE={best_rmse:.6f})")
...     # ----- Latih ulang model pada seluruh TRAIN (pakai val_split internal 10%) -----
...     ts = best_cfg["time_step"]
...     u = best_cfg["units"]
...     bs = best_cfg["batch_size"]
...     ep = best_cfg["epochs"]
...     if len(s_train) <= ts:
...         print(f"⚠ {comp}: panjang train ({len(s_train)}) <= time_step ({ts}). Skip.")
...         continue
...     X_full, y_full = create_supervised(s_train, ts)
...     model = build_model(ts, u)
...     es = EarlyStopping(monitor="val_loss", patience=10, restore_best_weights=True, verbose=0)
...     rdrop = ReduceLROnPlateau(monitor="val_loss", factor=0.5, patience=5, verbose=0, min_lr=1e-5)
...     model.fit(
...         X_full, y_full,
...         validation_split=0.1,
...         epochs=ep,
...         batch_size=bs,
...         verbose=0,
...         callbacks=[es, rdrop]
...     )
...     # Simpan model
...     model_path = os.path.join(OUT_MODEL, f"{comp}_LSTM.h5")
...     model.save(model_path)
...     # ----- Prediksi Train -----
...     # prediksi train sebagai in-sample: geser jendela dalam train, mulai setelah ts
...     y_train_true = s_train[ts:]
...     y_train_pred = model.predict(X_full, verbose=0).ravel()
...     # ----- Prediksi Test -----
...     if len(s_test) > 0:
...         y_test_pred = rolling_predict_test(s_train, s_test, ts, model)
...         y_test_true = s_test # disetarakan one-step-ahead
...     else:
...         y_test_pred = np.array([])
...         y_test_true = np.array([])
...     # ----- Evaluasi -----
...     # Train metrics (opsional untuk laporan)
...     rmse_tr = math.sqrt(mean_squared_error(y_train_true, y_train_pred)) if len(y_train_true)>0 else np.nan
...     mape_tr = mape(y_train_true, y_train_pred) if len(y_train_true)>0 else np.nan
...     # Test metrics (utama untuk skripsi)
...     rmse_te = math.sqrt(mean_squared_error(y_test_true, y_test_pred)) if len(y_test_true)>0 else np.nan
...     mape_te = mape(y_test_true, y_test_pred) if len(y_test_true)>0 else np.nan
...     print(f"{comp} -> TEST RMSE: {rmse_te:.6f}, MAPE: {mape_te:.3f}%")
...     # ----- Simpan prediksi ke Excel -----
...     # DataFrame Train
...     train_dates = df_tr[date_col].values[ts:] # selaras dengan y_train_true
...     df_pred_tr = pd.DataFrame({
...         "Tanggal": train_dates,
...         "Aktual_Norm": y_train_true,
...         "Prediksi_Norm": y_train_pred
...     })
...     df_pred_tr.to_excel(os.path.join(OUT_PRED, f"{comp}_Train_Pred.xlsx"), index=False)
...     # DataFrame Test
...     test_dates = df_te[date_col].values # one-step ahead over test dengan teacher forcing
...     df_pred_te = pd.DataFrame({
...         "Tanggal": test_dates,
...         "Aktual_Norm": y_test_true,
...         "Prediksi_Norm": y_test_pred
...     })
...     df_pred_te.to_excel(os.path.join(OUT_PRED, f"{comp}_Test_Pred.xlsx"), index=False)
...     # Simpan ringkasan
...     summary_rows.append({
...         "Komponen": comp,
...         "Time_Step": ts,
...         "Units": u,

```



```

... })
... df_pred_te.to_excel(os.path.join(OUT_PRED, f"{comp}_Test_Pred.xlsx"), index=False)
... # Simpan ringkasan
... summary_rows.append({
...     "Komponen": comp,
...     "Time_Step": ts,
...     "Units": u,
...     "Batch_Size": bs,
...     "Epochs": ep,
...     "RMSE_Train": rmse_tr,
...     "MAPE_Train(%)": mape_tr,
...     "RMSE_Test": rmse_te,
...     "MAPE_Test(%)": mape_te,
...     "Model_Path": model_path
... })
...

```

Hasil Prediksi Model LSTM IMF 1 – IMF 11

IMF1	IMF2	IMF3	IMF4	IMF5	IMF6	IMF7	IMF8	IMF9	IMF10	IMF11	Residual
1064.845	1053.945	1032.802	1019.02	1055.931	1104.721	1118.093	978.6121	1391.301	1840.537	1718.319	115.0175
1036.392	1061.452	1059.652	1015.772	1055.523	1105.688	1118.304	978.0602	1391.39	1841.112	1718.464	117.9323
1043.48	1060.918	1074.109	1014.595	1055.401	1106.531	1118.475	977.5053	1391.48	1841.687	1718.609	117.9205
1076.374	1045.928	1079.889	1015.27	1055.585	1107.248	1118.607	976.9475	1391.571	1842.262	1718.754	126.4971
1072.085	1039.935	1073.454	1017.596	1056.086	1107.838	1118.699	976.3868	1391.663	1842.836	1718.898	126.2795
1050.632	1050.978	1064.761	1021.382	1056.888	1108.3	1118.751	975.8232	1391.756	1843.41	1719.043	127.0082
1018.044	1007.886	1053.403	1026.055	1057.937	1108.632	1118.761	975.2567	1391.85	1843.984	1719.188	123.9857
1031.414	1052.799	1044.253	1031.165	1059.153	1108.836	1118.73	974.6873	1391.945	1844.558	1719.332	122.3044
1035.643	1077.6	1045.228	1036.715	1060.443	1108.912	1118.658	974.115	1392.041	1845.131	1719.476	119.7204
1057.733	1053.893	1049.198	1042.834	1061.718	1108.859	1118.544	973.5399	1392.138	1845.705	1719.621	112.128
1053.03	1053.831	1044.152	1049.12	1062.901	1108.679	1118.389	972.9618	1392.236	1846.278	1719.766	105.4002
1066.893	1061.716	1043.743	1054.82	1063.932	1108.371	1118.192	972.3809	1392.335	1846.85	1719.91	105.6806
1036.95	1059.634	1039.286	1059.306	1064.754	1107.936	1117.954	971.7972	1392.435	1847.423	1720.054	99.19967
1065.46	1057.554	1032.367	1062.455	1065.315	1107.376	1117.674	971.2107	1392.536	1847.995	1720.198	94.70142
1045.93	1044.694	1029.022	1064.749	1065.58	1106.695	1117.352	970.6214	1392.639	1848.567	1720.342	87.78315
1068.79	1048.171	1032.939	1066.815	1065.543	1105.896	1116.99	970.0293	1392.742	1849.139	1720.486	89.55119
1039.682	1054.986	1038.224	1068.8	1065.216	1104.983	1116.587	969.4345	1392.846	1849.71	1720.63	87.99019
1042.349	1059.322	1052.579	1070.5	1064.627	1103.96	1116.142	968.837	1392.951	1850.281	1720.774	85.89121
1038.105	1051.195	1057.5	1071.915	1063.799	1102.832	1115.657	968.2369	1393.058	1850.852	1720.918	84.87957
1054.216	1025.989	1063.016	1073.149	1062.739	1101.604	1115.131	967.6342	1393.165	1851.423	1721.062	86.31131
1066.4	1027.219	1068.558	1074.11	1061.445	1100.282	1114.564	967.0288	1393.273	1851.993	1721.206	92.26191
1040.718	1087.288	1074.705	1074.781	1059.924	1098.873	1113.957	966.4209	1393.383	1852.563	1721.35	90.62327
1048.812	1087.489	1080.694	1075.105	1058.198	1097.384	1113.31	965.8105	1393.494	1853.133	1721.494	91.70464
1070.44	1072.244	1079.989	1074.596	1056.297	1095.823	1112.623	965.1975	1393.605	1853.703	1721.637	87.2511
1056.607	1051.446	1069.4	1072.831	1054.237	1094.197	1111.896	964.5821	1393.718	1854.272	1721.781	82.57574
1049.367	1023.196	1051.027	1069.765	1052.028	1092.513	1111.13	963.9643	1393.832	1854.841	1721.924	74.25144
1055.775	1029.552	1026.522	1065.764	1049.68	1090.776	1110.325	963.3442	1393.947	1855.41	1722.068	73.8086
1061.054	1050.175	1006.45	1061.293	1047.225	1088.993	1109.482	962.7217	1394.063	1855.979	1722.211	74.07409
1034.951	1071.422	1004.745	1056.958	1044.718	1087.169	1108.6	962.0969	1394.18	1856.547	1722.355	71.25653
1063.017	1034.998	1018.038	1053.228	1042.212	1085.311	1107.682	961.4699	1394.299	1857.115	1722.498	74.38349
1042.166	1024.131	1037.982	1049.974	1039.726	1083.425	1106.726	960.8408	1394.418	1857.683	1722.642	74.42801
1016.134	1028.879	1059.202	1046.899	1037.243	1081.519	1105.734	960.2095	1394.539	1858.25	1722.785	77.53313
1066.277	1068.76	1071.971	1044.057	1034.735	1079.599	1104.706	959.5762	1394.66	1858.817	1722.928	88.75154
1073.637	1075.015	1075.563	1041.323	1032.23	1077.672	1103.642	958.9409	1394.783	1859.384	1723.071	92.84296
1052.411	1086.365	1069.423	1038.418	1029.834	1075.744	1102.544	958.3037	1394.907	1859.951	1723.214	93.50616
1031.559	1061.441	1049.891	1035.204	1027.693	1073.821	1101.412	957.6645	1395.032	1860.517	1723.357	90.98672
1046.759	1044.495	1036.825	1031.753	1025.951	1071.909	1100.246	957.0236	1395.159	1861.083	1723.5	88.94687
1078.382	1047.307	1031.323	1028.551	1024.705	1070.014	1099.047	956.3808	1395.286	1861.649	1723.644	88.79762
1058.381	1064.01	1034.087	1026.267	1023.993	1068.143	1097.816	955.7363	1395.414	1862.214	1723.786	90.82457
1035.102	1019.63	1041.284	1025.335	1023.809	1066.303	1096.553	955.0902	1395.544	1862.78	1723.929	85.47383
1032.515	1015.275	1050.65	1025.767	1024.123	1064.499	1095.261	954.4425	1395.675	1863.344	1724.072	86.1769
1041.395	1050.117	1052.453	1027.248	1024.911	1062.735	1093.938	953.7932	1395.807	1863.909	1724.214	91.35482
1024.675	1064.534	1049.557	1029.605	1026.161	1061.015	1092.586	953.1425	1395.94	1864.474	1724.357	85.48493
1072.65	1038.601	1051.845	1032.79	1027.882	1059.341	1091.206	952.4903	1396.075	1865.038	1724.5	92.04493
1056.955	1038.637	1055.582	1036.485	1030.09	1057.713	1089.798	951.8368	1396.21	1865.602	1724.642	99.40115
1031.799	1090.653	1064.671	1040.137	1032.782	1056.134	1088.364	951.182	1396.347	1866.165	1724.785	101.7538
1015.394	1104.384	1068.394	1043.219	1035.918	1054.604	1086.903	950.5259	1396.485	1866.728	1724.928	94.73967
1050.496	1052.091	1058.449	1045.905	1039.421	1053.126	1085.417	949.8686	1396.624	1867.291	1725.07	89.90614
1043.988	1019.625	1053.781	1048.408	1043.185	1051.701	1083.906	949.2102	1396.764	1867.854	1725.212	86.47949
1076.812	1042.228	1041.896	1050.593	1047.104	1050.33	1082.372	948.5508	1396.906	1868.416	1725.354	92.32827
1065.971	1052.845	1039.072	1052.582	1051.095	1049.015	1080.814	947.8904	1397.048	1868.978	1725.497	92.3229

Lampiran 9 Kode Python Prediksi Gabungan (Summation) & RMSE & MAPE

```
>>> import os
>>> import glob
>>> import numpy as np
>>> import pandas as pd
>>> import math
>>> from sklearn.metrics import mean_squared_error
>>> from joblib import load
>>>
>>> # ===== KONFIGURASI =====
>>> BASE = r"D:/FIX OLAH DATA/EEMD_SPLIT"
>>> PRED_FOLDER = os.path.join(BASE, "PREDIKSI_IMF_LSTM")
>>> SCALER_PATH = os.path.join(BASE, "scaler_minmax.joblib")
>>> OUT_FOLDER = os.path.join(BASE, "REKONSTRUKSI_AKHIR")
>>> os.makedirs(OUT_FOLDER, exist_ok=True)
>>> # =====
>>>
>>> def mape(y_true, y_pred):
...     eps = 1e-8
...     return np.mean(np.abs((y_true - y_pred) / (np.abs(y_true) + eps))) * 100.0
>>>
>>> # Load scaler untuk inverse transform
>>> scaler = load(SCALER_PATH)
>>>
>>> # --- Fungsi untuk penjumlahan komponen ---
>>> def sum_components(split): # "Train" atau "Test"
...     files = sorted(glob.glob(os.path.join(PRED_FOLDER, f"*_{split}_Pred.xlsx")))
...     total_act = None
...     total_pred = None
...     tanggal = None
...     for f in files:
...         df = pd.read_excel(f)
...         if tanggal is None:
...             tanggal = df["Tanggal"].values
...
...         total_act = df["Aktual_Norm"].values.copy()
...         total_pred = df["Prediksi_Norm"].values.copy()
...     else:
...         total_act += df["Aktual_Norm"].values
...         total_pred += df["Prediksi_Norm"].values
...     return tanggal, total_act, total_pred
>>>
>>> import os, glob, math
>>> import numpy as np
>>> import pandas as pd
>>> from sklearn.metrics import mean_squared_error
>>> from joblib import load
>>>
>>> # ===== KONFIG =====
>>> BASE = r"D:/FIX OLAH DATA/EEMD_SPLIT"
>>> PRED = os.path.join(BASE, "PREDIKSI_IMF_LSTM")
>>> SCALER_PATH = os.path.join(BASE, "scaler_minmax.joblib")
>>> OUT = os.path.join(BASE, "REKONSTRUKSI_AKHIR_FIX")
>>> os.makedirs(OUT, exist_ok=True)
>>>
>>> def mape(y_true, y_pred):
...     eps = 1e-8
...     return np.mean(np.abs((y_true - y_pred) / (np.abs(y_true) + eps))) * 100.0
>>>
>>> def sum_by_date(split): # "Train" atau "Test"
...     files = sorted(glob.glob(os.path.join(PRED, f"*_{split}_Pred.xlsx")))
...     base = None
...     akt_cols, pred_cols = [], []
...     for f in files:
...         comp = os.path.basename(f).replace(f"_ {split}_Pred.xlsx", "")
...         df = pd.read_excel(f, usecols=["Tanggal", "Aktual_Norm", "Prediksi_Norm"])
...         df["Tanggal"] = pd.to_datetime(df["Tanggal"])
...         df = df.rename(columns={
...             "Aktual_Norm": f"Akt_{comp}",
...             "Prediksi_Norm": f"Pred_{comp}"
...         })
...         if base is None:
...             base = df
...         else:
...             # inner join agar tanggal selaras (menghindari perbedaan panjang)
...             base = pd.merge(base, df, on="Tanggal", how="inner")
...         # urutkan dan jumlahkan
...         base = base.sort_values("Tanggal").reset_index(drop=True)
...     akt_cols = [c for c in base.columns if c.startswith("Akt_")]
...     pred_cols = [c for c in base.columns if c.startswith("Pred_")]
...     base["Akt_Total_Norm"] = base[akt_cols].sum(axis=1)
...     base["Pred_Total_Norm"] = base[pred_cols].sum(axis=1)
...     return base[["Tanggal", "Akt_Total_Norm", "Pred_Total_Norm"]]
>>>
>>> # --- Rekonstruksi (norm) dengan penyelarasan tanggal ---
>>> df_tr = sum_by_date("Train")
>>> df_te = sum_by_date("Test")
>>>
>>> # --- Inverse transform ke USD ---
>>> scaler = load(SCALER_PATH)
>>> df_tr["Akt_USD"] = scaler.inverse_transform(df_tr["Akt_Total_Norm"].values.reshape(-1,1)).ravel()
>>> df_tr["Pred_USD"] = scaler.inverse_transform(df_tr["Pred_Total_Norm"].values.reshape(-1,1)).ravel()
>>> df_te["Akt_USD"] = scaler.inverse_transform(df_te["Akt_Total_Norm"].values.reshape(-1,1)).ravel()
>>> df_te["Pred_USD"] = scaler.inverse_transform(df_te["Pred_Total_Norm"].values.reshape(-1,1)).ravel()
>>>
>>> # --- Evaluasi ---
>>> rmse_tr = math.sqrt(mean_squared_error(df_tr["Akt_USD"], df_tr["Pred_USD"]))
>>> mape_tr = mape(df_tr["Akt_USD"], df_tr["Pred_USD"])
>>> rmse_te = math.sqrt(mean_squared_error(df_te["Akt_USD"], df_te["Pred_USD"]))
>>> mape_te = mape(df_te["Akt_USD"], df_te["Pred_USD"])
>>>
```

```

>>> # --- Simpan ---
>>> df_tr.to_excel(os.path.join(OUT, "Rekonstruksi_Akhir_Train_FIX.xlsx"), index=False)
>>> df_te.to_excel(os.path.join(OUT, "Rekonstruksi_Akhir_Test_FIX.xlsx"), index=False)
>>> pd.DataFrame({
...     "Split":["Train","Test"],
...     "RMSE_USD":[rmse_tr, rmse_te],
...     "MAPE_USD(%)":[mape_tr, mape_te]
... }).to_excel(os.path.join(OUT, "Evaluasi_Rekonstruksi_Akhir_FIX.xlsx"), index=False)
>>> print("✅ Rekonstruksi akhir OK (tanggal diselaraskan).")
✅ Rekonstruksi akhir OK (tanggal diselaraskan).
>>> print(f"Train: RMSE={rmse_tr:.4f}, MAPE={mape_tr:.3f}%")
Train: RMSE=37.1071, MAPE=2.123%
>>> print(f"Test : RMSE={rmse_te:.4f}, MAPE={mape_te:.3f}%")
Test : RMSE=36.6336, MAPE=1.389%

```

Hasil Prediksi Gabungan (Summation)

Aktual	Prediksi
1935.95	1924.004
1921.44	1930.602
1943.38	1951.57
1957.48	1985.793
1957.4	1972.619
1923.2	1959.591
1919.19	1875.842
1933.06	1930.036
1937.23	1964.545
1924.3	1966.771
1932.44	1957.604
1923.76	1985.684
1925.48	1947.588
1932.17	1965.702
1945.85	1924.835
1953.43	1957.951
1966.59	1939.95
1977.72	1959.074
1973.52	1949.806
1974.54	1946.298
1978.5	1969.202
1949.84	2005.447
1957.41	2017.489
1951.49	2014.266
1929.73	1958.403
1897.69	1888.699
1905.56	1867.832
1886.12	1864.581
1894.34	1845.86
1896.4	1845.112
1862.77	1825.002
1867.79	1819.785
1880.92	1925.698
1876.84	1938.965
1882.96	1915.481
1853.92	1839.438
1838.14	1814.509
1852.12	1835.945
1821.72	1831.533
1811.15	1761.693
1823.79	1762.66
1814.67	1812.736
1815.61	1802.392
1841.72	1835.322
1845.68	1833.812
1853.22	1875.631
1865.9	1873.083
1852.83	1844.525
1850.02	1800.974
1852.73	1853.75
1856.21	1853.99
1837.09	1778.92
1845.55	1843.838
1868.13	1855.659

Aktual	Prediksi
1850.77	1877.301
1841	1820.754
1851.97	1847.43
1853.26	1896.942
1847.61	1926.121
1870.96	1850.098
1818.77	1826.033
1808.1	1828.17
1833.38	1845.152
1856.71	1828.872
1839.35	1803.873
1838.29	1877.448
1832.56	1887.423
1837.39	1850.672
1822.43	1820.913
1826.18	1821.686
1822.73	1808.383
1819.69	1786.877
1817.11	1843.793
1806.89	1838.325
1810.18	1862.143
1809.12	1852.856
1764.35	1785.878
1738.3	1778.791
1739.61	1762.816
1741.82	1704.96
1733.67	1723.459
1725.81	1763.485
1735.23	1766.649
1709.45	1719.415
1706.78	1733.19
1709.01	1644.128
1711.07	1677.866
1696.43	1647.23
1718.49	1688.844
1726.46	1707.863
1718.78	1668.247
1717	1665.762
1733.89	1713.917
1755.11	1724.435
1765.22	1709.89
1771.73	1765.135
1759.75	1839.237
1764.9	1848.434
1790.97	1853.218
1774.15	1776.159
1788.52	1780.184
1794.08	1793.94
1792.13	1780.293
1789.45	1790.268
1801.76	1813.726
1778.91	1804.807
1775.54	1812.987
1761.05	1744.425
1758.2	1742.833
1747.83	1755.802
1735.7	1733.859
1747.67	1730.647
1750.89	1743.751
1758.44	1727.261
1736.86	1777.907
1737.82	1744.724
1723.55	1698.524
1710.7	1701.9
1696.09	1669.668
1701.15	1718.569
...	...

Lampiran 10 Kode Python Forecast 365 Hari ke depan (EEMD-LSTM)

```
>>> import os
>>> import math
>>> import numpy as np
>>> import pandas as pd
>>> import matplotlib.pyplot as plt
>>> from joblib import load
>>> from tensorflow.keras.models import load_model
>>>
>>> # === KONFIG ===
>>> BASE = r"D:/FIX OLAH DATA/EEMD_SPLIT"
>>> MODEL_DIR = os.path.join(BASE, "MODEL_IMF_LSTM")
>>> PRED_DIR = os.path.join(BASE, "PREDIKSI_IMF_LSTM")
>>> RECON_DIR = os.path.join(BASE, "REKONSTRUKSI_AKHIR_FIX")
>>> OUT_FUTURE = os.path.join(BASE, "FUTURE_365")
>>> TUNING_SUM = os.path.join(PRED_DIR, "RINGKASAN_LSTM_TUNING_CEPAT.xlsx") # berisi kolom Komponen & Time_Step
>>> IMF_FULL_FILE = os.path.join(BASE, "IMF_Full_Normalized.xlsx") # hasil EEMD full (normalisasi)
>>> SCALER_PATH = os.path.join(BASE, "scaler_minmax.joblib")
>>> N_FUTURE = 365
>>>
>>> os.makedirs(OUT_FUTURE, exist_ok=True)
>>>
>>> # === 1) Load referensi ===
>>> df_imf_full = pd.read_excel(IMF_FULL_FILE)
>>> df_imf_full["Tanggal"] = pd.to_datetime(df_imf_full["Tanggal"])
>>> scaler = load(SCALER_PATH)
>>>
>>> # daftar komponen (IMF_1.., Residual)
>>> imf_cols = [c for c in df_imf_full.columns if c.startswith("IMF_")]
>>> if "Residual" in df_imf_full.columns:
...     imf_cols += ["Residual"]
>>>
>>> # time_step terbaik per komponen dari ringkasan tuning
>>> ts_map = {}
>>>
>>> if os.path.exists(TUNING_SUM):
...     df_ts = pd.read_excel(TUNING_SUM)
...     # Normalisasi nama 'Komponen' agar cocok dgn file model
...     for _, r in df_ts.iterrows():
...         comp = str(r["Komponen"]).strip()
...         ts_map[comp] = int(r["Time_Step"])
...     else:
...         # fallback: jika file ringkasan tidak ada, pakai 10 untuk semua
...         for c in imf_cols:
...             ts_map[c] = 10
>>>
>>> # === 2) Fungsi helper prediksi autoregresif ===
>>> def predict_future_component(series_norm: np.ndarray, model_path: str, time_step: int, n_future: int) -> np.ndarray:
...     """series_norm: seluruh deret normalisasi komponen (1D),
...     ambil window terakhir sepanjang time_step, lalu prediksi autoregresif n_future langkah."""
...     model = load_model(model_path)
...     buf = list(series_norm[-time_step:])
...     preds = []
...     for _ in range(n_future):
...         x = np.array(buf[-time_step:]).reshape(1, time_step, 1)
...         yhat = model.predict(x, verbose=0)[0, 0]
...         preds.append(yhat)
...         buf.append(yhat) # autoregresif murni
...     return np.array(preds, dtype=float)
>>>
>>> # === 3) Prediksi future per komponen ===
>>> future_norm_dict = {} # simpan prediksi future (norm) per komponen
>>> summary_rows = []
>>>
>>> for comp in imf_cols:
...     model_path = os.path.join(MODEL_DIR, f"{comp}_LSTM.h5")
...     if not os.path.exists(model_path):
...         print(f"⚠ Model tidak ditemukan untuk {comp}: {model_path}")
...         print(f"⚠ Model tidak ditemukan untuk {comp}: {model_path}")
...         continue
...     ts = int(ts_map.get(comp, 10))
...     series = df_imf_full[comp].values.astype(float)
...     if len(series) <= ts:
...         print(f"⚠ {comp}: panjang deret ({len(series)}) <= time_step ({ts}). Skip.")
...         continue
...     f_pred = predict_future_component(series, model_path, ts, N_FUTURE)
...     future_norm_dict[comp] = f_pred
...     # simpan excel per-IMF (norm)
...     future_dates = pd.date_range(df_imf_full["Tanggal"].iloc[-1] + pd.Timedelta(days=1), periods=N_FUTURE, freq="D")
...     pd.DataFrame({"Tanggal": future_dates, f"{comp}_Future_Norm": f_pred}) \
...         .to_excel(os.path.join(OUT_FUTURE, f"{comp}_Future_Norm.xlsx"), index=False)
...     summary_rows.append({"Komponen": comp, "Time_Step": ts, "Model": model_path})
>>>
2025-08-14 00:16:08.044850: I tensorflow/core/platform/cpu_feature_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep
Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: AVX AVX2
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
>>> pd.DataFrame(summary_rows).to_excel(os.path.join(OUT_FUTURE, "Ringkasan_Future_Per_IMF.xlsx"), index=False)
>>>
>>> # === 4) Rekonstruksi future (norm) + inverse ke USD ===
>>> # tanggal future (pakai yang sama utk semua)
>>> future_dates = pd.date_range(df_imf_full["Tanggal"].iloc[-1] + pd.Timedelta(days=1), periods=N_FUTURE, freq="D")
>>>
>>> # jumlahkan semua komponen future (norm)
>>> total_future_norm = np.zeros(N_FUTURE, dtype=float)
>>> for comp, arr in future_norm_dict.items():
...     total_future_norm += arr
>>>
>>> # inverse ke USD
>>> total_future_usd = scaler.inverse_transform(total_future_norm.reshape(-1, 1)).ravel()
>>>
>>> # simpan hasil future rekonstruksi
```



```

>>> df_future = pd.DataFrame({
...     "Tanggal": future_dates,
...     "Prediksi_Future_USD": total_future_usd
... })
>>> df_future.to_excel(os.path.join(OUT_FUTURE, "Rekonstruksi_Akhir_Future_USD.xlsx"), index=False)
>>>
>>> # === 5) Gabungkan dengan rekonstruksi Train/Test (USD) ===
>>> train_file = os.path.join(RECON_DIR, "Rekonstruksi_Akhir_Train_FIX.xlsx")
>>> test_file = os.path.join(RECON_DIR, "Rekonstruksi_Akhir_Test_FIX.xlsx")
>>> df_tr = pd.read_excel(train_file); df_tr["Tanggal"] = pd.to_datetime(df_tr["Tanggal"])
>>> df_te = pd.read_excel(test_file); df_te["Tanggal"] = pd.to_datetime(df_te["Tanggal"])
>>>
>>> # === 6) Plot Train-Test-Future (USD) ===
>>> plt.figure(figsize=(12, 6))
<Figure size 1200x600 with 0 Axes>
>>> plt.plot(df_tr["Tanggal"], df_tr["Akt_USD"], label="Aktual (Train)")
[<matplotlib.lines.Line2D object at 0x0000019E0CC02670>]
>>> plt.plot(df_tr["Tanggal"], df_tr["Pred_USD"], label="Prediksi (Train)")
[<matplotlib.lines.Line2D object at 0x0000019E0EDEC160>]
>>> plt.plot(df_te["Tanggal"], df_te["Akt_USD"], label="Aktual (Test)", linestyle="--")
[<matplotlib.lines.Line2D object at 0x0000019E0EDEC340>]
>>> plt.plot(df_te["Tanggal"], df_te["Pred_USD"], label="Prediksi (Test)", linestyle="--")
[<matplotlib.lines.Line2D object at 0x0000019E09ACA100>]
>>> plt.plot(df_future["Tanggal"], df_future["Prediksi_Future_USD"], label="Prediksi Future (365 hari)")
[<matplotlib.lines.Line2D object at 0x0000019E09A42E50>]
>>>
>>> # garis batas Train/Test dan Test/Future
>>> split_train_test = df_te["Tanggal"].iloc[0]
>>> split_test_future = df_future["Tanggal"].iloc[0]
>>> plt.axvline(split_train_test, linestyle="--")
<matplotlib.lines.Line2D object at 0x0000019E0EDEC1C0>
>>> plt.axvline(split_test_future, linestyle="--")
<matplotlib.lines.Line2D object at 0x0000019E09A42E80>
>>>
>>> # garis batas Train/Test dan Test/Future
>>> split_train_test = df_te["Tanggal"].iloc[0]
>>> split_test_future = df_future["Tanggal"].iloc[0]
>>> plt.axvline(split_train_test, linestyle="--")
<matplotlib.lines.Line2D object at 0x0000019E0EDEC1C0>
>>> plt.axvline(split_test_future, linestyle="--")
<matplotlib.lines.Line2D object at 0x0000019E09A42E80>
>>>
>>> plt.title("EEMD-LSTM - Rekonstruksi Akhir (Train-Test-Future) dalam USD")
Text(0.5, 1.0, 'EEMD-LSTM - Rekonstruksi Akhir (Train-Test-Future) dalam USD')
>>> plt.xlabel("Tanggal"); plt.ylabel("Harga (USD/troy ounce)")
Text(0.5, 0, 'Tanggal')
Text(0, 0.5, 'Harga (USD/troy ounce)')
>>> plt.legend(); plt.grid(True, linestyle="--", alpha=0.5); plt.tight_layout()
<matplotlib.legend.Legend object at 0x0000019E0ED65490>
>>>
>>> plot_path = os.path.join(OUT_FUTURE, "Grafik_Rekonstruksi_Akhir_Train_Test_Future_USD.png")
>>> plt.savefig(plot_path, dpi=300); plt.close()
>>>
>>> print("✅ Future per IMF selesai.")
✅ Future per IMF selesai.
>>> print("📁 Output folder:", OUT_FUTURE)
📁 Output folder: D:/FIX OLAH DATA/EEMD_SPLIT/FUTURE_365
>>> print(" - Rekonstruksi_Akhir_Future_USD.xlsx")
- Rekonstruksi_Akhir_Future_USD.xlsx
>>> print(" - Grafik_Rekonstruksi_Akhir_Train_Test_Future_USD.png")
- Grafik_Rekonstruksi_Akhir_Train_Test_Future_USD.png
>>> print(" - * Future_Norm.xlsx (per IMF)")
- * Future_Norm.xlsx (per IMF)

```

Hasil Forecast 365 Hari kedepan (EEMD-LSTM)

Hari	Prediksi (USD/troy ounce)
2025-04-12 00:00:00	3040.324
2025-04-13 00:00:00	3041.812
2025-04-14 00:00:00	3014.905
2025-04-15 00:00:00	3021.253
2025-04-16 00:00:00	3029.356
2025-04-17 00:00:00	3019.454
2025-04-18 00:00:00	3001.902
2025-04-19 00:00:00	2975.124
2025-04-20 00:00:00	2956.151
2025-04-21 00:00:00	2942.4
2025-04-22 00:00:00	2927.682
2025-04-23 00:00:00	2910.926
2025-04-24 00:00:00	2896.217
2025-04-25 00:00:00	2886.294
2025-04-26 00:00:00	2881.996
2025-04-27 00:00:00	2882.58
2025-04-28 00:00:00	2885.641
2025-04-29 00:00:00	2888.612
2025-04-30 00:00:00	2889.998
2025-05-01 00:00:00	2889.443
2025-05-02 00:00:00	2887.509
2025-05-03 00:00:00	2884.91

Hari	Prediksi (USD/ <i>troy ounce</i>)
2025-05-04 00:00:00	2882.035
2025-05-05 00:00:00	2878.783
2025-05-06 00:00:00	2875.058
2025-05-07 00:00:00	2870.938
2025-05-08 00:00:00	2866.649
2025-05-09 00:00:00	2862.484
2025-05-10 00:00:00	2858.729
2025-05-11 00:00:00	2855.616
2025-05-12 00:00:00	2853.314
2025-05-13 00:00:00	2851.89
2025-05-14 00:00:00	2851.287
2025-05-15 00:00:00	2851.351
2025-05-16 00:00:00	2851.886
2025-05-17 00:00:00	2852.704
2025-05-18 00:00:00	2853.685
2025-05-19 00:00:00	2854.8
2025-05-20 00:00:00	2856.096
2025-05-21 00:00:00	2857.675
2025-05-22 00:00:00	2859.656
2025-05-23 00:00:00	2862.152
2025-05-24 00:00:00	2865.256
2025-05-25 00:00:00	2869.034
2025-05-26 00:00:00	2873.522
2025-05-27 00:00:00	2878.722
2025-05-28 00:00:00	2884.602
2025-05-29 00:00:00	2891.093
2025-05-30 00:00:00	2898.094
2025-05-31 00:00:00	2905.488
2025-06-01 00:00:00	2913.154
2025-06-02 00:00:00	2920.988
2025-06-03 00:00:00	2928.922
2025-06-04 00:00:00	2936.936
2025-06-05 00:00:00	2945.069
2025-06-06 00:00:00	2953.422
2025-06-07 00:00:00	2962.148
2025-06-08 00:00:00	2971.446
2025-06-09 00:00:00	2981.546
2025-06-10 00:00:00	2992.695
2025-06-11 00:00:00	3005.145
2025-06-12 00:00:00	3019.14
2025-06-13 00:00:00	3034.909
2025-06-14 00:00:00	3052.658
2025-06-15 00:00:00	3072.566
2025-06-16 00:00:00	3094.791
2025-06-17 00:00:00	3119.467
2025-06-18 00:00:00	3146.71
2025-06-19 00:00:00	3176.625
2025-06-20 00:00:00	3209.311
2025-06-21 00:00:00	3244.87
2025-06-22 00:00:00	3283.404
2025-06-23 00:00:00	3325.026
2025-06-24 00:00:00	3369.853
2025-06-25 00:00:00	3418.009
2025-06-26 00:00:00	3469.62
2025-06-27 00:00:00	3524.814
2025-06-28 00:00:00	3583.712
2025-06-29 00:00:00	3646.427
2025-06-30 00:00:00	3713.06
2025-07-01 00:00:00	3783.697
2025-07-02 00:00:00	3858.4
2025-07-03 00:00:00	3937.208
2025-07-04 00:00:00	4020.12
2025-07-05 00:00:00	4107.1
2025-07-06 00:00:00	4198.048
2025-07-07 00:00:00	4292.807
2025-07-08 00:00:00	4391.131
2025-07-09 00:00:00	4492.682
2025-07-10 00:00:00	4597.012

Hari	Prediksi (USD/ <i>troy ounce</i>)
2025-07-11 00:00:00	4703.557
2025-07-12 00:00:00	4811.632
2025-07-13 00:00:00	4920.445
2025-07-14 00:00:00	5029.105
2025-07-15 00:00:00	5136.661
2025-07-16 00:00:00	5242.13
2025-07-17 00:00:00	5344.55
2025-07-18 00:00:00	5443.022
2025-07-19 00:00:00	5536.759
2025-07-20 00:00:00	5625.114
2025-07-21 00:00:00	5707.611
2025-07-22 00:00:00	5783.949
2025-07-23 00:00:00	5853.999
2025-07-24 00:00:00	5917.797
2025-07-25 00:00:00	5975.506
2025-07-26 00:00:00	6027.404
2025-07-27 00:00:00	6073.843
2025-07-28 00:00:00	6115.231
2025-07-29 00:00:00	6152.001
2025-07-30 00:00:00	6184.594
2025-07-31 00:00:00	6213.447
2025-08-01 00:00:00	6238.972
2025-08-02 00:00:00	6261.555
2025-08-03 00:00:00	6281.547
2025-08-04 00:00:00	6299.262
2025-08-05 00:00:00	6314.983
2025-08-06 00:00:00	6328.953
2025-08-07 00:00:00	6341.383
2025-08-08 00:00:00	6352.452
2025-08-09 00:00:00	6362.314
2025-08-10 00:00:00	6371.097
2025-08-11 00:00:00	6378.906
2025-08-12 00:00:00	6385.828
2025-08-13 00:00:00	6391.933
2025-08-14 00:00:00	6397.273
2025-08-15 00:00:00	6401.892
2025-08-16 00:00:00	6405.816
2025-08-17 00:00:00	6409.066
2025-08-18 00:00:00	6411.652
2025-08-19 00:00:00	6413.578
2025-08-20 00:00:00	6414.841
2025-08-21 00:00:00	6415.436
2025-08-22 00:00:00	6415.354
2025-08-23 00:00:00	6414.591
2025-08-24 00:00:00	6413.14
2025-08-25 00:00:00	6410.998
2025-08-26 00:00:00	6408.166
2025-08-27 00:00:00	6404.655
2025-08-28 00:00:00	6400.476
2025-08-29 00:00:00	6395.652
2025-08-30 00:00:00	6390.21
2025-08-31 00:00:00	6384.187
2025-09-01 00:00:00	6377.626
2025-09-02 00:00:00	6370.573
2025-09-03 00:00:00	6363.087
2025-09-04 00:00:00	6355.224
2025-09-05 00:00:00	6347.05
2025-09-06 00:00:00	6338.627
2025-09-07 00:00:00	6330.027
2025-09-08 00:00:00	6321.318
2025-09-09 00:00:00	6312.565
2025-09-10 00:00:00	6303.839
2025-09-11 00:00:00	6295.201
2025-09-12 00:00:00	6286.713
2025-09-13 00:00:00	6278.434
2025-09-14 00:00:00	6270.412
2025-09-15 00:00:00	6262.693
2025-09-16 00:00:00	6255.316

Hari	Prediksi (USD/ <i>troy ounce</i>)
2025-09-17 00:00:00	6248.312
2025-09-18 00:00:00	6241.704
2025-09-19 00:00:00	6235.509
2025-09-20 00:00:00	6229.735
2025-09-21 00:00:00	6224.382
2025-09-22 00:00:00	6219.443
2025-09-23 00:00:00	6214.906
2025-09-24 00:00:00	6210.749
2025-09-25 00:00:00	6206.952
2025-09-26 00:00:00	6203.48
2025-09-27 00:00:00	6200.305
2025-09-28 00:00:00	6197.386
2025-09-29 00:00:00	6194.69
2025-09-30 00:00:00	6192.178
2025-10-01 00:00:00	6189.812
2025-10-02 00:00:00	6187.556
2025-10-03 00:00:00	6185.373
2025-10-04 00:00:00	6183.23
2025-10-05 00:00:00	6181.097
2025-10-06 00:00:00	6178.948
2025-10-07 00:00:00	6176.76
2025-10-08 00:00:00	6174.513
2025-10-09 00:00:00	6172.194
2025-10-10 00:00:00	6169.793
2025-10-11 00:00:00	6167.306
2025-10-12 00:00:00	6164.733
2025-10-13 00:00:00	6162.08
2025-10-14 00:00:00	6159.358
2025-10-15 00:00:00	6156.582
2025-10-16 00:00:00	6153.772
2025-10-17 00:00:00	6150.952
2025-10-18 00:00:00	6148.15
2025-10-19 00:00:00	6145.398
2025-10-20 00:00:00	6142.728
2025-10-21 00:00:00	6140.177
2025-10-22 00:00:00	6137.782
2025-10-23 00:00:00	6135.58
2025-10-24 00:00:00	6133.608
2025-10-25 00:00:00	6131.903
2025-10-26 00:00:00	6130.5
2025-10-27 00:00:00	6129.431
2025-10-28 00:00:00	6128.724
2025-10-29 00:00:00	6128.406
2025-10-30 00:00:00	6128.499
2025-10-31 00:00:00	6129.019
2025-11-01 00:00:00	6129.978
2025-11-02 00:00:00	6131.383
2025-11-03 00:00:00	6133.235
2025-11-04 00:00:00	6135.531
2025-11-05 00:00:00	6138.262
2025-11-06 00:00:00	6141.411
2025-11-07 00:00:00	6144.96
2025-11-08 00:00:00	6148.883
2025-11-09 00:00:00	6153.151
2025-11-10 00:00:00	6157.731
2025-11-11 00:00:00	6162.585
2025-11-12 00:00:00	6167.673
2025-11-13 00:00:00	6172.951
2025-11-14 00:00:00	6178.377
2025-11-15 00:00:00	6183.903
2025-11-16 00:00:00	6189.483
2025-11-17 00:00:00	6195.071
2025-11-18 00:00:00	6200.621
2025-11-19 00:00:00	6206.088
2025-11-20 00:00:00	6211.432
2025-11-21 00:00:00	6216.61
2025-11-22 00:00:00	6221.588
2025-11-23 00:00:00	6226.332

Hari	Prediksi (USD/troy ounce)
2025-11-24 00:00:00	6230.812
2025-11-25 00:00:00	6235.005
2025-11-26 00:00:00	6238.89
2025-11-27 00:00:00	6242.45
2025-11-28 00:00:00	6245.677
2025-11-29 00:00:00	6248.562
2025-11-30 00:00:00	6251.106
2025-12-01 00:00:00	6253.313
2025-12-02 00:00:00	6255.189
2025-12-03 00:00:00	6256.748
2025-12-04 00:00:00	6258.005
2025-12-05 00:00:00	6258.978
2025-12-06 00:00:00	6259.689
2025-12-07 00:00:00	6260.162
2025-12-08 00:00:00	6260.421
2025-12-09 00:00:00	6260.493
2025-12-10 00:00:00	6260.403
2025-12-11 00:00:00	6260.178
2025-12-12 00:00:00	6259.839
2025-12-13 00:00:00	6259.412
2025-12-14 00:00:00	6258.916
2025-12-15 00:00:00	6258.368
2025-12-16 00:00:00	6257.783
2025-12-17 00:00:00	6257.172
2025-12-18 00:00:00	6256.543
2025-12-19 00:00:00	6255.9
2025-12-20 00:00:00	6255.241
2025-12-21 00:00:00	6254.564
2025-12-22 00:00:00	6253.862
2025-12-23 00:00:00	6253.123
2025-12-24 00:00:00	6252.333
2025-12-25 00:00:00	6251.477
2025-12-26 00:00:00	6250.535
2025-12-27 00:00:00	6249.487
2025-12-28 00:00:00	6248.31
2025-12-29 00:00:00	6246.982
2025-12-30 00:00:00	6245.479
2025-12-31 00:00:00	6243.777
2026-01-01 00:00:00	6241.856
2026-01-02 00:00:00	6239.694
2026-01-03 00:00:00	6237.271
2026-01-04 00:00:00	6234.571
2026-01-05 00:00:00	6231.579
2026-01-06 00:00:00	6228.285
2026-01-07 00:00:00	6224.679
2026-01-08 00:00:00	6220.76
2026-01-09 00:00:00	6216.526
2026-01-10 00:00:00	6211.983
2026-01-11 00:00:00	6207.138
2026-01-12 00:00:00	6202.004
2026-01-13 00:00:00	6196.598
2026-01-14 00:00:00	6190.94
2026-01-15 00:00:00	6185.055
2026-01-16 00:00:00	6178.972
2026-01-17 00:00:00	6172.722
2026-01-18 00:00:00	6166.34
2026-01-19 00:00:00	6159.861
2026-01-20 00:00:00	6153.324
2026-01-21 00:00:00	6146.77
2026-01-22 00:00:00	6140.238
2026-01-23 00:00:00	6133.768
2026-01-24 00:00:00	6127.402
2026-01-25 00:00:00	6121.178
2026-01-26 00:00:00	6115.133
2026-01-27 00:00:00	6109.302
2026-01-28 00:00:00	6103.718
2026-01-29 00:00:00	6098.41
2026-01-30 00:00:00	6093.404

Hari	Prediksi (USD/troy ounce)
2026-01-31 00:00:00	6088.721
2026-02-01 00:00:00	6084.38
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2026-02-23 00:00:00	6064.607
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