FORECASTING GAMIS DEMAND IN FASHION GALLERY USING WEIGHTED MOVING AVERAGE

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Abstract: This research will discuss predictions of demand for robes at the Fashion Gallery. The problem that occurs is that there is often a buildup in the number of robes provided in shops, thereby increasing additional expenses, such as storage costs and demand costs. On the other hand, if there is too little stock of robes, it will result in losses because potential buyers do not get the items they need. In this case, the forecasting system will be used as a tool to solve the problem of robe accumulation. The WMA method prioritizes the most recent data points while smoothing out fluctuations. The advantage of this method is increased responsiveness to recent changes in demand patterns, contributing to more accurate forecasts by considering current information more prominently than historical data. By implementing the WMA method, it is hoped that the accumulation of robes can be avoided. From the results of prediction calculations in January 2024, it is predicted that there will be 143 adult robes, with a MAD of 7.685185, MSE 74.79938 and MAPE 5%. For small children's robes, it is predicted that there will be 56 shirts, with MAD of 8.388889, MSE of 91.16358 and MAPE of 12%. It can be concluded that the WMA method can make it easier for Fashion Gallery to predict demand for adult and children's robes in the following month.

Keywords: forecasting; robe request; weighted moving average

Abstrak: Dalam penelitian ini akan membahas prediksi permintaan baju gamis pada Fashion Gallery. Permasalahan yang terjadi sering terjadinya penumpukan pada jumlah baju gamis yang disediakan pada toko, sehingga meningkatkan beban tambahan, seperti biaya penyimpanan dan biaya permintaan. Sebaliknya, apabila stok gamis yang terlalu sedikit, mengakibatkan kerugian yang disebabkan karena calon pembeli tidak mendapatkan barang yang dibutuhkan. Dalam hal ini sistem forecasting akan digunakan sebagai alat bantu dalam menyelesaikan permasalahan penumpukan baju gamis. Metode WMA, lebih mementingkan titik data terkini sambil memperlancar fluktuasi. Kelebihan metode ini meningkatkan daya tanggap terhadap perubahan pola permintaan terkini, berkontribusi pada perkiraan yang lebih akurat dengan mempertimbangkan informasi terkini secara lebih menonjol dibandingkan data historis. Dengan diterapkannya metode WMA, diharapkan dapat menghindari terjadinya penumpukan baju gamis. Dari hasil perhitungan prediksi pada bulan Januari 2024, untuk baju gamis dewasa diprediksi sebanyak 143 baju, dengan MAD sebesar 7.685185, MSE 74.79938 dan MAPE 5%. Untuk baju gamis anak kecil diprediksi sebanyak 56 baju, dengan MAD sebesar 8.388889, MSE 91.16358 dan MAPE sebesar 12%. Dapat disimpulkan bahwa metode WMA dapat memudahkan Fashion Gallery dalam meramalkan permintaan baju gamis dewasa dan anak-anak pada bulan berikutnya.

Kata Kunci: forecasting; permintaan baju gamis; weighted moving average

INTRODUCTION

Fashion business has now become an inseparable part of people's lives, especially because clothing is an essential need that cannot be avoided in various daily activities [1]. Looking stylish and following the latest trends is a way to look cooler and in line with the times [2].

One type of clothing that is popular, especially when celebrating Eid, is the robes, especially for women [3]. In this scenario, robe clothing items are predominantly retailed through boutique establishments [4].

Fashion Gallery is a business operating in the fashion sector that has been established since 2020. The products marketed by Fashion Gallery include tops, robes, trousers and skirts.

The analysis revealed issues within the Fashion Gallery relating to an accumulation of robe, attributed to mismatches between demand and supply dynamics. An interview with the proprietor, Tiyan Anggreani, elucidated that discrepancies exist between the volume of robe requests and available supplies. For example, in November 2023, the demand for robe was reported at 40 units, yet the supply stood at 65 units, leading to an excess inventory situation. Consequently, this mismatch resulted in a surplus of robs by December 2023.

In response to the identified issue, a proposed solution entails implementing a forecasting system capable of predicting forthcoming demand volumes. Such a system aims to optimize inventory management, mitigate the accumulation of excess robes, and enhance profitability within the fashion gallery. By accurately forecasting demand trends, the proposed system seeks to streamline supply chain operations, thereby minimizing the financial burden associated with surplus inventory and maximizing revenue potential.

Predictions of future trends or events based on past data or forecasting will be used to predict total demand that will come in the following month [5]. The forecasting method that will be used is the Weighting Moving Average method [6].

Weighted Moving Average (WMA), method involves assigning varying weights to recent data points compared to older ones [7]. This approach emphasizes recent trends while smoothing out fluctuations, aiding in more accurate forecasting by prioritizing current information over past data [8].

In the study titled "Prediction of 35,000 All Clothes Sales Range Using WMA Method", it was determined that employing the Weighted Moving Average (WMA) method enabled successful anticipation of clothing sales figures for the subsequent month [9].

In the research endeavor titled "Implementation of E-Forecasting on Jimmy Fish Using the Weighted Moving Average Method", it was deduced that the adoption of a forecasting system facilitated the accurate prediction of fish stock quantities based on preceding month's data [10].

In the study titled "A System for Predicting the Amount of Clothing Production Using a Weighted Moving Average", it was determined that the employment of the Weighted Moving Average (WMA) method enabled the accurate anticipation of clothing production quantities for the ensuing month, thereby mitigating instances of

duplication [11].

This research presents notable advantages in its utilization of the PHP 7programming language, complemented by a framework. Furthermore, the developed system exhibits versatility by extending its predictive capabilities beyond monthly forecasts to include predictions for subsequent days or weeks, enhancing its applicability and utility within the domain of forecasting.

The implementation of this system within the fashion gallery is poised to facilitate predictive forecasting of robe demand for the subsequent month [12].

METHOD

Research methodology refers to the systematic steps used in a study to collect, analyze, and interpret data. Research methodology helps to design and conduct research in a reliable and valid manner.

Studying Literature
Search for reference information in the form of books, journals and study materials related.

Data Collection
Data was collected through observations and interviews with Tiyan Anggreani, the proprietor of the Fashion Gallery, followed by processing of the acquired data. The data that will be used in this research is historical data requests for gamis clothes, from January 2023 to December 2023.

Table 1. Data on Demand Robes

Period	Gamis Request	
	Adult	Little Girl
January 2023	158	65
February 2023	160	73
March 2023	178	86
April 2023	180	90
May 2023	168	78
June 2023	172	89
July 2023	159	66
August 2023	160	71
September 2023	153	69
October2023	155	62
November 2023	144	57
December 2023	140	54
Jan 2024	?	?

System Planning
The architectural design stage involves the conceptualization and specification of the system architecture. This key step in software development is designing the basic structure of the system to be built, determining how the components will interact with each other, and establishing a framework that will be the basis for further development. This stage creates a holistic view of how the system will operate and interact with its environment.

System Implementation
Next stage, the software development cycle where the design that has been created is realized into code that can be run. The stages in the research method carried out in Image 1.
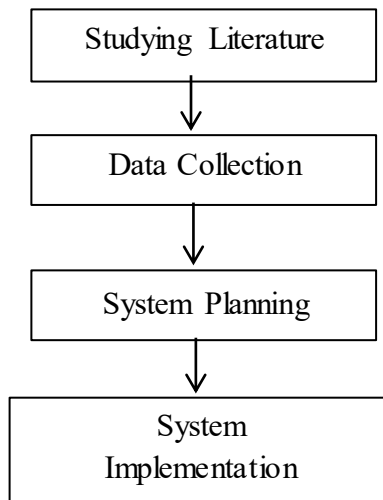
Studying Literature

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Data Collection

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System Planning

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System Implementation

Image 1. Research Methodology

Algorithm Weighted Moving Average

The system that will be created is a forecasting system for predicting demand for robes using the Weighted Mov-ing Average method. calculations using the Weighted Moving Average (WMA) method are as follows [5]:

$$WMA = \frac{\Sigma(w_t)(w)}{\Sigma w} \qquad (1)$$

Description:
X_t : Actual data in a certain period (t).
W : Weight

Forecasting error measured by comparing actual data for the the period with forecast results for the same period. If the resulting error rate is smaller, the forecasting results will be more accurate.

$$Et = Xt - ft \qquad (2)$$

Description:

E_t : Error value
X_t : Actual data for the t-th time period
F_t : Forecast for the t period

Estimating the accuracy of numbers by averaging the assessed errors (direct value of each error) can use the following equation:

$$MAD = \Sigma \frac{Aktual - Ramalan}{n} \qquad (3)$$

Description:
Et^2 : Squared error value
n : Lots of data

RESULT AND DISCUSSION

The data that will be used in this research is historical data on the number of requests for robes clothes, from January 2023 to December 2023. In implementing the calculation procedure utilizing the Weighted Moving Average (WMA) method, it is essential to ascertain the weights designated for use in the computation. Subsequently, in table 2, the outcomes of forecasting computations for adult robes will be delineated.

Furthermore, in table 3, the findings of forecasting computations for robes intended for children be presented. To facilitate forecasting for fashion gallery proprietors, this research has also devised a system employing the Weighted Moving Average method.

Table 2. Analysis of Prediction Errors in Demand for Adult Robes

Period	Calculation					
	Request	Ft	Error	ABS Error	Error^2	MAPE
Jan 2023	158	-				
Feb 2023	160	-				
Marc 2023	178	-				
Aprl 2023	180	168.66667	-11	11.33333333	128,444	6%
May 2023	168	176	8	8	64	5%
Jun 2023	172	173.66667	2	1.666666667	2.77778	1%
Jul 2023	159	172	13	13	169	8%
Augs 2023	160	164.83333	5	4.833333333	23.3611	3%
Sept 2023	153	161.66667	9	8.666666667	75.1111	6%
Octo2023	155	156.33333	1	1.333333333	1.77778	1%
Nov 2023	144	155.16667	11	11.16666667	124,694	8%
Dec 2023	140	149.16667	9	9.166666667	84.0278	7%
January 2024	Prediction	143.83333				
	MAD	7.685185				
	MSE	74.79938				
	MAPE (%)	5%				

Table 3. Calculation of Predictions for Demand for Children's Robes

Period	Calculation					
	Request	Ft	Error	ABS Error	Error^2	MAPE
Jan 2023	65	-				
Feb 2023	73	-				
Marc 2023	86	-				
Aprl 2023	90	78.166667	-12	11.83333333	140.0278	13%
May 2023	78	85.833333	8	7.833333333	61.36111	10%
Jun 2023	89	83.333333	-6	5.666666667	32.11111	6%
Jul 2023	66	85.5	20	19.5	380.25	30%
Augs 2023	71	75.666667	5	4.666666667	21.77778	7%
Sept 2023	69	72.333333	3	3.333333333	11.11111	5%
Oct 2023	62	69.166667	7	7.166666667	51.36111	12%
Nov 2023	57	65.833333	9	8.833333333	78.02778	15%
Dec 2023	54	60.666667	7	6.666666667	44.44444	12%
January 2024	Prediction	56.333333				
	MAD	8.388889				
	MSE	91.16358				
	MAPE (%)	12%				

Admin Dashboard View

Image 2. Menu Dashboard

Image 2 shows the Administrator's main page showing the implementation of the Weighted Moving Average method in predicting the number of requests for gamis clothes.

Period Page In System

The Period page displays period request data for each month. In figure 3, the period page is displayed.

Image 3. Period Page View

Calculation Method In System

The calculation page for predicting the demand for gamis clothes in the following month using the implementation of the Weighted Moving Average method (image 4).

Image 4. Calculation Page View

Graphic Result

The forecasting outcomes will be graphically represented, serving to provide shop owners with a visual depiction of anticipated clothing demand for the subsequent month, thereby enhancing comprehension and decision-making processes (image 5).
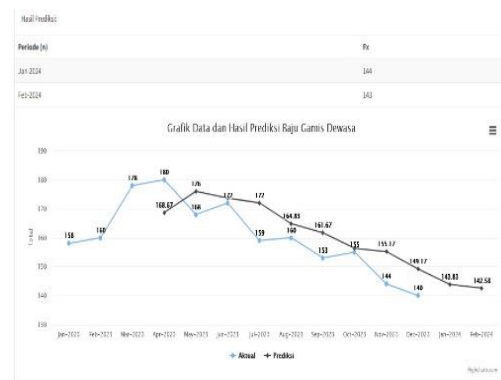

Image 5. Forecasting Graph

The research results show that the predicted need for adults is 143 units and the need for children is 56 units. The MAD results for adults were 7,686 and for children 8,389. The MSE result for adults was 74.791 and for children was 91.164, reflecting an overall lower error rate. And the MAPE results for adult robes are 5% and children's robes are 12%, indicating that the average percentage error relative to actual demand is quite low. In this way, the

store manager can take action to overcome this relatively low demand. This proves that the information system built can provide recommendations

CONCLUSION

Forecasting using the Weighted Moving Average method can predict the number of requests for robes for the next period (in January). Forecasting calculations for future periods are carried out based on previous quarterly data calculations and can also be carried out based on selecting the desired period. Having a forecasting system for demand for robes in fashion galleries can help simplify the owner's service process in providing goods for the future. The WMA method can be used to help fashion gallery owners predict ideal inventory.

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