JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 1, Desember 2022, hlm. 33 - 40 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i1.1572
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

PREDICTION OF DRUG SALES DURING A PANDEMI USING THE TREND MOMENT METHOD

Juniar Hutagalung[1*], Saiful NurArif[1], Rini Kustini[1], Sri Kusnasari[1], Rudi Gunawan[1]
[1]Information Systems, STMIK Triguna Dharma
email: [*]juniarhutagalung991@gmail.com

Abstract: Consumer demand for drugs during this pandemic is so high that pharmacies must be able to estimate drug sales to meet consumer demand. The history of monthly sales transactions is only a report that causes data to accumulate if not processed properly. There needs to be a system for estimated drug sales in order to reduce costs in drug supply so that consumer needs are met. This study aims to analyze in order to predict drug sales at Apotek Manjur Marendal so that it can control drug stock supplies so that losses can be minimized. Drug sales data samples were taken from January 2021 to December 2021. The web-based application was successfully applied to predict drug sales. The prediction results are stable in terms of sales of ± 5000 drugs per month in 2022. Based on the calculation results, the lowest accuracy is 64% and the highest accuracy is > 90%. Data mining techniques with the trend moment method can be applied to web-based applications to predict drug sales.

Keywords: data mining; drugs; drugstore; prediction; trend moment

Abstrak: Permintaan konsumen terhadap obat-obatan pada masa pandemi ini sangat tinggi sehingga membuat pihak apotik harus dapat mengestimasi penjualan obat untuk memenuhi permintaan konsumen. Riwayat transaksi penjualan perbulan hanya sebagai laporan yang menimbulkan data menumpuk bila tidak diolah dengan baik. Perlu adanya sebuah sistem untuk penjualan obat diestimasi agar mengurangi biaya dalam penyediaan obat sehingga terpenuhi kebutuhan konsumen. Penelitian ini bertujuan untuk menganalisa agar dapat memprediksi penjualan obat pada Apotik Manjur Marendal sehingga dapat mengendalikan persediaan stok obat dengan demikian kerugian dapat diminimalisir. Sampel data penjualan obat diambil mulai dari bulan Januari 2021 hingga Desember 2021. Aplikasi yang dibangun berbasis *web* berhasil diterapkan untuk memprediksi penjualan obat. Hasil prediksi stabil diangka penjualan ±5000 obat perbulan pada tahun 2022. Berdasarkan hasil perhitungan mencapai akurasi terendah 64% dan akurasi tertinggi > 90%. Teknik *data mining* dengan metode *trend moment* dapat diterapkan pada aplikasi berbasis *web* untuk melakukan prediksi penjualan obat.

Kata kunci: apotik; data mining; obat-obatan; prediksi; *trend moment*

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 1, Desember 2022, hlm. 33 - 40 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i1.1572
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

INTRODUCTION

The corona virus pandemic has paralyzed the Indonesian economy, such as the tourism and MSME sectors. Meanwhile, the health and food sectors remained stable and even recorded growth in drug sales, especially in pharmacies. This is because many people buy drugs to boost their immune system and get stronger.

Drug sales increased during the pandemic. Consumer demand for drugs is very high so that pharmacies must plan and estimate drug sales to meet consumer demand based on need. Predicting drug sales requires a web-based system that can reduce costs and meet consumer needs. Forecasting drug sales with data mining applies the trend moment method.

Some concepts of data mining: the process of extracting information and expertise from large amounts of data [1]-[3]. Knowledge discovery or pattern recognition [4]. The branch of informatics regarding data mining and text documents [5]. The data mining process requires the use of artificial intelligence technology [6]. Using data mining can extract information on deaths due to Covid-19 [7]. Being able to evaluate future decision making is the output of data mining [8].

The pharmacy has sales data used as a report only. The occurrence of data accumulation resulted in data processing that was not optimal. The application of data mining with the trend moment method is able to predict drug sales, so that stocks are controlled quickly and calculations are more accurate and valid. In forecasting techniques it is necessary to apply the right method so that decisions can be accounted for and there is no subjective element from certain parties.

To find out something that happened in the past by paying attention to existing data is called forecasting [9]. Sales forecasting is a projection of prospective customer demand with various assumptions for a certain time [10]. By being able to reduce dependence on something that is not yet clear [11]. Predictions must be in accordance with current conditions so that policies can be implemented appropriately [12].

At trend moments statistical and mathematical calculations are carried out in order to find trend lines [13], trends and moments combined [14]. Historical data is used from the variable [15]. Value starts from 0 for parameter [16].

Several studies have applied the trend moment method, including controlling inventory by predicting shoe sales [17]. Forecasting sales data by experiencing a positive trend [18]. Forecasting sales of typical Medan food and souvenirs that are sold so as to minimize excess or shortage of stock [19]. Clothing production is recorded monthly to reduce the risk of overstocking [20]. Predicting notebook sales in order to minimize losses [21].

This study aims to analyze in order to be able to predict drug sales at the Manjur Marendal Pharmacy so that it can control drug stock inventory so that losses can be minimized.

METHOD

The method applied is the trend moment to predict the number of sales in the next period. Image 1 is a research stage.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 1, Desember 2022, hlm. 33 - 40 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i1.1572
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

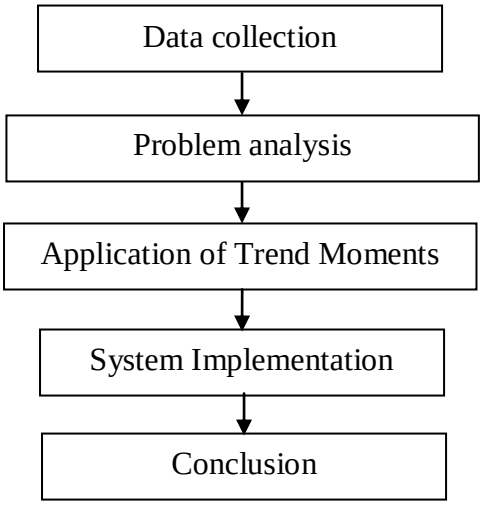

Image 1. Research Stages

Explanation of Image 1 that the initial stage of collecting drug sales data, and conducting data analysis. The application of the trend moment method is followed by the implementation of a web-based system. Then draw a conclusion.

The trend momentr method, formula (1) used is [22]:

$$Y = a + bx \quad (1)$$

To calculate the value of a and b, formulas (2) and (3) are used.

$$b = \sum \frac{X_i Y_i - n\,(X)(Y)}{X_i 2 - n\,(X)\,2} \quad (2)$$

$$a = Y - b\,(X) \quad (3)$$

RESULT AND DISCUSSION

The data used is in the form of monthly drug sales data for all drugs that were sold during the Covid-19 pandemic in 2021 from January to December, according to table 1.

Table 1. Sales Data

Month	Sale (Y)	Time (X)
Jan	3289	1
Feb	4021	2
Mar	4556	3
Apr	5671	4
May	5785	5
Jun	5719	6
Jul	5010	7
Aug	5318	8
Sep	5119	9
Oct	4907	10
Nov	4877	11
Dec	4012	12
Amount:	58284	78
Average:	4857	6.5

The overall value results are according to table 2.

Table 2. Results of XY and X2 values

Month	Sale (Y)	Time (X)	XY	X^2
Jan	3289	1	3289	1
Feb	4021	2	8042	4
Mar	4556	3	13668	9
Apr	5671	4	22684	16
May	5785	5	28925	25
Jun	5719	6	34314	36
Jul	5010	7	35070	49
Aug	5318	8	42544	64
Sep	5119	9	46071	81
Oct	4907	10	49070	100
Nov	4877	11	53647	121
Dec	4012	12	48144	144
Amount:	58284	78	385468	650
Average	4857	6.5	32122.3	54.2

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 1, Desember 2022, hlm. 33 - 40 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i1.1572
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Drug sales predictions for the next 1 year period are:

1. January 2022

$Y = a + bX$

$b = \frac{\sum xiyi - n\bar{x}\bar{y}}{\sum xi^2 - n(\bar{x}\bar{n})^2}$

$b = \frac{385468 - 12 \times 6{,}5 \times 4857}{650 - 12 \times (6{,}5)^2}$

$b = \frac{6622}{143}$

$b = 46{,}3$

$a = \bar{y} - b(\bar{x})$

$a = 4857 - 46{,}3(6{,}5)$

$a = 4556$

Value trend:

$Y = a + bX$

$Y = 4556 + 46{,}3(13)$

$Y = \mathbf{5158}$

2. February 2022

$Y = a + bX$

$b = \frac{\sum xiyi - n\bar{x}\bar{y}}{\sum xi^2 - n(\bar{x}\bar{n})^2}$

$b = \frac{385468 - 12 \times 6{,}5 \times 4857}{650 - 12 \times (6{,}5)^2}$

$b = \frac{6622}{143}$

$b = 46{,}3$

$a = \bar{y} - b(\bar{x})$

$a = 4857 - 46{,}3(6{,}5)$

$a = 4556$

Value trend:

$Y = a + bX$

$Y = 4556 + 46{,}3(14)$

$Y = \mathbf{5204}$

Complete calculation results, according to table 3.

Table 3. Calculation Results

Month	Real Sales Data	Predictive Sales Data	Accuracy
Jan	3289	5158	64%
Feb	4021	5204	77%
Mar	4556	5251	87%
Apr	5671	5297	93%
May	5785	5343	92%
Jun	5719	5390	94%
Jul	5010	5436	92%
Aug	5318	5482	97%
Sep	5119	5528	93%
Oct	4907	5575	88%
Nov	4877	5621	87%
Dec	4012	5667	71%

The results of the calculation accuracy of the lowest value are 64% and the highest are 97%. Prediction of drug sales at Manjur Pharmacy until 2022 will sell around + 5,000. A sales graph according to Image 2.

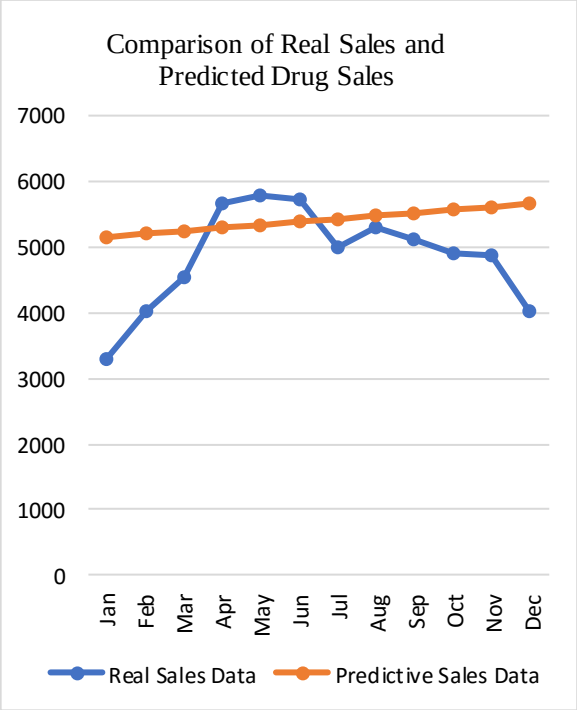

Image 2. Sales Graph

Image 3 is the menu display of the predicted results in a web-based application program

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. IX No 1, Desember 2022, hlm. 33 - 40 ISSN 2550-0201 (Online)
DOI: https://doi.org/10.33330/jurteksi.v9i1.1572
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Image 3. Menu Display of Sales Prediction Results

Based on Image 3, the prediction process is carried out in December with drug sales of 5667 drugs that will be sold.

The prediction data menu in image 4 is the menu used by the admin to view predictive drug sales data using the Trend Moment method. The prediction data menu in the application program that has been built is as follows. Based on image 4 the admin can delete the desired data by pressing the delete button.

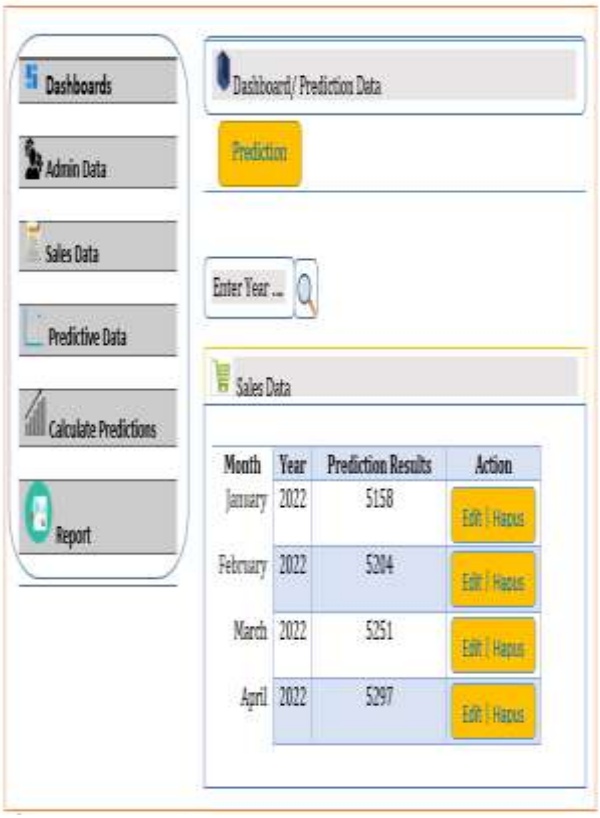

Image 4. Prediction Data Menu Display

The prediction report menu is used to view and print reports on drug sales prediction results. The prediction results report is printed based on the year the admin is looking for, according to image 5.

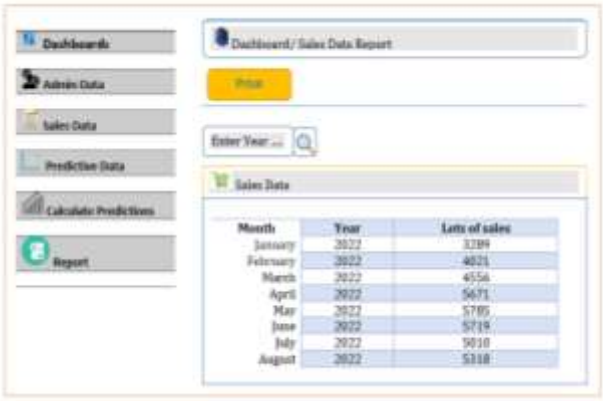

Image 5. Sales Prediction Report Menu Display

CONCLUSION

The application of the web-based trend moment data mining method was successfully applied in predicting drug sales with the predicted results for 2022 being stable at sales of ± 5,000 drugs per month. Based on the calculation results obtained that the lowest accuracy is 64% and the highest accuracy is 97%. From the results of the forecasting carried out, it can help the pharmacy to prepare the amount of medicines for the following year.

BIBLIOGRAPHY

[1] P. Edastama, A. S. Bist, and A. Prambudi, "Implementation Of Data Mining On Glasses Sales Using The Apriori Algorithm," *Int. J. Cyber IT Serv. Manag.*, vol. 1, no. 2, pp. 159–172, 2021, doi: 10.34306/ijcitsm.v1i2.46.

[2] J. Hutagalung and F. Sonata, "Penerapan Metode K-Means Untuk Menganalisis Minat Nasabah Asuransi," vol. 5, no.3 pp. 1187–1194, 2021, doi: 10.30865/mib.v5i3.3113.

[3] S. Shrestha and M. Pokharel, "Educational data mining in moodle data," *Int. J. Informatics Commun. Technol.*, vol. 10, no. 1, p. 9, 2021, doi: 10.11591/ijict.v10i1.pp9-18.

[4] J. Hutagalung, and U. F. Sari, "InfoTekJar : Jurnal Nasional Informatika dan T. Jaringan,"Penerapan Metode K-Means dan MOORA Dalam Penerimaan Bantuan Stimulan Perumahan Swadaya (BSPS)," vol. 6 no.1, pp. 30–42,2021.https://doi.org/10.30743/infotekjar.v6i1.4093 42

[5] Y. Sinambela, S. Herman, A. Takwim, and S. R. Widianto, "a Study of Comparing Conceptual and Performance of K-Means and Fuzzy C Means Algorithms (Clustering Method of Data Mining) of Consumer Segmentation," *J. Ris. Inform.*, vol. 2, no. 2, pp. 49–54, 2020, doi: 10.34288/jri.v2i2.116.

[6] M. Wahyudi and L. Pujiastuti, "Application of K-Means Algorithm Data Mining in Goat Meat Production Data Grouping in Indonesia," vol. 5, no. 36, pp. 2452–2461, 2022. https://doi.org/10.35335/jurnalmantik.v5i4

[7] J. Hutagalung, N. L. W. S. R. Ginantra, G. W. Bhawika, W. G. S. Parwita, A. Wanto, and P. D. Panjaitan, "COVID-19 Cases and Deaths in Southeast Asia C. using K-Means Algorithm," *J. Phys. Conf. Ser.*, vol. 1783, no. 1, 2021, doi: 10.1088/1742-596/1783/1/012027.

[8] A. H. Nasyuha *et al.*, "Frequent pattern growth algorithm for maximizing display items," *Telkomnika (Telecommunication Comput. Electron. C.*, vol. 19, no. 2, pp. 390–396, 2021, doi: 10.12928/TELKOMNIKA.v19i2.16192.

[9] Muhammad Rizal, Dewi Rosa Indah, and Rahmi Meutia, "Analisis Peramalan Produksi Menggunakan Trend Moment Pada Kilang Padi Do'a Ibu Diperlak Kecamatan Pereulak," *J. Samudra Ekon.*, vol. 5, no. 2, pp. 161–168, 2021, doi: 10.33059/jse.v5i2.4274.

[10] M. Fahrur Rizal and D. Wahyu

Widodo, "Peramalan Dengan Metode T. Moment Untuk Memprediksi Jumlah Penjualan Produk Healthy di CV. Surya Willis," 2021. https://doi.org/10.29407/inotek.v5i3.1073

[11] N. E. Marlina, K. Oktafianto, and R. Yuliastuti, "Perbandingan Metode Trend Moment Dan Single Moving Average Untuk Meramalkan Jumlah Penduduk Kabupaten Tuban," vol. 02, no. 01, pp. 18–22, 2021. http://journal.unirow.ac.id/index.php/mv/article/view/138

[12] R. Janah, A. Isro, A. Alfan, M. Nurul Alamin, and S. Sarwinda Mas Ayu, "Peramalan Hasil Panen Jagung Di Kecamatan Solokuro Dengan Metode T. Moment," *J. Mat. Sains*, vol. 1, no. 2, pp. 65–74, 2021. http://ejournal.billfath.ac.id/index.php/jms/article/view/102

[13] I. Turmuzdi and A. C. Murti, "Implementation of Trend Moment Method for Goods Stock Control," *J. Transform.*, vol. 16, no. 2, p. 182, 2019, doi: 10.26623/transformatika.v16i2.1202.

[14] D. N. E. Ardini, A. D. Riyanto, P. Arsi, Y. M. Idah, and A. Prasetyo, "Sistem Peramalan Penjualan Menggunakan Metode Trend Moment Pada Toko Mebel Nabila Furniture Paguyangan Brebes Berbasis Desktop," *J. Inform. UPGRIS*, vol. 5, no. 2, pp. 2–6, 2019.https://doi.org/10.26877/jiu.v5i2.4346

[15] E. Purnomo, A. Najib, and Y. Nyura, "Penerapan Metode Trend Moment Untuk Forecast Penjualan Barang di Indomaret," *Pros. Semin. Ilmu Komput. dan Teknol. Inf.*, vol. 3, no. 1, pp. 98–102, 2018, http://e-journals.unmul.ac.id/index.php/SAKTI/article/view/2074

[16] M. Ilmi, A. Mahmudi, and Y. Agus Pranoto, "Prediksi Penjualan Bibit Ikan Air Tawar Pada Ibat Pandaan Menggunakan Metode Trend Moment," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 4, no. 2, pp. 222–229, 2020, doi: 10.36040/jati.v4i2.2704.

[17] D. I. Taniansyah and I. R. Setiawan, "Implementasi metode trend moment pada prediksi tren penjualan sepatu di toko garageshoessmi kota sukabumi," vol. 2, no. 2, pp. 205–213, 2021.https://jurnal.polsri.ac.id/index.php/jasisfo/article/view/3495

[18] S. Renhoat and S. Rahayuningsih, "Analisis Peramalan Penjualan," vol. 1, no. November, pp. 11–46, 2019. https://akamigas.esdm.go.id/jurnal/index.php/sntm/article/view/616

[19] F. A. S. Ayu Nanda Safitri, "Analisa Metode Trend Moment Untuk Peramalan Penjualan Stok Barang Pada Toko Sun Oleh-Oleh," vol. 3, no. 3, pp. 91–102, 2021. http://ejournal.sisfokomtek.org/index.php/jikom/article/view/95/82

[20] D. N. Fitriani, P. Aisyiyah, and R. Devi, "Implementasi Metode Trend Moment Pada Jumlah Produksi Baju Distro Jatirogo," vol. 16, no. January 2019, pp. 134–140, 2022. https://www.journal.uniku.ac.id/index.php/ilkom/article/view/5329

[21] D. A. Irawati, A. R. Ririd, and R. R. Wahyu Oetomo, "Implementasi metode trend moment untuk

peramalan penjualan buku tulis," *J. Eltek*, vol. 18, no. 1, p. 24, 2020, doi: 10.33795/eltek.v18i1.169.

[22] I. Yulian, D. S. Anggraeni, and Q. Aini, "Penerapan Metode Trend Moment Dalam Forecasting Penjualan Produk CV. Rabbani Asyisa," *JURTEKSI (Jurnal Teknol. dan Sist. Informasi)*, vol. 6, no. 2, pp. 193–200, 2020. https://doi.org/10.33330/jurteksi.v6i2.443