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PREDICTION OF MEDICINE SALES FOR TODDLERS AT SARI MUTIARA INDONESIA UNIVERSITY PHARMACY USING THE BACKPROPAGATION ALGORITHM

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Abstract

This research predicts sales of medicines for toddlers by applying artificial neural networks. The application uses a backpropagation algorithm where the data is input on the number of sales, income and expenditure of medicines for toddlers from the pharmacy. Basically, backpropagation is an algorithm that can be used to calculate derivatives quickly. The data that will be examined or predicted is data on drug sales for toddlers in the last 2 years or from 2022 to 2023, until 2024 is the target for the results. the prediction. The output that will be obtained from this research is the smallest error approach so that we can obtain predicted results for the availability of medicines for toddlers at the Sari Mutiara University Pharmacy in Indonesia.

The purpose of gradient descent. namely to find the optimal weights in an artificial neural network. Then form an artificial neural network by determining the number of units in each layer. After the network is formed, training is carried out from the data that has been grouped. Experiments are carried out with a network architecture consisting of input units, hidden units, output units and network architecture. Testing was carried out with Matlab software. The result was a prediction of drug availability for toddlers with the training and testing process producing actual output as the target achieved

Keywords

algorithm, digital compression, compression ratio, image quality

Introduction

A pharmacy is a store where medications are dispensed and sold based on a doctor's prescription, as well as a place where medical supplies are traded. A pharmacy is a designated location where pharmaceutical services are provided to the public. One such pharmacy is the Sari Mutiara Indonesia University Pharmacy, officially opened in 2022. According to Dr. Parlindungan Purba, S.H., M.H., the Chairman of the Foundation, this pharmacy not only serves as a place to sell medicine but also as an educational facility. Additionally, the Rector of Sari Mutiara Indonesia University encouraged pharmacists working at the pharmacy to deliver quality services.

Pareto data is based on the 80/20 principle, which states that roughly 80% of outcomes or consequences of an event are due to 20% of the causes or factors. In the context of quality management or business management, Pareto data is often used to identify key factors contributing to specific issues or outcomes. For children under five years old, the classification of medications that sell within a particular period is critical for determining the demand for children's medicine in upcoming periods.

The Sari Mutiara Indonesia University Pharmacy employs several forecasting methods, implementing the previous period's drug stock usage as training data tested using the backpropagation algorithm. Additionally, to grow the business effectively, the pharmacy requires sales predictions for medications for children under five to anticipate the quantity of medication needed. This helps prevent shortages or surpluses of medication.

This technique is commonly used in multilayer networks to minimize errors in the output generated by the network. This study aims to understand and apply the concept of the backpropagation algorithm to predict sales of medication for children, as well as to design a neural network architecture for predicting these sales using the backpropagation algorithm.

Methodology

2.1 Artificial Neural Network (ANN)

An Artificial Neural Network (ANN) is a network of interconnected artificial neurons. An artificial neural network is a computational model inspired by the natural neurons in the human brain. The term "artificial" is used because this neural network is implemented using computer programs capable of performing various calculations during the learning process. When input is given as x1,x2,…,xnx_1, x_2, \ldots, x_nx1,x2,…,xn, the neuron (neural cell) learns to solve the given problem, and this learning process takes a certain amount of time. The sum of inputs is then compared to a certain threshold value through an activation function in each neuron.

1. **ANN Model**: The neural network consists of several neurons, with connections between these neurons. Neurons transform the information they receive through their output connections to other neurons.
2. **Activation Function**: This function processes input data into output data. The activation function in continuous backpropagation must be differentiable, continuous, and monotonically non-decreasing.

2.2 Backpropagation Algorithm

Backpropagation is a supervised training method that uses a weight adjustment pattern to minimize the error between predicted and actual outputs. This method has a strong mathematical foundation and is objective, with the algorithm calculating equations and coefficient values by minimizing the sum of squared errors using a developed model (training set).

1. The steps are similar to those in the standard backpropagation algorithm but differ in the backpropagation phase. Initialize weights (starting with small random values), set Epoch = 1, and Mean Squared Error (MSE) = 1. The smaller the MSE, the better the model predicts the data.
2. Set the maximum epoch, learning rate (α), and target error.
3. Execute steps 4 through 12 while (Epoch < maximum epoch) and (MSE > target error).
4. Increase Epoch by 1.
5. **Feedforward**:

- Each input x1,i=1,2,3,…,nx_1, i = 1, 2, 3, \ldots, nx1,i=1,2,3,…,n receives a signal and transmits it to all units in the layer above (hidden layer).
- Each hidden unit Z1,j=1,2,3,…,pZ_1, j=1,2,3,\ldots,pZ1,j=1,2,3,…,p sums the weighted input signals: Zinj=b1j+∑i=1nxivijZ_{\text{inj}} = b_{1j} + \sum_{i=1}^{n} x_i v_{ij}Zinj=b1j+i=1∑nxivij Then, the activation function is used to compute the output signal, as shown in the equation: zj=f(zinj)z_j = f(z_{\text{inj}})zj=f(zinj) and these signals are sent to all units in the upper layer.

Findings

3.1 Analysis

The analysis involves receiving input (data input) and test data from the medication sales data, which is then processed by applying the Backpropagation algorithm to produce output. This research process comprises two stages: the first stage involves pattern recognition by finding the optimal architecture for the Artificial Neural Network model created. Data training and testing are conducted to achieve the best model, which is derived from the drug sales index data.

3.2 Application of the Backpropagation Algorithm

In determining the network architecture, multiple trials are conducted to obtain the best network with the following steps:

1. Data Input
2. Normalization Step
3. Training and Parameter Setting for the Network
4. Result Generation Process
5. Prediction Result

1. Data Input

The data used consists of medication sales for children under five years old from 2022 to 2024, covering sales from June 2022 to May 2024.

Below is an example of the data used:

No	No Drug	X1	X2	Y
1	ACTIVATE GREEN 60ML	5	6	0
2	ACTIVATE RED 60ML	3	7	0
3	ACYCLOVIR CREAM	0	0	4
4	ALBOTHYL 10ML	2	8	5
5	ALERFED SYRUP	1	2	1
6	AMBROXOL SYRUP	11	15	5
7	AMOXICILLIN SYRUP 60 ML	4	5	1
8	ANACONIDINE SYRUP 30ML	4	5	1
9	ANACONIDINE OBH 60ML	5	7	1
10	ANTANGIN JUNIOR	9	14	16
11	ANTIMO CHILD SYRUP 5ML	3	28	10
12	APIALYS DROP	1	1	0
13	APIALYS SYRUP 100 ML	3	2	0
14	AZITHROMYCIN SYRUP 60 ML	0	1	0
15	BABY COUGH	9	0	0
16	POWDER CUSHIONS BABY 150G	1	0	0
17	BETAMETHASONE CREAM	0	0	3
18	BISOLVON EXTRA 60ML	0	4	1
19	BISOLVON TABLET	0	2	1
20	BODREXIN TABLET	0	7	5
21	BYEBYE FEVER CHILDREN (CHILD)	0	8	6
22	BYEBYE FEVER CHILDREN 10'S (BIG)	26	20	0
23	BYEBYE FEVER HISAMITU	22	15	0

24	CALADINE LOTION 60ML	6	5	3
25	CALADINE LOTION 95ML	0	0	1
26	CALADINE POWDER 100GR	8	3	2
27	CALADINE POWDER 60GR	1	4	1
28	CEFFROD SYRUP60 ML	0	1	0
29	CETIRIZINE SYRUP 60ML	0	2	2
30	COD LIVER 100	0	2	1
31	COLDREXIN 60ML	0	4	1
32	COMBANTRIN 125MG	8	4	0
33	COMBANTRIN 250MG	6	16	16
34	COMBANTRIN ORANGE 10ML	4	11	3
35	CONTREXYN STRIP	3	1	0
36	COUGH FRIEND 100ML	5	13	8
37	CURCUMA GROW 200ML ORANGE	1	1	0
38	CURCUMA SHARPY PLUS 60ML ORANGE	4	6	5
39	CURCUMASIR 60ML	0	3	0
40	DIAFORM TAB	0	0	2
41	Warmth RECTAL TUBE 125 MG/2,5 ML	0	1	0
42	ERLAMYCETIN OINTMENT EYE	3	9	3
43	FARSIFEN SYRUP	0	1	0
44	FITCOM GUMMY	1	2	0
45	FLUTAMOL 60ML	0	1	1
46	GENTAMICIN CREAM	13	6	0
47	GENTAMICIN SULFATE OINTMENT 5 GR	22	29	8
48	GUAFENESIN 100MG(GG)	100	72	0
49	HUFAGRIP BP (GREEN) 60ML	6	3	1
50	HUFAGRIP FLU (YELLOW) 60ML	5	4	3
51	HUFAGRIP HAVE A COLD (BLUE) 60ML	3	4	1
52	HUFAGRIP TMP (RED) 60ML	3	1	2
53	HYDROCORTISONE 5 GR	0	0	2
54	MOTHER PROFESSIONS SYRUP 60ML	1	1	2
55	IKADRYL 60ML	0	2	2
56	IMBOOST FORCE KIDS 60ML	3	1	0
57	COMIX HERBAL ORIGINAL	0	22	8
58	COMIX GINGER	4	48	34
59	COMIX ORANGE THIN	0	37	17
60	COMIX OBH 7 ML	1	59	25
61	CONIDINE TABLET	1	23	8
62	CONVERMEX 250MG	15	3	0
63	CONVERMEX ORANGE 125MG	2	0	1
64	CABBAGE FEVER	10	1	0
65	CABBAGE FEVER BABY(SHOP DRUG MITRA)	3	17	8
66	L WAS	0	7	0
67	LACTO B	0	25	4
68	LAPIFED EXP.60ML	0	2	0
69	LAPIFED SYRUP	0	2	0
70	SOLUTION PK	0	0	3
71	HONEY NICE BOX ORIGINAL	0	31	1
72	HONEY FLAVOR ORANGE THIN	13	15	10
73	HONEY TJ EXTRA 150GR	3	7	1
74	HONEY TJ EXTRA 250GR	2	2	3
75	HONEY TJ ORANGE	22	11	6
76	HONEY TJ DATES 150GR	0	2	0
77	HONEY TJ DATES 250GR	0	1	2
78	HONEY TJ MURNI 150GR	12	11	1

79	HONEY TJ ORIGINAL	49	93	17
80	HONEY TJ STRAWBERRY	4	7	6
81	mucous SYRUP	2	13	3
82	NEW MENTASIN 110ML	2	0	0
83	NEW MENTASIN 60ML	2	0	0
84	OBH COMBI CHILD ORANGE	12	12	5
85	OBH COMBI CHILD STRAWBERRY 60ML	0	1	1
86	OMEGDIAN 60ML	0	1	0
87	ORS 100'S	3	82	33
88	ORATEMP KIDS 60 ML	0	1	0
89	PANADOL CHILD	3	0	0
90	PARACETAMOL SYRUP	4	5	2
91	PARATUSIN 60 ML	3	22	3
92	PIMTRAKOL CHERY 60ML	8	1	2
93	PIMTRAKOL LEMON 60ML	1	1	0
94	PROFENID SUPP	0	1	0
95	PRORIS IBUPROFEN SUP 125MG	1	1	0
96	PRORIS 60ML	0	3	0
97	PRORIS 60ML(NEW)	0	3	3
98	REMCO COUGH SYRUP 60ML	0	1	0
99	RHINOS DROP	2	3	0
100	SALICYL TALK	0	12	7
101	SANADRYL COUGH PHLOMOUS 60ML	0	1	0
102	SANMOL DROPS15ML	6	12	5
103	SANMOL SYRUP 60ML	21	30	10
104	TEMPERING 30ML	3	3	0
105	TEMPERING 60ML	2	5	0
106	TEMPERING DROP 15ML	2	3	3
107	TEMPERING FORTE 60ML	0	1	1
108	TEMPERING SIR 60ML	0	3	0
109	TERMOREX 30ML	2	1	2
110	TERMOREX 60ML	0	1	0
111	REJECT WIND LIQUID CHILD 12'S	10	0	0
112	TRIOCID 60ML	0	0	2
113	EVENING SUSPENSION 60 ML	0	1	0
114	VICKS CHILD 27ML	0	8	0
115	VITAL EAR OIL10ML	0	0	1
116	ZINC SULFATE MONOHYDRATE 60ML	0	2	0
117	ZINC TABLET	0	2	1
118	THEY ARE SERIN KIDS 60ML	0	1	0
119	ZINKID 100ML	1	3	0

2. Data Normalization

Next, transform the input values of the training data and training targets based on drug sales data for toddlers. In this study using binary sigmoid altivation, the data must be transformed to make output function sigmoid binary that is [0,1]. Transformation or normalization data done with use formula:

Preliminary drug sales data: 2022-2024Data Training : 2022-2023

Target data : 2024

X'=(o.8*(x-a))/((b-a)) + 0.1

Information:

0.8 = Determination

X = mark data k-n

a = mark data the lowest from input Which Of get (0).

b = mark data highest from data Which Of get (100).

No	No Drug	X1	X2	AND
1	ACTIVATE GREEN 60ML	0,14	0,148	0,1
2	ACTIVATE RED 60ML	0,124	0,156	0,1
3	ACYCLOVIR CREAM	0,1	0,1	0,132
4	ALBOTHYL 10ML	0,116	0,164	0,14
5	ALERFED SYRUP	0,108	0,116	0,108
6	AMBROXOL SYRUP	0,188	0,22	0,14
7	AMOXICILLIN SYRUP 60 ML	0,132	0,14	0,108
8	ANACONIDINE SYRUP 30ML	0,132	0,14	0,108
9	ANACONIDINE OBH 60ML	0,14	0,156	0,108
10	ANTANGIN JUNIOR	0,172	0,212	0,228
11	ANTIMO CHILD SYRUP 5ML	0,124	0,324	0,18
12	APIALYS DROP	0,108	0,108	0,1
13	APIALYS SYRUP 100 ML	0,124	0,116	0,1
14	AZITHROMYCIN SYRUP 60 ML	0,1	0,108	0,1
15	BABY COUGH	0,172	0,1	0,1
16	POWDER CUSHIONS BABY 150G	0,108	0,1	0,1
17	BETAMETHASONE CREAM	0,1	0,1	0,124
18	BISOLVON EXTRA 60ML	0,1	0,132	0,108
19	BISOLVON TABLET	0,1	0,116	0,108
20	BODREXIN TABLET	0,1	0,156	0,14
21	BYEBYE FEVER CHILDREN (CHILD)	0,1	0,164	0,148
22	BYEBYE FEVER CHILDREN 10'S (BIG)	0,308	0,26	0,1
23	BYEBYE FEVER HISAMITU	0,276	0,22	0,1
24	CALADINE LOTION 60ML	0,148	0,14	0,124
25	CALADINE LOTION 95ML	0,1	0,1	0,108
26	CALADINE POWDER 100GR	0,164	0,124	0,116
27	CALADINE POWDER 60GR	0,108	0,132	0,108
28	CEFFROD SYRUP60 ML	0,1	0,108	0,1
29	CETIRIZINE SYRUP 60ML	0,1	0,116	0,116
30	COD LIVER 100	0,1	0,116	0,108
31	COLDREXIN 60ML	0,1	0,132	0,108
32	COMBANTRIN 125MG	0,164	0,132	0,1
33	COMBANTRIN 250MG	0,148	0,228	0,228
34	COMBANTRIN ORANGE 10ML	0,132	0,188	0,124
35	CONTREXYN STRIP	0,124	0,108	0,1
36	COUGH FRIEND 100ML	0,14	0,204	0,164
37	CURCUMA GROW 200ML ORANGE	0,108	0,108	0,1
38	CURCUMA SHARPY PLUS 60ML ORANGE	0,132	0,148	0,14
39	CURCUMASIR 60ML	0,1	0,124	0,1
40	DIAFORM TAB	0,1	0,1	0,116
41	Warmth RECTAL TUBE 125 MG/2,5 ML	0,1	0,108	0,1
42	ERLAMYCETIN OINTMENT EYE	0,124	0,172	0,124
43	FARSIFEN SYRUP	0,1	0,108	0,1
44	FITCOM GUMMY	0,108	0,116	0,1
45	FLUTAMOL 60ML	0,1	0,108	0,108
46	GENTAMICIN CREAM	0,204	0,148	0,1
47	GENTAMICIN SULFATE OINTMENT 5 GR	0,276	0,332	0,164

48	GUAFENESIN 100MG(GG)	0,9	0,676	0,1
49	HUFAGRIP BP (GREEN) 60ML	0,148	0,124	0,108
50	HUFAGRIP FLU (YELLOW) 60ML	0,14	0,132	0,124
51	HUFAGRIP HAVE A COLD (BLUE) 60ML	0,124	0,132	0,108
52	HUFAGRIP TMP (RED) 60ML	0,124	0,108	0,116
53	HYDROCORTISONE 5 GR	0,1	0,1	0,116
54	MOTHER PROFESSIONS SYRUP 60ML	0,108	0,108	0,116
55	IKADRYL 60ML	0,1	0,116	0,116
56	IMBOOST FORCE KIDS 60ML	0,124	0,108	0,1
57	COMIX HERBAL ORIGINAL	0,1	0,276	0,164
58	COMIX GINGER	0,132	0,484	0,372
59	COMIX ORANGE THIN	0,1	0,396	0,236
60	COMIX OBH 7 ML	0,108	0,572	0,3
61	CONIDINE TABLET	0,108	0,284	0,164
62	CONVERMEX 250MG	0,22	0,124	0,1
63	CONVERMEX ORANGE 125MG	0,116	0,1	0,108
64	CABBAGE FEVER	0,18	0,108	0,1
65	CABBAGE FEVER BABY(SHOP DRUG MITRA)	0,124	0,236	0,164
66	L WAS	0,1	0,156	0,1
67	LACTO B	0,1	0,3	0,132
68	LAPIFED EXP.60ML	0,1	0,116	0,1
69	LAPIFED SYRUP	0,1	0,116	0,1
70	SOLUTION PK	0,1	0,1	0,124
71	HONEY NICE BOX ORIGINAL	0,1	0,348	0,108
72	HONEY FLAVOR ORANGE THIN	0,204	0,22	0,18
73	HONEY TJ EXTRA 150GR	0,124	0,156	0,108
74	HONEY TJ EXTRA 250GR	0,116	0,116	0,124
75	HONEY TJ ORANGE	0,276	0,188	0,148
76	HONEY TJ DATES 150GR	0,1	0,116	0,1
77	HONEY TJ DATES 250GR	0,1	0,108	0,116
78	HONEY TJ MURNI 150GR	0,196	0,188	0,108
79	HONEY TJ ORIGINAL	0,492	0,844	0,236
80	HONEY TJ STRAWBERRY	0,132	0,156	0,148
81	mucous SYRUP	0,116	0,204	0,124
82	NEW MENTASIN 110ML	0,116	0,1	0,1
83	NEW MENTASIN 60ML	0,116	0,1	0,1
84	OBH COMBI CHILD ORANGE	0,196	0,196	0,14
85	OBH COMBI CHILD STRAWBERRY 60ML	0,1	0,108	0,108
86	OMEGDIAN 60ML	0,1	0,108	0,1
87	ORS 100'S	0,124	0,756	0,364
88	ORATEMP KIDS 60 ML	0,1	0,108	0,1
89	PANADOL CHILD	0,124	0,1	0,1
90	PARACETAMOL SYRUP	0,132	0,14	0,116
91	PARATUSIN 60 ML	0,124	0,276	0,124
92	PIMTRAKOL CHERY 60ML	0,164	0,108	0,116
93	PIMTRAKOL LEMON 60ML	0,108	0,108	0,1
94	PROFENID SUPP	0,1	0,108	0,1
95	PRORIS IBUPROFEN SUP 125MG	0,108	0,108	0,1
96	PRORIS 60ML	0,1	0,124	0,1
97	PRORIS 60ML(NEW)	0,1	0,124	0,124
98	REMCO COUGH SYRUP 60ML	0,1	0,108	0,1
99	RHINOS DROP	0,116	0,124	0,1
100	SALICYL TALK	0,1	0,196	0,156
101	SANADRYL COUGH PHLOMOUS 60ML	0,1	0,108	0,1
102	SANMOL DROPS15ML	0,148	0,196	0,14
103	SANMOL SYRUP 60ML	0,268	0,34	0,18
104	TEMPERING 30ML	0,124	0,124	0,1

105	TEMPERING 60ML	0,116	0,14	0,1
106	TEMPERING DROP 15ML	0,116	0,124	0,124
107	TEMPERING FORTE 60ML	0,1	0,108	0,108
108	TEMPERING SIR 60ML	0,1	0,124	0,1
109	TERMOREX 30ML	0,116	0,108	0,116
110	TERMOREX 60ML	0,1	0,108	0,1
111	REJECT WIND LIQUID CHILD 12'S	0,18	0,1	0,1
112	TRIOCID 60ML	0,1	0,1	0,116
113	EVENING SUSPENSION 60 ML	0,1	0,108	0,1
114	VICKS CHILD 27ML	0,1	0,164	0,1
115	VITAL EAR OIL10ML	0,1	0,1	0,108
116	ZINC SULFATE MONOHYDRATE 60ML	0,1	0,116	0,1
117	ZINC TABLET	0,1	0,116	0,108
118	THEY ARE SERIN KIDS 60ML	0,1	0,108	0,1
119	ZINKID 100ML	0,108	0,124	0,1

1. calculation training use algorithm backpropagation.

1. Learning rate (a) = 0,5
2. Target error = 0,01
3. Maximum epoch = 10000
4. Target = 0,1

Initialization weight regularly random that is as following :

1. 1. Weight early input the hidden layer (Vij):

	V1	V2
X1	0,1	-0,3
X2	0,3	-0,4
1	-0,3	0,3

2. Weight early bias the hidden layer (V0j):

V01 = 0.3 V02 = -0.4

3. Weight early hidden layer the output layer (Wjk):

W11 = -0,1 W21 = 0,1

4. Weight early bias the output layer (W0j)

W01 = 0,1

a. Level Propagation Proceed (Forward Propagation)

1. Operation on hidden layer with equality

Calculation proceed is calculation mark output from unit hidden or hidden layer, as formula

Which has been explained onrunway theory :

$$Z\_in1 = V01 + \sum_{i=1}^{4} xivi1$$

Z_in1 = V01 +(X1 *V11)+(X2 *V21)=
-0,3+(0,14*0,1)+(0,1516*0,3)=0,1556
Z_in2 =V02 + (X1 *V12) + (X2
V22)=0,3+(0,14-
0,3)+(0,1516*-0,4)=0,19736

b. Level Propagation Go back (Backpropagation)

1. For each unit output (yk, k=1,,,,m) receive by target Which appropriate with by input, And Then counted information fault Count factor d united output based on fault each unit output yk.

$$\delta 1 = (T1 - y)^{*} \frac{1}{1e^{-y\_in1}} * [1 - (\frac{1}{) = 1 + e^{-y}in1}$$

$$\delta 1 = 0,1 - 0,5388^{*} \frac{1}{1e^{-0,1516}} * [1 - (\frac{1}{1 + e^{-0,1556}})] = -0,1090$$

2. Ethnic groupchange weight Week (withα = 0.5) Termchange weight Wjk done calculation(Whichwill usedfor change weight Wjk) with speed training learning rate α=0,5 .

Count correct weight with equality:

$$\Delta w11 = a\delta 1z1 = 0,5 * -0,1090 * 0,5388 = -0,0293$$
$$\Delta w12 = a\delta 1z2 = 0,5 * -0,1090 * 0,5491 = -0,0299$$

3. For each (Zj, j=1,…,p) counted delta input Which originate from neuron on layer Of above it, based on references on.

Count correct bias with equality:

ΔIN01=aδ1=0,5*-0,1090=-0,0545

Unit hidden add up delta input:

δ-in1= δ1*In11=-0,1090*-0,0293=0,0031937

δ-in2= δ1*In12=-,1090*-0,0299=0,0032591

4. Then mark the multiplied with mark derivative from function activation for count information fault,

Count information output with equality:

$\delta 1 = \delta\text{-in1} * \frac{1}{1+e^{-zin1}} * [(\frac{1}{1+e^{-zin1}})]$

$=-0,0293 * \frac{1}{1+e^{-0,1556}} * [(\frac{1}{1+e^{-0,5156}})] = -0,0085$

$\delta 2 = \delta\text{-in}2 * \frac{1}{1+e\text{-}zin2} * [(1) \; \frac{1}{1+e\text{-}zin2}]$

$= -0{,}0299 * \frac{1}{1} * [(\frac{1}{1+e-0{,}19736}) \; \frac{1}{1+e-0{,}19736}] = -0{,}0090$

5. Count correct mark weight Which Then used for update vij

Count correct weight with equality :

$\Delta vjk = a * \delta i * x1$

$\Delta 11 = 0{,}5 * -0{,}0085 * 0{,}1 = -0{,}00042$

$\Delta 21 = 0{,}5 * -0{,}0090 * 0{,}1 = -0{,}00045$

Count correct bias with equality:

$\Delta v0j = a * \delta i$

$\Delta v11 = a * \delta i = 0{,}5 * -0{,}0085 = -0{,}0042$

$\Delta v21 = a * \delta i = 0{,}5 * -0{,}0090 = -0{,}0045$

Count change weight And bias with equality:

$Vij(new) = Vij(llama) + Vij$

$V11(new) = V11j(llama) + V11 = 0{,}1 + -0{,}0042 = -0{,}0958$

$V12(new) = V12j(llama) + V12 = 0{,}3 + -0{,}0045 = 0{,}0955$

$INij(new) = Inij(llama) + Wij$

$IN11(new) = In11(llama) + W11 = -0{,}1 + -0{,}0293 = -0{,}1293$

$IN12(new) = In12(llama) + W12 = 0{,}1 + -0{,}0299 = -0{,}1299$

After results change weightand bias in the processiteration First finished done for will produce mark change weightand the bias thatnew throughprocesstraining, Processtraining network will to be continued regularly sustainable until later produce mark output And Alsomark that error the smallest.

$ANDink = Njii$

$= 0{,}1 + (1{,}0{,}5388x\text{-}0{,}1) + (0{,}5491x0{,}1) = 0{,}10103$

$= \frac{1}{1+e-0{,}1556} = 0{,}5388$

$y = \frac{1}{1} = \frac{}{} = 0{,}474763$

$1+e^{-yin1}$ $1+e0{,}10103$

Check error (iteration stop when error < 0,01

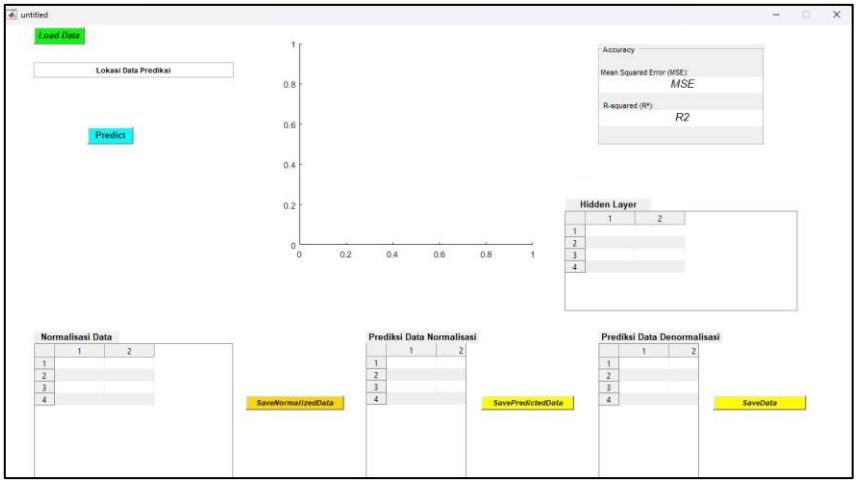
Error Layer Y1= 0.01604 – 0,474763 = -0,458723

Amount square error = (0,474763)2= 0,949526

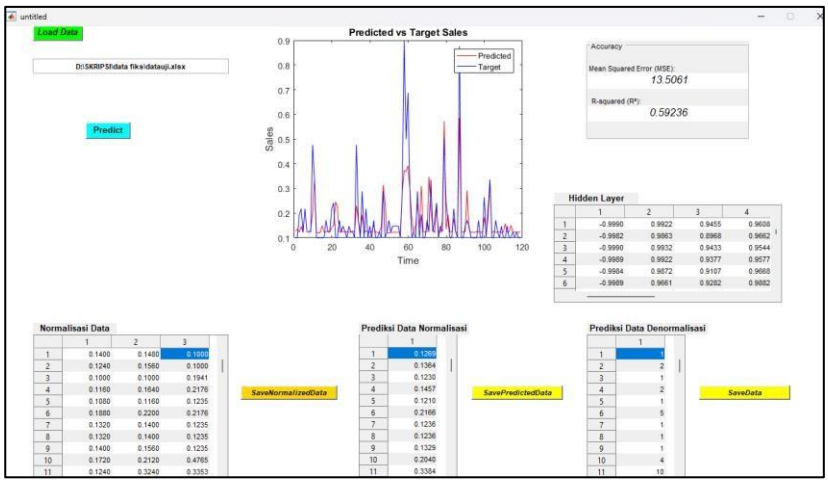
for One iteration to use method backpropagationn the result 0,474763 with amount square error0,949526 , target error Not yet fulfilled for repeat calculation until reach target error.

Process get results

for predict sale drug for news for admin or guardian pharmacy mustenter data from load data that is data test.



Gambar Tampilan setelah di Run



Gambar Tampilan setelah di prediksi

Conclusion

In the study on predicting medicine sales for toddlers at the Sari Mutiara Indonesia University Pharmacy using the backpropagation algorithm, the following conclusions can be drawn:

1. Currently, the existing system is still manual, so the system developed in this study can assist pharmacy assistants in predicting toddler medicine sales. This enables them to better manage stock levels, either increasing supply for high-demand medicines or reducing stock for medicines with low demand in the future.
2. Medicine sales for toddlers can be effectively predicted using the backpropagation algorithm method.

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