

## DAFTAR PUSTAKA

- Alonso, C.R.G., Jimenez, M.T., dan Martinez, C.H., 2010, Income prediction in the agrarian sector using product unit neural networks, *European Journal of Operational Research* 204, 355–365.
- Arsyad, L., 2001, *Peramalan Bisnis Edisi Pertama*, BPFE. Yogyakarta.
- Bai, E., Wong, W.K., Chu, W.C., Xia, M., dan Pan, F., 2011, A heuristic time-invariant model for fuzzy time series forecasting, *Expert Systems with Applications* 38, 2701–2707.
- Brown, L.D., 1993, Earnings Forecast Research: Its Implications for Capital Market Research, *International Journal of Forecasting* 9, 295–320.
- Chapman, S.N., 2006, *The Fundamentals of Production Planning and Control* Pearson, Prentice-Hall. New Jersey.
- Chen, S.M., 1996, Forecasting Enrollments Based On Fuzzy Time Series, *Fuzzy Sets and Systems* 81, 311–319.
- Chen, S.M., 2002, Forecasting Enrollments Based On High-Order Fuzzy Time Series, *Cybernetics and Systems: An International Journal* 33, 1–16.
- Chen, Y.M., 2014, A high-order fuzzy time series forecasting model for internet stock trading, *Future Generation Computer Systems* 37, 461–467.
- Cramer, D., dan Howitt, D., 2006, *The Sage Dictionary of Statistics*. London: Sage Publication.
- Foster, G., 1986, *Financial statement analysis Second Edition*, Prentice-Hall International.
- Giri, E.F., 2012, *Akuntansi Keuangan Menengah 1 Perspektif IFRS*, UPP STIM YKPN.
- Ghozali, I., 2005, *Aplikasi Analisis Multivariate dengan Program SPSS*, Badan Penerbit Universitas Diponegoro, Semarang.
- Ghozali, I., dan Chariri, A., 2014, *Teori Akuntansi International Financial Reporting System (IFRS)*, Badan Penerbit Universitas Diponegoro.
- Heizer, J., dan Render, B., 2005, *Operation Management 7<sup>th</sup> Edition (Manajemen Operation Edisi 7, Buku I)*, penerbit Salemba empat, Jakarta.
- Higgins, H., 2013, Can securities analysts forecast intangible firms' earnings?, *International Journal of Forecasting* 29, 155–174.

- Huarng, K., 2001, Effective lengths of intervals to improve forecasting in fuzzy time series, *Fuzzy Sets and Systems* 123, 387–394.
- Jilani, T.A., dan Burney, S.M.A, 2008, A refined fuzzy time series model for stock market forecasting, *Physica A* 387, 2857–2862.
- Jumingan, 2009, *Studi Kelayakan Bisnis, Teori dan Proposal Kelayakan*. Bumi Aksara, Jakarta.
- Kusumadewi, S., 2002, *Analisis & Desain Sistem Fuzzy Menggunakan Tool Box Matlab*, Graha Ilmu, Yogyakarta.
- Kusumadewi, S., dan Purnomo, H., 2013, *Aplikasi Logika Fuzzy untuk Pendukung Keputusan Edisi 2*, Graha Ilmu, Yogyakarta.
- Makridakis, S., Wheelwright, S.C., dan McGee, V.E., 1999, *Metode dan Aplikasi Peramalan, Jilid I, Edisi Kedua*. Binarupa Aksara, Jakarta.
- Nany, M., 2013, Analisis Kemampuan Prediksi Arus Kas Operasi (Studi Pada Bursa Efek Indonesia), *Jurnal Dinamika Akuntansi* Vol. 5, No. 1, pp. 35-46.
- Robandi, I., 2006, *Desain Sistem Tenaga Modern, Optimasi, Logika Fuzzy dan Algoritma Genetika*, Andi, Yogyakarta.
- Rustami, P., Kirya, I.K., dan Cipta, W., 2014, Pengaruh Biaya Produksi, Biaya Promosi, Dan Volume Penjualan Terhadap Laba Pada Perusahaan Kopi Bubuk Banyuwatis, *e-Journal Bisma Universitas Pendidikan Ganesha Jurusan Manajemen* Volume 2.
- Sarwono, J., dan Budiono, H., 2012, *Statistik Terapan Aplikasi untuk Riset Skripsi, Tesis dan Disertasi Menggunakan SPSS, AMOS dan Excel*. Elex Media Komputindo, Jakarta.
- Siregar, S., 2013, *Metode Penelitian Kuantitatif Dilenkapi dengan Perbandingan Perhitungan Manual & SPSS*, Kencana.
- Siregar, S., 2015, *Statistik Parametrik untuk Penelitian Kuantitatif Dilengkapi dengan Perhitungan Manual dan Aplikasi SPSS Versi 17*, Bumi Aksara, Jakarta.
- Spiegel, M.R., 1988, *Teori dan Soal-soal Statistik Versi SI (Metrik)*, Erlangga, Jakarta.
- Song, Q., dan Chissom, B., 1993, Forecasting Enrollments with Fuzzy Time Series part 1. *Fuzzy Sets and System* 54, 1-9.

- Steel, R.G.D., dan Torrie, J.H., 1991, *Prinsip dan Prosedur Statistika (Suatu Pendekatan Biometrik)*, Gramedia, Jakarta.
- Sugiyono, 20014, *Statistika Untuk Penelitian*, Alfabeta, Bandung.
- Sungkawa, I., 2013, Penerapan Analisis Regresi Dan Korelasi Dalam Menentukan Arah Hubungan Antara Dua Faktor Kualitatif Pada Tabel Kontingensi, *Jurnal Mat Stat*, Vol. 13 No. 1, 33-41
- Supranto, J., 1987, *Statistik, Teori dan Aplikasi, Edisi ke lima Jilid 1*, Erlangga, Jakarta.
- Syamsudin dan Primayuta, C., 2009, Rasio Keuangan Dan Prediksi Perubahan Laba Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia, *BENEFIT Jurnal Manajemen dan Bisnis* Volume 13, Nomor 1, hlm.61-69.
- Wang, C.C., 2011, A comparison study between fuzzy time series model and ARIMA model for forecasting Taiwan export. *Expert Systems with Applications* 38, 9296–9304.
- Zadeh, L.A., 1965, *Fuzzy Sets*, Information and Control 8.
- Zhu, S.J., Sun, A.H., Zhang, Z.X., dan Wang, B., 2012, Multivariable Linear Regression Equation for Rice Water Requirement based on Meteorological Influence, *Procedia Engineering* 28, 516 – 521.

## Lampiran 1

Titik Persentase Distribusi F untuk Probabilita = 0,05

df untuk penyebut (N2)	df untuk pembilang (N1)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	161	199	216	225	230	234	237	239	241	242	243	244	245	245	246
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.40	19.41	19.42	19.42	19.43
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.76	8.74	8.73	8.71	8.70
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.94	5.91	5.89	5.87	5.86
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.70	4.68	4.66	4.64	4.62
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00	3.98	3.96	3.94
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.60	3.57	3.55	3.53	3.51
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.31	3.28	3.26	3.24	3.22
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.10	3.07	3.05	3.03	3.01
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.94	2.91	2.89	2.86	2.85
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.82	2.79	2.76	2.74	2.72
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.72	2.69	2.66	2.64	2.62
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.63	2.60	2.58	2.55	2.53
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.57	2.53	2.51	2.48	2.46
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.51	2.48	2.45	2.42	2.40
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.46	2.42	2.40	2.37	2.35
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.41	2.38	2.35	2.33	2.31
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.37	2.34	2.31	2.29	2.27
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.34	2.31	2.28	2.26	2.23
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.31	2.28	2.25	2.22	2.20
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.28	2.25	2.22	2.20	2.18
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.26	2.23	2.20	2.17	2.15
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.24	2.20	2.18	2.15	2.13
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.22	2.18	2.15	2.13	2.11
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.20	2.16	2.14	2.11	2.09
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.18	2.15	2.12	2.09	2.07
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.17	2.13	2.10	2.08	2.06
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.15	2.12	2.09	2.06	2.04
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.14	2.10	2.08	2.05	2.03
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.13	2.09	2.06	2.04	2.01
31	4.16	3.30	2.91	2.68	2.52	2.41	2.32	2.25	2.20	2.15	2.11	2.08	2.05	2.03	2.00
32	4.15	3.29	2.90	2.67	2.51	2.40	2.31	2.24	2.19	2.14	2.10	2.07	2.04	2.01	1.99
33	4.14	3.28	2.89	2.66	2.50	2.39	2.30	2.23	2.18	2.13	2.09	2.06	2.03	2.00	1.98
34	4.13	3.28	2.88	2.65	2.49	2.38	2.29	2.23	2.17	2.12	2.08	2.05	2.02	1.99	1.97
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.07	2.04	2.01	1.99	1.96
36	4.11	3.26	2.87	2.63	2.48	2.36	2.28	2.21	2.15	2.11	2.07	2.03	2.00	1.98	1.95
37	4.11	3.25	2.86	2.63	2.47	2.36	2.27	2.20	2.14	2.10	2.06	2.02	2.00	1.97	1.95
38	4.10	3.24	2.85	2.62	2.46	2.35	2.26	2.19	2.14	2.09	2.05	2.02	1.99	1.96	1.94
39	4.09	3.24	2.85	2.61	2.46	2.34	2.26	2.19	2.13	2.08	2.04	2.01	1.98	1.95	1.93
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.04	2.00	1.97	1.95	1.92
41	4.08	3.23	2.83	2.60	2.44	2.33	2.24	2.17	2.12	2.07	2.03	2.00	1.97	1.94	1.92
42	4.07	3.22	2.83	2.59	2.44	2.32	2.24	2.17	2.11	2.06	2.03	1.99	1.96	1.94	1.91
43	4.07	3.21	2.82	2.59	2.43	2.32	2.23	2.16	2.11	2.06	2.02	1.99	1.96	1.93	1.91
44	4.06	3.21	2.82	2.58	2.43	2.31	2.23	2.16	2.10	2.05	2.01	1.98	1.95	1.92	1.90
45	4.06	3.20	2.81	2.58	2.42	2.31	2.22	2.15	2.10	2.05	2.01	1.97	1.94	1.92	1.89

## Lampiran 2

Titik Persentase Distribusi t (df = 1 – 40)

Pr	0.25	0.10	0.05	0.025	0.01	0.005	0.001
df	0.50	0.20	0.10	0.050	0.02	0.010	0.002
1	1.00000	3.07768	6.31375	12.70620	31.82052	63.65674	318.30884
2	0.81650	1.88562	2.91999	4.30265	6.96456	9.92484	22.32712
3	0.76489	1.63774	2.35336	3.18245	4.54070	5.84091	10.21453
4	0.74070	1.53321	2.13185	2.77645	3.74695	4.60409	7.17318
5	0.72669	1.47588	2.01505	2.57058	3.36493	4.03214	5.89343
6	0.71756	1.43976	1.94318	2.44691	3.14267	3.70743	5.20763
7	0.71114	1.41492	1.89458	2.36462	2.99795	3.49948	4.78529
8	0.70639	1.39682	1.85955	2.30600	2.89646	3.35539	4.50079
9	0.70272	1.38303	1.83311	2.26216	2.82144	3.24984	4.29681
10	0.69981	1.37218	1.81246	2.22814	2.76377	3.16927	4.14370
11	0.69745	1.36343	1.79588	2.20099	2.71808	3.10581	4.02470
12	0.69548	1.35622	1.78229	2.17881	2.68100	3.05454	3.92963
13	0.69383	1.35017	1.77093	2.16037	2.65031	3.01228	3.85198
14	0.69242	1.34503	1.76131	2.14479	2.62449	2.97684	3.78739
15	0.69120	1.34061	1.75305	2.13145	2.60248	2.94671	3.73283
16	0.69013	1.33676	1.74588	2.11991	2.58349	2.92078	3.68615
17	0.68920	1.33338	1.73961	2.10982	2.56693	2.89823	3.64577
18	0.68836	1.33039	1.73406	2.10092	2.55238	2.87844	3.61048
19	0.68762	1.32773	1.72913	2.09302	2.53948	2.86093	3.57940
20	0.68695	1.32534	1.72472	2.08596	2.52798	2.84534	3.55181
21	0.68635	1.32319	1.72074	2.07961	2.51765	2.83136	3.52715
22	0.68581	1.32124	1.71714	2.07387	2.50832	2.81876	3.50499
23	0.68531	1.31946	1.71387	2.06866	2.49987	2.80734	3.48496
24	0.68485	1.31784	1.71088	2.06390	2.49216	2.79694	3.46678
25	0.68443	1.31635	1.70814	2.05954	2.48511	2.78744	3.45019
26	0.68404	1.31497	1.70562	2.05553	2.47863	2.77871	3.43500
27	0.68368	1.31370	1.70329	2.05183	2.47266	2.77068	3.42103
28	0.68335	1.31253	1.70113	2.04841	2.46714	2.76326	3.40816
29	0.68304	1.31143	1.69913	2.04523	2.46202	2.75639	3.39624
30	0.68276	1.31042	1.69726	2.04227	2.45726	2.75000	3.38518
31	0.68249	1.30946	1.69552	2.03951	2.45282	2.74404	3.37490
32	0.68223	1.30857	1.69389	2.03693	2.44868	2.73848	3.36531
33	0.68200	1.30774	1.69236	2.03452	2.44479	2.73328	3.35634
34	0.68177	1.30695	1.69092	2.03224	2.44115	2.72839	3.34793
35	0.68156	1.30621	1.68957	2.03011	2.43772	2.72381	3.34005
36	0.68137	1.30551	1.68830	2.02809	2.43449	2.71948	3.33262
37	0.68118	1.30485	1.68709	2.02619	2.43145	2.71541	3.32563
38	0.68100	1.30423	1.68595	2.02439	2.42857	2.71156	3.31903
39	0.68083	1.30364	1.68488	2.02269	2.42584	2.70791	3.31279
40	0.68067	1.30308	1.68385	2.02108	2.42326	2.70446	3.30688

## Lampiran 3

### Script Aplikasi *FTS Heuristic Time Invariant* dan Regresi Linier Berganda

#### 1. Script data aktual

```
function aktual()
{
    $this->crud->set_theme('twitter-bootstrap');
    $this->crud->set_table('actual');
    $this->crud->set_subject('Aktual');
    $this->crud->display_as('nilai','Laba (Y)');
    $this->crud->display_as('x1','Penjualan (X1)');
    $this->crud->display_as('x2','Beban pokok penjualan (X2)');
    $this->crud->display_as('x3','Beban umum & administrasi (X3)');
    $this->crud->display_as('x4','Beban penjualan & pemasaran (X4)');
    $this->crud->display_as('x5','Penghasilan Bunga (X5)');
    $this->crud->order_by('waktu');
    $this->crud->callback_column('waktu',array($this,'field_waktu'));
    $this->crud->callback_field('waktu',array($this,'field_waktu_field'));
    $this->crud->callback_insert(array($this,'change_insert'));
    $this->crud->callback_update(array($this,'change_update'));
    $output = $this->crud->render();

    $this->data = array_merge($this->data,get_object_vars($output));
    $this->data['title'] = "Data Aktual";
    $this->file_grocery($output);
    $this->parser->parse('admin',$this->data);
}
function field_waktu($value = "", $primary_key = null)
{
    $curMonth = @date("m", strtotime($value));
    $curY = @date("Y", strtotime($value));
    $curQuarter = ceil($curMonth/3);
    return "Triwulan ".$curQuarter."-".$curY;
}
function field_waktu_field($value = "", $primary_key = null)
{
    $curMonth = @date("m", strtotime($value));
    $curY = @date("Y", strtotime($value));
    $curQuarter = ceil($curMonth/3);
    return '<input type="text" maxlength="50" value="'.$curQuarter.'-".$curY.'"
name="waktu" style="width:100px"><div style="margin-bottom:10px;">(Format (Triwulan)-
(Tahun) Contoh: 1-2001)</div>';
}
function change_insert($post_array) {

    $post_array['waktu'] = $this->quarter_to_date($post_array['waktu']);

    return $this->db->insert('actual',$post_array);
}
function change_update($post_array,$primary_key) {
    $post_array['waktu'] = $this->quarter_to_date($post_array['waktu']);
    return $this->db->update('actual',$post_array,array('id' =>
$primary_key));
}
```

```

function quater_to_date($quarter)
{
    $value = explode("-", $quarter);
    $add = "";
    if($value[0]=="1")
    {
        $add="01-01";
    }
    else if($value[0]=="2")
    {
        $add="04-01";
    }
    else if($value[0]=="3")
    {
        $add="07-01";
    }
    else if($value[0]=="4")
    {
        $add="10-01";
    }
    $date = $value[1]."-".$add;
    return $date;
}
function addkeltim()
{
    $this->data['title'] = "Tambah";
    $this->data['borload']=$this->db->query("SELECT * FROM borload a WHERE
    status='2'
    order by id ASC LIMIT 10
    ")->result_array();
    $this->data['output'] = $this->parser->parse('addkeltim',$this->data,true);
    $this->parser->parse('home',$this->data);
}

```

## 2. Scrip Proses *Fuzzy Time Series*

### a. proses *UoD* dan interval

```

public function proses_u($min,$x,$interval,$table)
{
    $u=array();
    $li=$min;
    $ui=0;
    $i=1;
    while(($min+($i*$interval)) <= $x)
    {
        $u[$i]['i']= $i;
        $li = $min+((($i-1)*$interval));
        $u[$i]['min']= $li;
        $ui = $min+($i*$interval);
        $u[$i]['max']= $ui;
        $i++;
    }
    $this->db->query("delete from $table");
    $this->db->insert_batch($table, $u);
    return $this->db->query("select * from view_ui")->result_array();
}

```

```

}
public function call_grel()
{

}
public function proses_us($table)
{
    $this->db->query("delete from $table");
    $this->db->query("
        insert into $table
        select @c:=@c+1 as i,a.min, a.max,a.min+((a.max-
a.min)/2) as midpoint from
        (
        select va.min,va.max from view_ui va
        )
        as a
        join (select @c:=0) r
        order by a.min
    ");
    return $this->db->query("select * from $table")->result_array();
}

```

### b. Himpunan *Fuzzy* dan fuzzifikasi

```

public function fuzziset()
{
    return $this->db->query("select * from fuzziset")->result_array();
}

```

### c. Proses *FLR* dan *FLRG*

```

public function relasi()
{
    $this->db->query("delete from relasi");
    $this->db->query("
        insert into relasi
        select @c:=@c+1 as id,i as a," as b from `data` d
        left join vi
        on (d.nilai BETWEEN vi.min and vi.max)
        join (select @c:=0) r
    ");
    $this->db->query("update relasi a join relasi b on (a.id=b.id-1) set a.a_rel=b.a");
    $this->db->query("CALL rel_training()");
    return $this->db->query("select * from relasi where a_rel!=0 order by id")->result_array();
}
public function first_order_r()
{
    return $this->db->query("select concat('A',a,'->',concat('A',b)) as relasi from firstorder
where b!='')->result_array();
}
public function second_order_r()
{
    return $this->db->query("select concat('A',a,',A',b,'->',concat('A',c)) as relasi from
secondorder where b!='' and c!='')->result_array();
}

```



```

public function third_order_r()
{
return $this->db->query("select concat('A',a,',A',b,',A',c,'->',concat('A',d)) as relasi from
3order where b!=" and c!=" and d!=" ")->result_array();
}
public function fourth_order_r()
{
return $this->db->query(" select concat('A',a,',A',b,',A',c,',A',d,'->',concat('A',e)) as relasi
from 4order where b!=" and c!=" and d!=" and e!=" ")->result_array();
}
public function fifth_order_r()
{
return $this->db->query(" select concat('A',a,',A',b,',A',c,',A',d,',A',e,'->',concat('A',f)) as
relasi from 5order where b!=" and c!=" and d!=" and e!=" and f!=" ")->result_array();
}

public function first_order()
{
return $this->db->query("select concat('A',a,'->',GROUP_CONCAT(concat('A',b))) as
relasi from firstorder where b!=" group by a ")->result_array();
}
public function second_order()
{
return $this->db->query("select concat('A',a,',A',b,'->',GROUP_CONCAT(concat('A',c)))
as relasi from hsecondorder where b!=" and c!=" group by a,b ")->result_array();
}
public function third_order()
{
return $this->db->query("select concat('A',a,',A',b,',A',c,'-
>',GROUP_CONCAT(concat('A',d))) as relasi from h3order where b!=" and c!=" and d!="
group by a,b,c ")->result_array();
}
public function fourth_order()
{
return $this->db->query(" select concat('A',a,',A',b,',A',c,',A',d,'-
>',GROUP_CONCAT(concat('A',e))) as relasi from h4order where b!=" and c!=" and d!="
and e!=" group by a,b,c,d ")->result_array();
}
public function fifth_order()
{
return $this->db->query(" select concat('A',a,',A',b,',A',c,',A',d,',A',e,'-
>',GROUP_CONCAT(concat('A',f))) as relasi from h5order where b!=" and c!=" and d!="
and e!=" and f!=" group by a,b,c,d,e ")->result_array();
}
public function bobot_relasi()
{
return $this->db->query("select * from bobotrelasi")->result_array();
}

```

#### d. Proses Pediksi

```

public function training()
{
$this->db->query("delete from training");
$this->db->query("set @a=1");
$this->db->query("set @b=2");
}

```

```

$this->db->query("
    insert into training select hs.waktu,hs.nilai,concat('A',fs.a) as a,
    case
        when (select ak1 from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1) is null then @a:=1
            when (select
                (case
                    when @a=1 then hsf.ak1
                    when @a=2 then hsf.ak2
                    when @a=3 then hsf.ak3
                    else hsf.ak4 end)
                from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1) >
                    (select
                        (case
                            when @a=1 then hsf.ak2
                            when @a=2 then hsf.ak3
                            when @a=3 then hsf.ak4
                            else hsf.ak5 end)
                        from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1)
                    then @a:=@a+1 else (case when (@a-1) < 2 then
@a:=1 else @a:=@a-1 end)
            end orde_1,
        case
            when (select ak2 from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1) is null then @b:=2
                when
                    (select
                        (case
                            when @b=2 then hsf.ak1
                            when @b=3 then hsf.ak2
                            when @b=4 then hsf.ak3
                            else hsf.ak5 end)
                        from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1) >
                            (select
                                (case
                                    when @b=2 then hsf.ak2
                                    when @b=3 then hsf.ak3
                                    when @b=4 then hsf.ak4
                                    else hsf.ak5 end)
                                from hasilordeseluruh hsf where
hsf.waktu=adddate(hs.waktu,interval -1 quarter) limit 1)
                            then @b:=@b+1 else (case when (@b-1) < 3 then
@b:=2 else @b:=@b-1 end)
                end orde_2,
        case when @a=1 then hasil_1 else null end as
hasil_1,
        coalesce(case when @a=2 then hasil_2 else null
end,case when @b=2 then hasil_2 else null end) as hasil_2,
        coalesce(case when @a=3 then hasil_3 else null
end,case when @b=3 then hasil_3 else null end) as hasil_3,
        coalesce(case when @a=4 then hasil_4 else null
end,case when @b=4 then hasil_4 else null end) as hasil_4,

```

```

                                coalesce(case when @a=5 then hasil_5 else null
end,case when @b=5 then hasil_5 else null end) as hasil_5
                                from `hasilordeseluruh` hs
                                join fuzzzyset fs on hs.waktu=fs.waktu      ");
}

```

### e. Grafik Hasil Prediksi

```

public function file_grocery($output){
    foreach($output->css_files as $row=>$value):
        $this->data['css'][$row]['file']=$value;
    endforeach;
    foreach($output->js_files as $row=>$value):
        $this->data['js'][$row]['file']=$value;
    endforeach;
}

```

## 3. Scrip Proses Regresi Linier Berganda

### a. Hitung regresi

```

public function hitung_reg()
{
    $hasil = $this->db->query("select x1,x2,x3,x4,x5,nilai from actual")-
>result_array();
    //echo print_r($hasil);
    $i=0;
    $hasil1=array();
    foreach($hasil as $row)
    {
        $hasil1[$i][0]=$row['x1'];
        $hasil1[$i][1]=$row['x2'];
        $hasil1[$i][2]=$row['x3'];
        $hasil1[$i][3]=$row['x4'];
        $hasil1[$i][4]=$row['x5'];
        $i++;
    }
    $predictors = $hasil1;
    $hasil2=array();
    $i=0;
    foreach($hasil as $row)
    {
        $hasil2[$i][0]=$row['nilai'];

        $i++;
    }
    $predicted = $hasil2;
    $regression = new Regression();
    $regression->setX(new Matrix($predictors));
    $regression->setY(new Matrix($predicted));
    $regression->exec();

    $this->data['actual']      = $this->db->query("select count(*) as
jumlah from actual")->row_array();
    $this->data['langkah2']    = $this->db->query("select * from
langkah2")->row_array();
}

```

```

        $this->data['langkah3'] = $this->db->query("select * from
langkah3")->row_array();
        $this->data['langkah4'] = $this->db->query("select * from
langkah4")->row_array();
        $this->data['title'] = "PROSES REGRESI";
        $this->data['f'] = $regression->getF();
        $this->data['koef'] = $regression->getCoefficients();
        $this->data['RS'] = $regression->getRSQUARE();
        $this->data['SSE'] = $regression->getSSE();
        $this->data['ste'] = $regression->getStandardError();
        $this->data['TS'] = $regression->getTStats();
        $this->data['output'] = $this->parser->parse('regresi.php',$this-
>data,true);
        $this->parser->parse('home',$this->data);
    }

```