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Product analysis analysis at Yuyun Cell Mobile shop with the monte carlo method

Putri Novrianti Iswanto[1], Ardy Januantoro[2]
[1,2]Universitas 17 Agustus 1945 Surabaya, Indonesia

A R T I C L E I N F O

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ABSTRACT

In the development of today's business world, business is growing rapidly everywhere and of course the competition is also getting tougher. yuyun cell shop is one of the businesses that often has problems with cellphone product stock, with this the authors conducted research to help predict product stock and reduce dead stock in it. In this case the research method used is waterfall because the approach used for research is systematic and for the analytical method used is the monte carlo method to predict product stock sales because it has algorithms to simulate various systems and their mathematics. The Monte Carlo method is used to determine the prediction of cellphone product stock later to help Yuyun's cellphone shop in optimizing and maximizing cellphone sales. The results of this study are to determine the accuracy of future cellphone stock predictions, with predictions for three categories based on the price range of mobile phone products, namely high end getting an accuracy of 99%, then for the medium category getting a simulation accuracy of 98.14%, and finally low category gets prediction accuracy. 98.16% accuracy.

Corresponding Author:

Putri Novrianti Iswanto,
Department of Electrical and Computer Engineering,
National Chung Cheng University,
168 University Road, Minhsiung Township, Chiayi County 62102, Taiwan, ROC.
Email: putri.novriantiis.22@gmail.com

1. INTRODUCTION

In the development of today's business world, business has developed rapidly everywhere and competition of course has also become increasingly stringent. Yuyun cell shop is a mobile phone shop located in Mandiangin District, Sarolangun Regency, Jambi Province, Indonesia. The Yuyun cell shop has been established since 2006. This shop sells new and used cellphones, and also sells cellphone accessories and then sells prepaid credit and electricity credit, and is also a distributor for selling credit. With this business flow, yuyun cell mobile shop often faces various difficulties such as calculating and managing product stock. These things make shop owners have to monitor transactions and the amount of product stock at any time. For better monitoring, the use of product forecasting methods is a solution to the problem.

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There are several research topics that are often carried out for simulations such as the use of moving average forecasting using data with stationary data patterns (Nurlifa & Kusumadewi, 2017). Handling the difference between the amount of production inventory with the number of sales in the market (Linda et al., 2014). The implementation of the Box-Jenkins ARIMA method is based on the 3 tests used, namely the sample adequacy test, the seasonal test, and the trend test. Determining the right amount of production so that there is difficulty in projecting company profits. So the Linear Programming and Decision Tree methods are used in sales data (Djie, 2013). Make a profit analysis prediction simulation using the monte carlo method to support store performance properly (Algifari, 2021), From some of these studies, what will be used in this study is the Monte Carlo method.

Monte Carlo simulation is currently very widely applied in solving probabilistic problems. Monte Carlo methods can also be used in mathematics, physics and science to predict and analyze data such as business and financial problems. The advantage of the Monte Carlo method is that it is intuitive and easy to understand as a method that is categorized as a statistical test.

The results of this study are predicting the stock of mobile phone products by looking at the results of product sales in the previous year which can later be used to compile recommendations for mobile phone products that will be provided, so that they can assist the management strategy process in sales.

2. RESEARCH METHOD

Reseearch stage

The research stage is a stage or guideline that will be carried out during the research. The research method that will be used by the author is the Waterfall method, because this method has a structured nature and is carried out step by step, the process will be carried out by following the structure. The research structure framework is as follows:

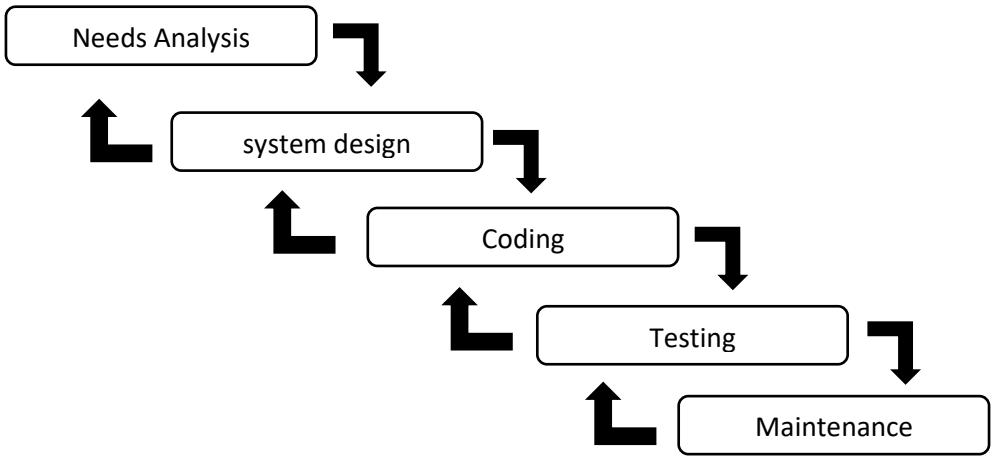

Figure 1. Structure waterfall

Interview

At this stage, the author will conduct question and answer and data information with sources. This stage aims to get information from the Yuyun Cell store.

Literature Study and Observation

In this stage, all data or methods that have a relationship with the topic that the author takes in this study are collected. In addition, it is also necessary to study documents obtained from various sources such as journals, the internet and libraries. After that, also make observations of

the store from the state of the store, and the running of business processes, so that you can find out an overview of the application to be built.

Monte Carlo Methode

Monte Carlo was developed by Von Neumann, Ulam and Fermi during World War II "Involved the solution of non probabilistic mathematical problems by simulating a stochastic process that has moment or probability distribution satisfying the mathematical relations of the non probabilistic problem". Monte Carlo simulation is an approach to reshape probability distributions based on the choice or generation of random numbers. Predict product inventory sales for Yuyun Cell mobile phone shops, making it easier for owners to decide which products will be supplied more quickly. The simulation is carried out based on the number of existing inventory items, by looking at mobile phone sales data.

$$Ji + 1 = (y * Ji + z) mod\ m \quad (1)$$

$$PJR = \frac{FR}{DC} \quad (2)$$

The Monte Carlo simulation method is a simulation technique that uses random numbers to solve problems involving situations of uncertainty where mathematical evaluation is impossible. So the Monte Carlo Method is a simulation technique that uses random elements when there are opportunities in their behavior.

3. RESULTS AND DISCUSSIONS

Random Number

Tablel 1. Random number

No.	month	Variables a	Variables y	Variables m	Ji	(a*Ji+y)	Ji+1 = (a*Ji+y) mod m
1	January	15	22	99	53	817	25
2	February	15	22	99	74	1.132	43
3	March	15	22	99	45	697	4
4	April	15	22	99	21	337	40
5	May	15	22	99	10	172	73
6	June	15	22	99	16	262	64
7	July	15	22	99	11	187	88
8	August	15	22	99	1	37	37
9	September	15	22	99	44	682	88
10	October	15	22	99	81	1.237	49
11	November	15	22	99	72	1.102	13
12	December	15	22	99	62	952	61

The input values used in this random number process are a=15, y=22, m=99, with the conditions a, y < m and Ji> 0. After that the values of these parameters are set then proceed to generate random numbers. A random number that is calculated for each month with the following calculations.

J01 = (15 * 53 + 22) mod 99 = 25
J02 = (15 * 74 + 22) mod 99 = 43
J03 = (15 * 45 + 22) mod 99 = 4
J04 = (15 * 21 + 22) mod 99 = 40
J05 = (15 * 10 + 22) mod 99 = 73
J06 = (15 * 16 + 22) mod 99 = 64
J07 = (15 * 11 + 22) mod 99 = 88
J08 = (15 * 1 + 22) mod 99 = 37
J09 = (15 * 44 + 22) mod 99 = 88
J10 = (15 * 81 + 22) mod 99 = 49
J11 = (15 * 72 + 22) mod 99 = 13
J12 = (15 * 62 + 22) mod 99 = 61

Based on what was found that the random numbers are 12, namely 25, 43, 4, 40, 73, 64, 88, 37, 88, 49, 13, dan 61.

Simulation Experiment and Accuracy Percentage

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The results of the calculations in this study based on data from 2020 to 2021 can be calculated by comparison.Berdasarkan data yang didapat dari penjualan produk. Cara perhitungan sebagai berikut.

$$Ta = \frac{TDR}{TDT} \times 100\% = \frac{209.230.000}{211.500.000} \times 100\% = 99\%$$

Obtaining an accuracy level of suitability of simulated data with real data of 99%. Ta is the level of accuracy, TDR is the lowest total data, TDT is the highest total data. Then the real data and simulated data are compared to each income data as a whole, the lowest result is divided by the highest result multiplied by 100%, the result is obtained.

$$Ta = \frac{TDR}{TDT} \times 100\% = \frac{120.230.000}{122.500.000} \times 100\% = 98,14\%$$

Obtain an accuracy level of suitability of simulated data with real data of 98.14%. Ta is the level of accuracy, TDR is the lowest total data, TDT is the highest total data. Then the real data and simulated data are compared for each income data as a whole, the lowest result is divided by the highest result multiplied by 100%.

$$Ta = \frac{TDR}{TDT} \times 100\% = \frac{112.490.000}{114.500.000} \times 100\% = 98,16\%$$

Obtaining an accuracy level of suitability of simulated data with real data of 98.16%. Ta is the level of accuracy, TDR is the lowest total data, TDT is the highest total data. Then the real data and simulated data are compared for each income data as a whole, the lowest result is divided by the highest result multiplied by 100%.

Table 2. Accuracy simulation

No.	Month	Product Selling Out		Resulth Selling Out		Accuracy		
		Data real	Simulation	Data real	Simulation	HighEnd	Middle	Low
1	January	5	10	8.720.000	8.800.000			
2	February	3	5	9.200.000	10.000.000			
3	March	2	12	9.470.000	9.500.000			
4	April	6	9	25.000.000	20.000.000			
5	May	3	5	11.200.000	11.500.000			
6	June	7	12	32.270.000	30.400.000			
7	July	3	5	11.170.000	10.700.000	99%	98,14%	98,16%
8	August	7	10	28.000.000	20.000.000			
9	September	3	5	9.600.000	20.200.000			
10	October	1	5	9.800.000	10.000.000			
11	November	8	4	43.700.000	32.300.000			
12	December	4	9	11.100.000	28.100.000			
Total		52	91	209.230.000	211.500.000			

From the results of the Monte Carlo simulation method, it can be predicted that more products can be stocked at the yuyun cell cellphone shop by looking at the results of cell phone sales per category and per brand, with predictions for the high end category obtaining 99% accuracy, then for the middle category obtaining a simulation accuracy of 98.14 %, and finally the low category obtained an accuracy of 98.16%.

4. CONCLUSION

With the results of implementing the Monte Carlo method in product prediction, yuyun cell owners can more easily find out which products will focus more on in-store sales. after analyzing the needs of the yuyun cell handpone store the monte carlo method is most suitable to be applied as a calculation, with calculations using the monte carlo method it can be useful and developed for other researchers, it is hoped that this article can help, of course this research is not perfect it is hoped that the research This can be continued and developed by other researchers.

References

IKAB Wahyudi., AW Putra.,& Aulia lefan Datya, 2017. Metode Waterfall. *APLIKASI PENJUALAN POINT OF SALE (POS) MENGGUNAKAN BARCODE PADA KOPERASI BINA KASIH SEJAHTERA BERBASIS DESKTOP DENGAN METODE FIRST IN FIRST OUT (FIFO),* 3(2).

Fikri Algifari., 2021. Metode Monte Carlo. *Simulasi dalam Menganalisis Tingkat Pendapatan Penjualan Handphone dengan Menggunakan Metode Monte Carlo,* 3(4).

Putu Dika Arta Wiguna., I Putu Agus Swastika.,& I Putu Satwika, 2018. Point Of Sale. *Rancang Bangun Aplikasi Point of Sales Distro Management System dengan Menggunakan Framework React Native,* 4(3).

Jefri, Kristina., Thommy, 2017, *Perancangan Aplikasi Pemesanan Makanan Berbasis Android Menggunakan Metode Priority Scheduling*, Jakarta

Komang Dharmawan, 2017. *Penentuan Harga Opsi Beli Tipe Asia Dengan Metode Monte Carlo – Control Variate*. Matematika.

Nasution, K. N., 2016. *Prediksi Penjualan Barang pada Koperasi PT. Perkebunan Silidak dengan menggunakan Metode Monte Carlo*. Jurnal Riset Komputer, Vol. 3 No. 6.

Kiki Hariani Manurung., Julius Santony, 2021, *Simulasi Pengadaan Barang Menggunakan Metode Monte Carlo*. Jurnal Sistem Informasi dan Teknologi, Vol. 1 No. 3.

Fitri., R. F. Adhiputra., S. Lestari, 2021, *Optimasi Komoditi Sayur Organik Di PT Masada Organik Indonesia Menggunakan Simulasi Monte Carlo*. Vol. 2 No. 2.

Gianjar Wiro Sasmito, 2017, *Penerapan Metode Waterfall Pada Desain Sistem Informasi Geografis Industri Kabupaten Tegal.* Vol. 2 No. 1.

Irfan Ardiansyah., Totok Pujianto., Indita I. P, 2019, PENERAPAN SIMULASI MONTE CARLO DALAM MEMPREDIKSI PERSEDIAAN PRODUK JADI PADA IKM BULUK LUPA. 1(3).

Ivo Andika Hasugian., Khabiril Muhyi., Nia Firlidany, 2022, SIMULASI MONTE CARLO DALAM MEMPREDIKSI JUMLAH PENGIRIMAN DAN TOTAL PENDAPATAN. 17(2).

Wita Siska Moza., Yuhandri Yunus, 2020, Pemodelan dan Simulasi Monte Carlo dalam Meningkatkan Penjualan Peralatan Motor (Studi Kasus : Bengkel AMI Motor). Vol.2 No. 4.

Muhamad Apri., Dasril Aldo., Hariselmi, 2019, SIMULASI MONTE CARLO UNTUK MEMPREDIKSI JUMLAH KUNJUNGAN PASIEN. Jurnal Sistem Informasi dan Manajemen. Vol. 7 No. 2.

A AI Akbar., Hendri A., Riska, 2020, SIMULASI PREDIKSI JUMLAH MAHASISWA BARU UNIVERSITAS DEHASEN BENGKULU MENGGUNAKAN METODE MONTE CARLO. 7(1).

Mohammad Kafil., 2019, PENERAPAN METODE K-NEAREST NEIGHBORS UNTUK PREDIKSI PENJUALAN BERBASIS WEB PADA BOUTIQ DEALOVE BONDOWOSO. 3(2)

Algifari, F. (2021). Simulasi dalam Menganalisis Tingkat Pendapatan Penjualan Handphone dengan Menggunakan Metode Monte Carlo. *Jurnal Informatika Ekonomi Bisnis*, 136–141.

Djie, I. S. J. (2013). Analisis Peramalan Penjualan dan Penggunaan Metode Linear Programming dan Decision Tree Guna Mengoptimalkan Keuntungan pada PT Primajaya Pantes Garment. *The Winners*, *14*(2), 113–119.

Linda, P., Situmorang, M., & Tarigan, G. (2014). Peramalan Penjualan Produksi Teh Botol Sosro pada PT. Sinar Sosro Sumatera Bagian Utara Tahun 2014 dengan Metode Arima Box-Jenkins. *Saintia Matematika*, *2*(3), 253–266.

Nurlifa, A., & Kusumadewi, S. (2017). Sistem peramalan jumlah penjualan menggunakan metode moving average pada rumah jilbab Zaky. *INOVTEK Polbeng-Seri Informatika*, *2*(1), 18–25.

Zulkhi, M. D. (2022). *Pengembangan modul elektronik berbasis kearifan lokal Balumbo Biduk menggunakan aplikasi 3D pageflip professional di kelas IV tema 7 Sekolah Dasar* (Doctoral dissertation, Universitas Jambi).