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Clothing Sales Prediction Information System Using Web-Based Double Exponential Smoothing Method

Apriyanti Anggraini Sitorus[1*], Ali Ikhwan[2], Moustafa H. Aly[3]
[1,2]Department of Information System, Faculty of Sciences and Technology, Universitas Islam Negeri Sumatera Utara, Indonesia
[3]Department of Electronics and Communications Engineering, Arab Academy for Science, Technology and Maritime Transport, Egypt

Abstract.
Purpose: The purpose of this research is to determine the smallest error value so that the resulting prediction data is more accurate. This prediction data is used to help Raja Fashion Medan in processing goods data and help predict the amount of goods that must be provided to meet customer needs in the next period.
Methods: This research uses the Double Exponential Smoothing method because it is used on data that is more stable and has a trend pattern. To test the accuracy of the prediction results with the Double Exponential Smoothing method, the Root Mean Square Error (RMSE) and Mean Absolute Percent Error (MAPE) data testing methods are used by finding the smallest error value.
Result: This test is carried out by determining the smallest error value on 118 data types of goods with error results, namely the average Root Mean Square Error (RMSE) of 26.5, Mean Absolute Deviation (MAD) 1.2, Mean Squared Error (MSE) 37.8 and Mean Absolute Percent Error (MAPE) of 10%, it can be concluded that the accuracy of the prediction is very good.
Novelty: Testing on prediction results uses 4 methods to determine more accurate results, namely with Root Mean Square Error (RMSE), Mean Absolute Deviation (MAD), Mean Squared Error (MSE) and Mean Absolute Percent Error (MAPE) which are used to find values smallest error.

Keywords: Prediction, Double exponential smoothing, Root mean square error, Mean absolute percent error

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INTRODUCTION

Technological developments are now occurring in all areas of people's lives, as well as in the economic sector, namely trading activities which are now experiencing various changes including changes to improve the company's management system. This management system improvement is in the form of changes in data collection which is usually done manually, namely written and now the data collection is computerized. Computers have an important role to play in helping to obtain accurate and up-to-date information and can help in determining the best action to take [1]. Smart strategies in trading can also be built based on information obtained based on the results of data processing [2]. Good management is management that has a function that can be used in decision making and as a control in economic business activities to run effectively and can generate optimal profits [3].

The fashion field has also undergone many changes in the form of the increasingly diverse fashion trends that are now in society. Not only women's fashion, men's fashion has also undergone many changes so that this has attracted the interest of the community, especially men, to improve the quality of appearance by adjusting the fashion trends that have recently developed. With the various types of clothing that are currently trending, a system is needed that can estimate the types of goods that are most in demand and have the highest number of sales to the least so that traders no longer experience losses due to incorrect estimates of the types and quantities of goods to be provided by traders [4], [5].

*Corresponding author.
Email addresses: 1anggrainisitorusa@gmail.com (Sitorus)
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Raja Fashion Medan is a shop that specializes in men's fashion. The store that has been established since 2011 is centered on Jalan Sei Mencirim Paya Geli, Medan. However, with the increasing number of sales and the increasing interest of buyers, the store opened 9 branch stores in various areas in Medan city. With the many branches of this store, sales data collection becomes rather difficult to do because data collection is still done manually, namely every sales transaction is only recorded in the sales logbook by the head of the store. In the data collection process for the procurement of goods, it becomes an obstacle because the owner must visit each branch store and ask about the number of items sold. Daily sales information from each store head is what is used to monitor sales developments. With the system in this shop which is still fairly manual, a prediction information system is needed that can help predict the amount of goods that must be provided to meet market demand using sales transaction data in the previous period so that the data obtained becomes more effective, in maximizing profits and minimizing the risk of loss for the store.

The prediction or forecasting method is a form of quantitative inventory control based on historical data in a certain period of time[6], [7]. Prediction can also be a very important element to predict or estimate in the future period and to assist in making a decision[8], [9]. By knowing the prediction of the amount of goods needed, there will be no problem in meeting the amount of consumer demand for certain goods. The choice of technique to be used in predicting must also be considered because this technique must produce a high level of accuracy and produce a low level of difference between the predicted results and reality[10]–[12].

In the research using Knative is a popular Kubernetes-based technology with two main components: Eventing and Serving, to manage serverless applications. Serving primitives facilitate automatic scaling of serverless programs, even to zero, as Knative services. However, the delivery module calculates the number of pods using the moving average method, which is ineffective for accounting for future changes as it relies on historical data. In this study, it describes the optimization in calculating the number of pods using double exponential smoothing. Preliminary testing shows that the results are superior to moving averages. [13] Hasmin's research has developed a system using the Double Exponential Smoothing approach based on this foundation. Using a quantitative method to process data from several previous periods that are well collected is forecasting with a time series. The forecast results are used as a guide when predicting values for future timeframes. From April 2019 to September 2019, the existing data set was used to forecast frozen food (So Good Bakso Goreng 120gr), and the result was 14 with a MAPE calculation error of 2.1% [14].

The research conducted by Ramadiani predicts that the level of room bookings is fundamental because it can impact hotel revenues and current regional economic indicators. We use the Double Exponential Smoothing (DES) approach to predict the reservation level in this study. Furthermore, the calculation variable's value with the Mean Squared Error (MSE) technique is used to calculate the error forecasting results for each alpha value. The best forecast reservation rate for January 2019 is 52,263, according to the study's forecasting alpha of 0.1 and an MSE error value of 19.278478603164 [15]. As for the following research conducted first, using the Artificial Neural Network (ANN) algorithm is used as a popular forecasting tool. The input data determine the success of ANN in solving problems. Smoothing incoming data can improve data quality. The data will be smoothed in this study using the Exponential Smoothing (ES) method. Forecasting using ANN with a smoothing process in data input using the Double Exponential Smoothing (DES) model will be compared to forecasting using ANN with original data input and forecasting using ANN with a smoothing process on input data using Single Exponential Smoothing (SES) as the model in this study. Model performance will be evaluated based on error values and execution time. This study concludes that the Double Exponential Smoothing (DES) method can improve ANN performance on IDR/USD exchange rate forecasting, yielding 0.530% of the MAPE value and taking 561 seconds to execute, and that DES is superior to SES in terms of improving ANN performance for forecasting exchange rates [16].

Departing from previous studies, Raja Fashion Medan needs a prediction system that is able to assist in predicting goods sold in each period so that Raja Fashion Medan can use this information as a reference to supply goods in accordance with market demand in order to get optimal profits. This prediction system uses data from the previous period designed with certain methods. Therefore, the method used in this prediction information system is the double exponential smoothing method. It can be concluded that the purpose of this research is to determine the smallest error value so that the resulting prediction data is more accurate. This predictive data is useful for helping Raja Fashion Medan in processing goods data and helping predict the amount of goods that must be provided to meet customer needs in the next period so that Raja Fashion gets maximum profit and minimizes losses. This system processes 118 types of goods data for each to be

predicted. In previous research, error testing on prediction results used only one method, but in this study error testing on prediction results was carried out using 4 methods, namely Root Mean Square Error (RMSE), Mean Absolute Deviation (MAD), Mean Squared Error (MSE) and Mean Absolute Percent Error (MAPE) to improve the accuracy of the prediction results.

METHODS

Research Methods

The research method used in this study is Research and Development (R&D). R&D is a step or process used to produce a certain product or develop an existing product. This method also tests the effectiveness of existing products[17]–[20]. The data collection technique in this method is by interview, observation and literature study of previous research related to the research being conducted. This data collection process was carried out at Raja Fashion Medan Jl. Sei Mencirim Paya Geli, Sunggal Kanan, Kec. Medan Sunggal, Deli Serdang Regency, North Sumatra.

System Development Method

The development method used in this system is the waterfall method. Waterfall is one of the systematic information system development methods which means that each stage in this method is carried out sequentially[21], [22].

Data Mining

Data mining is the process of collecting and using historical data to find patterns or relationships in a dataset. The results of this data mining can be used to assist in making a decision[23]–[25]. Data mining has several functions, one of which is as a prediction function. This prediction function will find patterns from data in data mining[26]–[28].

Prediction

Prediction is a technique to estimate future events in a certain- period using mathematical models and based on past data. Prediction is also the process of estimating how many certain needs in the future[9], [11], [29]–[31]. To estimate the needs or phenomena that occur in the future, one of them is time series analysis. One method that can be used in time series analysis is the double exponential smoothing method [32]–[35].

Double Exponential Smoothing Method

The double exponential smoothing method is a multiple smoothing formula using two parameters with different values. Double exponential smoothing is one type of exponential smoothing which is a time series method that uses data in the previous period to predict the upcoming period[13], [14], [36], [37]. This method is also used as a solution in anticipating the difference or difference between the actual data and the results or values from forecasting if there is a trend in the data. The more data from the past period used in the prediction analysis, the smaller the percentace error (PE) produced will be and if the data used in the past is fairly small, the percentace error (PE) produced will be more and this will affect the accuracy of the prediction[38]–[40]. If the reference data used is unstable or volatile in one period with the next period, an alpha value close to 1 is selected. However, if the reference data used is stable from one period to the next period, an alpha value close to 0 is selected. The application of the double exponential smoothing method used in this study has several stages which can be seen in the following figure [41], [42]:

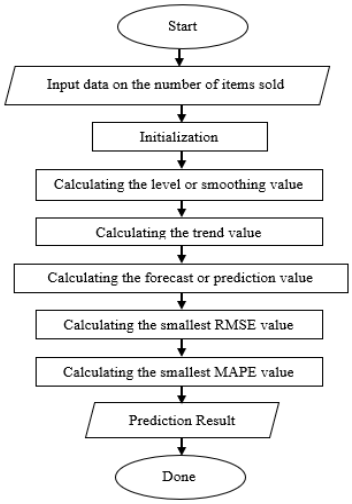

Figure 1. Flowchart of double exponential smoothing method

Figure 1 explains the steps taken and starts from entering the amount of data sold. Then proceed with the initialization stage on the initial data, then calculate the level or smoothing value, calculate the trend value and calculate the forecast or prediction value. Furthermore, calculating the smallest RMSE value and the smallest [30], [41], [43], [44] and the last stage is issuing prediction results . PThe initialization process in double exponential smoothing uses two estimates, the first estimate for the first smoothing value (S'_t) and the second for the trend value (T_1)**.** The formula used to process data is as follows:

For initial data, use the following initialization,

$$S_t = X_t \quad (1)$$

$$T_t = X_t - X_{t-1} \quad (2)$$

Determine the value of smoothing (S_t) based on the following equation,

$$S_t = \boldsymbol{\alpha}.X_t + (\mathbf{1} - \boldsymbol{\alpha})(S_{t-1} + T_{t-1}) \quad (3)$$

Determining the trend(T_t) based on the following equation,

$$T_t = \beta\,(S_t - S_{t-1}) + (1-\beta)T_{t-1} \quad (4)$$

Determine the predicted magnitude (F_{t+m}) based on the following equation,

$$F_{t+m} = S_t + T_t m \quad (5)$$

Description:

S_t : Value of period t smoothing
S_{t-1} : Value of period $t-1$ smoothing
T_t : Trend value in period t
T_{t-1} : Trend value in period $t-1$
X_t : Actual data in period t
X_{t-1} : Actual data in period t
α : Alpha parameter $(0 < \alpha < 1)$
β : Beta parameter $(0 < \alpha < 1)$
F_{t+m} : Forecasting value for m periods ahead
m : The future period to be forecasted

Accuracy

Accuracy is an accepted consequence based on calculations, estimates or details that match a certain value or standard. Data accuracy must have the information given must be accurate and not justified if there are errors[45]. If there is a data error, it will disrupt or damage several components related to the data. The accuracy formula is as follows:

$$Accuracy = \frac{TP+TN}{TP+FN+FP+TN} \quad (6)$$

Description:

TP : True Positive
FN : False Negative
FP : False Positive
TN : True Negative

Root Square Mean Error (RMSE)
RMSE is the result of rooting the value of MSE. RMSE is also more accurate than MSE, for example twice the RMSE value means that the value has an error that is twice as large as the previous one. However, twice the MSE value does not mean this[46]. The smaller the value produced by RMSE, the better the forecasting results that have been carried out. The RMSE formula is as follows:

$$RMSE = \sqrt{\frac{\Sigma(X_t - F_t)^2}{n}} \quad (7)$$

Description:
X_t : Actual data value
F_t : Predicted data value
n : Data count

Mean Absolute Deviation (MAD)
MAD is the result of the average error in a prediction by processing absolute or absolute data values. The MAD formula is as follows [47]:

$$MAD = \sum_{t=1}^{n} \left| \frac{X_t - F_t}{n} \right| \quad (8)$$

Description:
X_t : Actual data value
F_t : Predicted data value
n : Data count

Mean Squared Error (MSE)
Mean Squared Error is the result of the average error squared to strengthen the effect of large error numbers but reduce small forecast error numbers. The MSE formula is as follows.[48] :

$$MSE = \sum_{t=1}^{n} \frac{(X_t - F_t)^2}{n} \quad (9)$$

Description:
X_t : Actual data value
F_t : Predicted data value
n : Data count

Mean Absolute Percentage error (MAPE)
The success rate of a prediction information system is influenced by the accuracy of the system itself. The smaller the percentage of the error value, the better the system will be. Mean absolute percentage error is a method used to calculate the accuracy of a prediction in statistical calculations[38]. This system testing method is calculated using the absolute error in each period divided by the real observation value for this period. Then MAPE is used to find the smallest error value, where the formula used is as follows [42]:

$$M = \frac{100\%}{n} \sum_{t=1}^{n} \left| \frac{X_t - F_t}{X_t} \right| \quad (10)$$

Description:
M : Average absolute percentage error
n : Data count
X_t : Actual data value
F_t : Predicted data value

The results of this MAPE calculation also have a value. This value affects the accuracy of predictions related to the feasibility of the prediction system. The value of the results of MAPE to analyze the performance of the forecasting process can be seen in the parameter table as follows:

Table 1. Accuracy on MAPE

Accuracy on MAPE	Prediction Accuracy
MAPE ≤ 10%	Excellent
10% ≤ MAPE ≤ 20%	Good
20% ≤ MAPE ≤ 50%	Reasonable
MAPE ≥ 50%	Inaccurate/Failed

RESULTS AND DISCUSSIONS

The problem in this research is related to the need for a prediction system that can help predict the amount of goods that must be provided in a period in order to get maximum income and profit. This prediction system uses the double exponential smoothing method, which is a time series method that uses sales data in the previous period to predict the number of items that must be provided in the next period. Testing the accuracy of the prediction results in this study also uses root square mean error (RMSE) and mean absolute percentage error (MAPE) with the provision that the smaller the percentace error (PE) number produced, the higher the accuracy of the prediction data.

Application of the Double Exponential Smoothing Method

In applying this method, the first step is to collect various types of goods and sort the sales data in the previous period. There are 118 types of goods and here are the sales data for the last week:

Table 2. 118 Types of goods

No.	Item		Actual Data
	Type	Specifications	5th week of Oct
1		O Neck, Short, Thick, Monochrome, Pattern, Lettering	309
2		O Neck, Short, Thick, Monochrome, Pattern, Logo	337
3		O Neck, Short, Thick, Monochrome, Pattern, Line	289
4		O Neck, Short, Thick, Monochrome, Pattern, Floral	189
5		O Neck, Short, Thick, Monochrome, Pattern, Animation	317
6		O Neck, Short, Thick, Monochrome, Pattern, Abstract	287
7		O Neck, Short, Thick, Monochrome, Pattern, Animal	304
8		O Neck, Short, Thick, Monochrome, Plain	304
9		O Neck, Short, Thick, Color, Pattern, Lettering	291
10		O Neck, Short, Thick, Color, Pattern, Logo	327
11		O Neck, Short, Thick, Color, Pattern, Line	341
12		O Neck, Short, Thick, Color, Pattern, Floral	207
13		O Neck, Short, Thick, Color, Pattern, Animation	336
14		O Neck, Short, Thick, Color, Pattern, Abstract	341
15		O Neck, Short, Thick, Color, Pattern, Animal	263
16		O Neck, Short, Thick, Color, Plain	339
17		O Neck, Short, Thin, Monochrome, Pattern, Lettering	371
18		O Neck, Short, Thin, Monochrome, Pattern, Logo	289
19		O Neck, Short, Thin, Monochrome, Pattern, Line	289
20		O Neck, Short, Thin, Monochrome, Pattern, Floral	203
21	T-shirt	O Neck, Short, Thin, Monochrome, Pattern, Animation	317
22		O Neck, Short, Thin, Monochrome, Pattern, Abstract	341
23		O Neck, Short, Thin, Monochrome, Pattern, Animal	304
24		O Neck, Short, Thin, Monochrome, Plain	328
25		O Neck, Short, Thin, Color, Pattern, Lettering	394
26		O Neck, Short, Thin, Color, Pattern, Logo	404
27		O Neck, Short, Thin, Color, Pattern, Line	356
28		O Neck, Short, Thin, Color, Pattern, Floral	217
29		O Neck, Short, Thin, Color, Pattern, Animation	204
30		O Neck, Short, Thin, Color, Pattern, Abstract	183
31		O Neck, Short, Thin, Color, Pattern, Animal	296
32		O Neck, Short, Thin, Color, Plain	374
33		O Neck, Long, Thick, Monochrome, Pattern, Lettering	224
34		O Neck, Long, Thick, Monochrome, Pattern, Logo	174
35		O Neck, Long, Thick, Monochrome, Pattern, Line	217
36		O Neck, Long, Thick, Monochrome, Pattern, Animation	204
37		O Neck, Long, Thick, Monochrome, Pattern, Abstract	249
38		O Neck, Long, Thick, Monochrome, Pattern, Animal	268
39		O Neck, Long, Thick, Monochrome, Plain	247
40		O Neck, Long, Thick, Color, Pattern, Lettering	338
41		O Neck, Long, Thick, Color, Pattern, Line	264

42	Shirt	O Neck, Long, Thick, Color, Pattern, Animation	142
43		O Neck, Long, Thick, Color, Pattern, Animal	237
44		O Neck, Long, Thick, Color, Plain	284
45		O Neck, Long, Thin, Monochrome, Pattern, Lettering	174
46		O Neck, Long, Thin, Monochrome, Pattern, Logo	168
47		O Neck, Long, Thin, Monochrome, Pattern, Line	176
48		O Neck, Long, Thin, Monochrome, Pattern, Animation	216
49		O Neck, Long, Thin, Monochrome, Pattern, Animal	241
50		O Neck, Long, Thin, Monochrome, Plain	316
51		O Neck, Long, Thin, Color, Pattern, Lettering	206
52		O Neck, Long, Thin, Color, Pattern, Animation	102
53		O Neck, Long, Thin, Color, Plain	107
54		V Neck, Short, Thick, Monochrome, Plain	247
55		V Neck, Short, Thick, Color, Plain	227
56		V Neck, Long, Thick, Monochrome, Plain	233
57		V Neck, Long, Thick, Color, Plain	193
58		Short, Linen, Monochrome	352
59		Short, Linen, Color	331
60		Short, Formal, Monochrome	289
61		Short, Formal, Color	339
62		Short, Batik, Monochrome	155
63		Short, Batik, Color	204
64		Short, Hawaiian, Monochrome	178
65		Short, Hawaiian, Color	191
66		Long, Linen, Monochrome	287
67		Long, Linen, Color	306
68		Long, Formal, Monochrome	254
69		Long, Formal, Color	334
70		Long, Batik, Monochrome	168
71		Long, Batik, Color	212
72		Long, Flannel, Monochrome	293
73		Long, Flannel, Color	378
74	Pants	Jeans, Straight cut, Denim	528
75		Jeans, Straight cut, Monochrome	438
76		Jeans, Straight cut, Color	464
77		Jeans, Skinny fit, Denim	391
78		Jeans, Skinny fit, Monochrome	363
79		Jeans, Skinny fit, Color	393
80		Jeans, Slim fit, Denim	414
81		Jeans, Slim fit, Monochrome	384
82		Jeans, Slim fit, Color	425
83		Keper, Slim fit, Monochrome	432
84		Keper, Slim fit, Color	316
85		Keper, Straight cut, Monochrome	296

86		Keper, Straight cut, Color	328
87		Chinos, Skinny fit, Monochrome	346
88		Chinos, Skinny fit, Color	219
89		Chinos, Slim fit, Monochrome	324
90		Chinos, Slim fit, Color	358
91		Chinos, Straight cut, Monochrome	361
92		Chinos, Straight cut, Color	326
93		Cargo, Slim fit, Monochrome	301
94		Cargo, Slim fit, Color	344
95		Cargo, Jogger, Monochrome	275
96		Cargo, Jogger, Color	324
97		Cargo, Straight cut, Monochrome	293
98		Cargo, Straight cut, Color	315
99		Short, Straight cut, Monochrome	310
100		Short, Straight cut, Color	269
101		Short, Slim fit, Monochrome	257
102		Short, Slim fit, Color	261
103		Sweater, Monochrome, Pattern, Lettering	214
104		Sweater, Monochrome, Pattern, Logo	178
105		Sweater, Monochrome, Pattern, Animation	139
106		Sweater, Monochrome, Plain	281
107		Sweater, Color, Pattern, Lettering	305
108		Sweater, Color, Pattern, Logo	242
109		Sweater, Color, Pattern, Animation	172
110	Jacket	Sweater, Color, Plain	306
111		Hoodie, Monochrome, Pattern, Lettering	297
112		Hoodie, Monochrome, Pattern, Logo	231
113		Hoodie, Monochrome, Pattern, Animation	169
114		Hoodie, Monochrome, Plain	213
115		Hoodie, Color, Pattern, Lettering	241
116		Hoodie, Color, Pattern, Logo	239
117		Hoodie, Color, Pattern, Animation	228
118		Hoodie, Color, Plain	427

To do number processing, you must start by sorting the sales data starting with the oldest to the newest data. The following is an example of sorting sales data from one type of sales fund:

Table 3. Data sorting example 1

Month	Week	Item		Actual Data (x)
		Type	Specifications	
June	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	267
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	278
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	269
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	274
July	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	317

	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	339
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	257
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	238
	5	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	219
Agustus	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	240
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	298
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	285
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	243
September	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	289
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	297
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	294
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	276
October	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	292
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	295
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	281
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	293
	5	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	309

Initialization

After sorting the data based on the period, the next step that must be done is the initialization of each second data. This initialization uses the following formula:

$$S_t = X_t$$
$$S_1 = 278$$

$$T_t = X_t - X_{t-1}$$
$$T_1 = 278 - 267$$
$$T_1 = 11$$

Table 4. Data initialization 1

Month	Week	Item		Actual Data (x)	Level (St)	Trend (T)	Forecast	Error
		Type	Spesifications					
June	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	267				0
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	278	278	11		0

Smoothing Value (S_t), Trend (T_t) dan Prediction (F_{t+m})

After initializing the second data, then proceed to process the data on the third data. Data processing on the third data to find the smoothing value (S_t) is as follows:

$$S_t = \alpha.X_t + (1 - \alpha)(S_{t-1} + T_{t-1})$$
$$= 1.269 + (1 - 1)(278 + 11)$$
$$= 269 + 0.(289)$$
$$= 269$$

$$T_t = \beta\,(S_t - S_{t-1}) + (1 - \beta)T_{t-1}$$
$$= 0{,}021818429\,(269 - 278) + (1 - 0{,}021818429)11$$
$$= 0{,}021818429\,(-9) + (0{,}0978181571)11$$
$$= (-0{,}196365861) + 10{,}7599973$$
$$= 10{,}56363141$$

$$F_{t+m} = S_t + T_t m$$
$$= 278 + 11$$
$$= 289$$

Table 5. Smoothing value, trend and prediction data 1

Month	Week	Item		Actual Data (x)	Level (St)	Trend(T)	Forecast	Error
		Type	Specifications					
June	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	267				0
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	278	278	11		0
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	269	269	10,56363141	289	-20
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	274	274	10,44224171	279,5636314	-5,56363141
July	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	317	317	11,15260086	284,4422417	32,55775829
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	339	339	11,38927408	328,1526009	10,84739914
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	257	257	9,351666786	350,3892741	-93,38927408
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	238	238	8,733077943	266,3516668	-28,35166679
	5	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	219	219	8,127985737	246,7330779	-27,73307794
Agust	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	240	240	8,408832873	227,1279857	12,87201426
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	298	298	9,490834256	248,4088329	49,59116713
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	285	285	9,000119575	307,4908343	-22,49083426
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	243	243	7,887377062	294,0001196	-51,00011957
Sept	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	289	289	8,718934638	250,8873771	38,11262294
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	297	297	8,703248614	297,7189346	-0,718934638
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	294	294	8,447902109	305,7032486	-11,70324861
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	276	276	7,870850422	302,4479021	-26,44790211
Oct	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	292	292	8,048215698	283,8708504	8,129149578
	2	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	295	295	7,93807156	300,0482157	-5,048215698
	3	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	281	281	7,459417293	302,9380716	-21,93807156
	4	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	293	293	7,558485676	288,4594173	4,540582707
	5	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	309	309	7,742666261	300,5584857	8,441514324

Nov	1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	316,742666 3

The same process is also carried out on 117 other item data. The results of this data processing are then converted into integers and can be seen in the following table:

Tabel 6. Actual data, forecasting and accuracy

No.	Item		Actual Data	Forecasting	MAPE
	Type	Specifications	5th week of Oct		
1	T-shirt	O Neck, Short, Thick, Monochrome, Pattern, Lettering	309	317	9%
2		O Neck, Short, Thick, Monochrome, Pattern, Logo	337	340	7%
3		O Neck, Short, Thick, Monochrome, Pattern, Line	289	269	5%
4		O Neck, Short, Thick, Monochrome, Pattern, Floral	189	192	7%
5		O Neck, Short, Thick, Monochrome, Pattern, Animation	317	300	6%
6		O Neck, Short, Thick, Monochrome, Pattern, Abstract	287	273	7%
7		O Neck, Short, Thick, Monochrome, Pattern, Animal	304	311	8%
8		O Neck, Short, Thick, Monochrome, Plain	304	306	7%
9		O Neck, Short, Thick, Color, Pattern, Lettering	291	291	7%
10		O Neck, Short, Thick, Color, Pattern, Logo	327	334	7%
11		O Neck, Short, Thick, Color, Pattern, Line	341	339	8%
12		O Neck, Short, Thick, Color, Pattern, Floral	207	208	9%
13		O Neck, Short, Thick, Color, Pattern, Animation	336	345	7%
14		O Neck, Short, Thick, Color, Pattern, Abstract	341	354	6%
15		O Neck, Short, Thick, Color, Pattern, Animal	263	267	9%
16		O Neck, Short, Thick, Color, Plain	339	338	7%
17		O Neck, Short, Thin, Monochrome, Pattern, Lettering	371	377	7%
18		O Neck, Short, Thin, Monochrome, Pattern, Logo	289	295	9%
19		O Neck, Short, Thin, Monochrome, Pattern, Line	289	285	9%
20		O Neck, Short, Thin, Monochrome, Pattern, Floral	203	195	11%
21		O Neck, Short, Thin, Monochrome, Pattern, Animation	317	325	8%
22		O Neck, Short, Thin, Monochrome, Pattern, Abstract	341	349	9%
23		O Neck, Short, Thin, Monochrome, Pattern, Animal	304	308	6%
24		O Neck, Short, Thin, Monochrome, Plain	328	333	8%
25		O Neck, Short, Thin, Color, Pattern, Lettering	394	399	5%
26		O Neck, Short, Thin, Color, Pattern, Logo	404	416	7%
27		O Neck, Short, Thin, Color, Pattern, Line	356	367	7%
28		O Neck, Short, Thin, Color, Pattern, Floral	217	230	12%
29		O Neck, Short, Thin, Color, Pattern, Animation	204	207	11%
30		O Neck, Short, Thin, Color, Pattern, Abstract	183	188	14%
31		O Neck, Short, Thin, Color, Pattern, Animal	296	299	7%
32		O Neck, Short, Thin, Color, Plain	374	386	8%
33		O Neck, Long, Thick, Monochrome, Pattern, Lettering	224	229	13%
34		O Neck, Long, Thick, Monochrome, Pattern, Logo	174	172	13%
35		O Neck, Long, Thick, Monochrome, Pattern, Line	217	223	11%
36		O Neck, Long, Thick, Monochrome, Pattern, Animation	204	205	12%

37		O Neck, Long, Thick, Monochrome, Pattern, Abstract	249	262	13%
38		O Neck, Long, Thick, Monochrome, Pattern, Animal	268	276	12%
39		O Neck, Long, Thick, Monochrome, Plain	247	247	12%
40		O Neck, Long, Thick, Color, Pattern, Lettering	338	341	10%
41		O Neck, Long, Thick, Color, Pattern, Line	264	269	9%
42		O Neck, Long, Thick, Color, Pattern, Animation	142	148	20%
43		O Neck, Long, Thick, Color, Pattern, Animal	237	244	12%
44		O Neck, Long, Thick, Color, Plain	284	290	9%
45		O Neck, Long, Thin, Monochrome, Pattern, Lettering	174	180	28%
46		O Neck, Long, Thin, Monochrome, Pattern, Logo	168	176	28%
47		O Neck, Long, Thin, Monochrome, Pattern, Line	176	180	26%
48		O Neck, Long, Thin, Monochrome, Pattern, Animation	216	225	14%
49		O Neck, Long, Thin, Monochrome, Pattern, Animal	241	247	13%
50		O Neck, Long, Thin, Monochrome, Plain	316	318	11%
51		O Neck, Long, Thin, Color, Pattern, Lettering	206	216	14%
52		O Neck, Long, Thin, Color, Pattern, Animation	102	108	27%
53		O Neck, Long, Thin, Color, Plain	107	110	17%
54		V Neck, Short, Thick, Monochrome, Plain	247	265	12%
55		V Neck, Short, Thick, Color, Plain	227	235	12%
56		V Neck, Long, Thick, Monochrome, Plain	233	240	13%
57		V Neck, Long, Thick, Color, Plain	193	201	13%
58		Short, Linen, Monochrome	352	353	9%
59		Short, Linen, Color	331	352	8%
60		Short, Formal, Monochrome	289	292	7%
61		Short, Formal, Color	339	346	7%
62		Short, Batik, Monochrome	155	159	13%
63		Short, Batik, Color	204	208	8%
64		Short, Hawaiian, Monochrome	178	184	13%
65	Shirt	Short, Hawaiian, Color	191	197	10%
66		Long, Linen, Monochrome	287	291	8%
67		Long, Linen, Color	306	309	8%
68		Long, Formal, Monochrome	254	258	7%
69		Long, Formal, Color	334	342	6%
70		Long, Batik, Monochrome	168	169	11%
71		Long, Batik, Color	212	210	10%
72		Long, Flannel, Monochrome	293	300	9%
73		Long, Flannel, Color	378	386	8%
74		Jeans, Straight cut, Denim	528	533	6%
75		Jeans, Straight cut, Monochrome	438	448	7%
76		Jeans, Straight cut, Color	464	471	8%
77	Pants	Jeans, Skinny fit, Denim	391	395	8%
78		Jeans, Skinny fit, Monochrome	363	374	12%
79		Jeans, Skinny fit, Color	393	403	9%
80		Jeans, Slim fit, Denim	414	430	9%

81	Jacket	Jeans, Slim fit, Monochrome	384	421	20%
82		Jeans, Slim fit, Color	425	436	9%
83		Keper, Slim fit, Monochrome	432	435	9%
84		Keper, Slim fit, Color	316	326	10%
85		Keper, Straight cut, Monochrome	296	303	12%
86		Keper, Straight cut, Color	328	337	9%
87		Chinos, Skinny fit, Monochrome	346	364	11%
88		Chinos, Skinny fit, Color	219	226	11%
89		Chinos, Slim fit, Monochrome	324	334	10%
90		Chinos, Slim fit, Color	358	368	11%
91		Chinos, Straight cut, Monochrome	361	369	10%
92		Chinos, Straight cut, Color	326	332	8%
93		Cargo, Slim fit, Monochrome	301	310	9%
94		Cargo, Slim fit, Color	344	352	8%
95		Cargo, Jogger, Monochrome	275	281	9%
96		Cargo, Jogger, Color	324	335	8%
97		Cargo, Straight cut, Monochrome	293	300	11%
98		Cargo, Straight cut, Color	315	329	7%
99		Short, Straight cut, Monochrome	310	323	9%
100		Short, Straight cut, Color	269	277	11%
101		Short, Slim fit, Monochrome	257	268	13%
102		Short, Slim fit, Color	261	266	9%
103		Sweater, Monochrome, Pattern, Lettering	214	228	8%
104		Sweater, Monochrome, Pattern, Logo	178	179	9%
105		Sweater, Monochrome, Pattern, Animation	139	146	14%
106		Sweater, Monochrome, Plain	281	301	8%
107		Sweater, Color, Pattern, Lettering	305	309	9%
108		Sweater, Color, Pattern, Logo	242	257	11%
109		Sweater, Color, Pattern, Animation	172	192	14%
110		Sweater, Color, Plain	306	313	10%
111		Hoodie, Monochrome, Pattern, Lettering	297	306	8%
112		Hoodie, Monochrome, Pattern, Logo	231	235	10%
113		Hoodie, Monochrome, Pattern, Animation	169	181	12%
114		Hoodie, Monochrome, Plain	213	222	11%
115		Hoodie, Color, Pattern, Lettering	241	245	10%
116		Hoodie, Color, Pattern, Logo	239	248	11%
117		Hoodie, Color, Pattern, Animation	228	248	11%
118		Hoodie, Color, Plain	427	455	9%
		Average		289	10%

After processing all the data, the next step is to determine the error value by finding the root square mean error (RMSE) and mean absolute percentage error (MAPE) values. The results of RMSE and MAPE are used as a reference for how much the accuracy of the predicted data is. Below are the results of the average data that has been processed, namely:

Tabel 7. Final results of data processing

	RMSE	MAD	MSE	MAPE	Conclusion
Average	26,5	1,2	37,8	10%	Excellent

Research conducted by Mulyana predicts the price of vaname shrimp and is tested with the RMSE method. This accuracy test with RMSE produces an RMSE value of 1932587 because it is influenced by unstable data [49]. MAD, MSE and MAPE error testing methods were also carried out by Damanik in predicting white crystal sugar production. Testing with the double exponential smoothing model produces MAD 1.327, MSE 3.002 and MAPE 34%, so in this study it can be concluded that this prediction model is within fairly good limits, namely within the limits of 20%-50% [50]. Based on the prediction research of goods carried out with the double exponential smoothing method in this study, the accuracy test with RMSE produces a value of 26.5. Other accuracy tests carried out also produce MAD values of 1.2, MSE 37.8 and MAPE 10% so it can be concluded that this prediction is categorized as very good because MAPE ≤ 10%.

CONCLUSION

This research uses 118 types of item data as historical sales data at Raja Fashion Medan. After going through various stages of research, the final stage is drawing conclusions. Based on the data that has been processed and with the results obtained, namely MAD 1.2, MSE 37.8, RMSE 26.5 and MAPE 10%, it can be concluded that the accuracy of this prediction system application can be said to be very good. So in other words, the prediction system using the double exponential smoothing method can be used to help the store in determining the amount of goods that must be provided in order to meet market demand and get maximum profit. This system is expected to be developed with an Android-based system so that it helps facilitate access via cellular phones.

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