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Application of the K-Nearest Neighbor Method to Predict Demand for Goods from Customers at PT Sinergi Prima Enjineering

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ABSTRACT

PT Sinergi Prima Enjineering, which is engaged in services, has been trusted as a contractor in several companies facing challenges in handling the large number of requests for goods and stock inventory management. This research aims to improve the prediction of demand for goods and inventory management using the calculation of the K-Nearest Neighbor (KNN) method and RapidMiner tools. With the comparison of calculations between KNN and RapidMiner using ten test data, the results are appropriate where the categorical grouping is often ordered totaling five data, moderately ordered totaling two data and rarely ordered totaling three data. The test results show that K = 3 produces a prediction accuracy of 91.98%. These results show that K-Nearest Neighbor can accurately anticipate future stock inventory and items that will be ordered by customers and it is hoped that the company can improve customer satisfaction and overall operational performance.

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INTRODUCTION

In an era of dynamic and increasingly tight business competencies, companies are trying to improve their operational efficiency by utilizing available technology and data[1]. One important aspect of company operations is stock inventory management, where prediction of demand for goods becomes a strategic key to the success of the company and inventory planning[2],[3].

Forecasting, often known as prediction, is a calculation that looks at data from previous situations[4]. A prediction should aim to find an answer that is as close as possible to the actual event, not to provide a solution to every detail of what will happen[5]. Data mining is the process of identifying patterns, correlations, and anomalies in very large data by applying mathematical, statistical, and intelligence processing techniques. The results of data mining can be an alternative or source for better judgment in the future[6],[7].

K-Nearest Neighbor (KNN) is one of the techniques that can be used in data mining to forecast information about the demand for goods from customers. PT Sinergi Prima Enjineering, as a company engaged in services, has been trusted as a contractor in several companies. However,

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this company faces obstacles in handling the large number of requests that accumulate and stock inventory that must be in accordance with the customer's needs[8].

PT Sinergi Prima Enjineering faces concrete challenges in the form of fluctuations in demand for goods from customers that are often difficult to predict, as well as the need to maintain a balance between stock availability and actual demand[9]. If the stock of goods is too much, the company will face the problem of high storage costs and the risk of expired or damaged goods. Conversely, if the stock is too low, the company risks losing sales opportunities and decreasing customer satisfaction. Therefore, the K-Nearest Neighbor method is needed in predicting demand for goods to find out what items customers often order and when to purchase stock items so that there is no excess or shortage of stock inventory which can have a negative impact on customer satisfaction and company performance[10].

The purpose of this research is to apply the K-Nearest Neighbor method to improve the accuracy of predicting demand for goods at PT Sinergi Prima Enjineering[11]. This research aims to identify patterns of demand for goods that are often ordered by customers and determine the optimal time to make stock purchases. Thus, companies can manage inventory more efficiently and improve customer satisfaction and company operational performance[12].

In the research "K-Nearest Neighbor Method: Application of Data Mining to Predict Shallot Prices in Yogyakarta", the purpose of this research is to forecast shallot prices by utilizing data mining and the K-Nearest Neighbor technique, where four conditions or scenarios are carried out aimed at processing shallot data. The data, with a value of 91.67%, produced the best accuracy results[13].

METHODS

This research uses quantitative research methods to get a comprehensive picture of a situation by collecting, presenting, and evaluating data to produce the most recent, accurate, and relevant information.

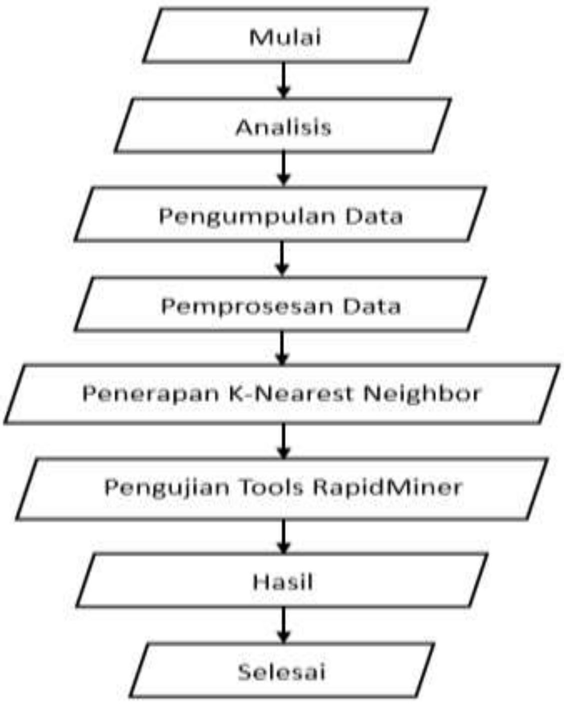

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Figure 1: Research flow

An explanation of the above-mentioned research flow is given below:

1. Data Collection, Conducting interviews with the purchasing department, visiting the research location of PT Sinergi Prima Enjineering and collecting information needed for data mining calculations using data on demand for goods from 2021 to 2022 from PT Sinergi Prima Enjineering.
2. Data Processing, at this stage, data cleaning is carried out so that there is no same data and reduces the quantity of data to be analyzed.
3. Application of K-Nearest Neighbor, At this stage, the K-Nearest Neighbor method will be used for data mining on data that is ready to be processed. The K-Nearest Neighbor (K-NN) method is a technique for categorizing new objects according to their K nearest neighbors[14],[15]. The calculation steps of the K-NN method are as follows:
   a. Determine the K value (manually selected)
   b. The Euclidean Distance formula is used to calculate the distance between training and testing data in order to evaluate a measure that can be used to interpret how close the distance between two objects is[16],[17]. The Euclidean Distance formula is as follows:

$$d(x,y) = \sqrt{\sum\nolimits_{i=1}^{n} (x_i - y_i)^2}$$

   Description:
   d(x,y)= distance between x to y data
   x_i = data training
   y_i = data testing
   n = variable data
   i = data dimension

   c. Next, group the training data according to the smallest distance.
   d. Using the majority K-Nearest Neighbor category, the value of the calculated query instance can be predicted.
   e. A higher value in the formula indicates a greater degree of similarity between two objects, while a lower value indicates a closer degree of similarity. The training and testing data are the objects in question. The amount of data determines the optimal K value [18].
4. RapidMiner testing, at this stage the data that has been processed with the K-Nearest Neighbor algorithm will be tested using the RapidMiner tool [19],[20]. RapidMiner is software used for data mining processing with the aim of finding suitable data patterns. However, it is important to note that not all algorithms can be used appropriately on every data set. Therefore, the data patterns generated from preprocessing must be modified to suit the specific needs of data processing in RapidMiner [21],[22].
5. Results, this stage explores the results of the data mining process carried out with the K-Nearest Neighbor method and the results of testing the RapidMiner tools

RESULTS AND DISCUSSION

The following is the calculation process for predicting demand for goods from customers at PT Sinergi Prima Enjineering using the K-Nearest Neighbor (K-NN) method and Microsoft Excel 2019. Based on data on demand for goods from customers from 2021 to 2022. Below is a data set of requests for goods from customers:

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Table 1. Data Set

NO	Nama	Kuantiti	Bulan
1	ST Karet	15	Januari
2	Kacamata Safety	17	Januari
3	ST Benang	20	Januari
4	ST Karet	30	Januari
5	Limit Switch	24	Januari
6	Karet Packing 5mm	50	Januari
7	Junction Box	4	Januari
8	Brushing Kawat	20	Januari
9	Solenoid Valve VQ7-8-FHG-D-3NRSC-X23	10	Januari
10	Subplate V57-8 VS7-2-A04	24	Januari
…	…	…	…
3000	B/M 16x70 SUS 304	14	Desember

K-Nearest Neihgbord Algorithm (K-NN)

To forecast the demand for goods from customers at PT Sinergi Prima Enjineering, data cleaning will now be carried out to reduce the impact of noise during the calculation process using K-Nearest Neighbor[23]. The next step is to provide training and testing data. Ten data from 2022 become testing data, while one hundred data from 2021 become data training.

Table 2. Data Training

NO	Nama Barang	Bln 1	Bln 2	Bln 3	Bln 4	Bln 5	Bln 6	Bln 7	Bln 8	Bln 9	Bln 10	Bln 11	Bln 12
1	Kabel Pejal	100	0	163	200	144	10	0	0	0	0	40	100
2	B Cutting	51	25	92	105	27	70	23	35	40	45	28	50
3	Angkur	40	15	5	0	200	4	4	150	3	2	15	4
4	B Gerinda	15	15	19	37	14	8	5	8	8	15	17	18
5	B Perseng / JFL	0	0	162	212	0	0	210	0	0	230	0	0
6	B/M Full Drat	212	12	40	50	72	30	40	48	29	100	14	10
7	ST Benang	20	15	23	14	20	4	4	22	15	12	12	1
8	Air Hose BRG Shone	50	40	40	50	60	50	50	50	50	40	50	60
9	Akrilik Clear	1	5	4	14	14	2	2	1	4	4	1	1
10	Aluminium Frame Akustik	22	34	10	57	25	23	43	32	38	12	13	12
…	...	…	…	…	...	...	...	...	...	...	...	...	...
100	Junction Box	4	3	3	1	2	0	4	2	2	4	0	0

Table 3. Data Testing

NO	Nama Barang	Bln 1	Bln 2	Bln 3	Bln 4	Bln 5	Bln 6	Bln 7	Bln 8	Bln 9	Bln 10	Bln 11	Bln 12	Katagori
1	Dyna Set	34	376	328	4	0	60	0	4	0	2	34	0	?
2	Kabel Power	10	50	200	30	10	20	0	40	50	0	30	0	?
3	ST Benang	20	15	23	14	20	4	4	22	15	12	12	1	?
4	Air Hose BRG Shone	50	35	55	70	50	50	50	40	40	30	50	50	?
5	High Angkur	14	0	66	168	0	15	15	216	20	68	55	8	?
6	Hollow full	20	40	15	44	22	172	10	61	44	31	126	4	?
7	Elbow E31 Conduit	0	6	2	0	0	0	15	0	0	3	0	0	?
8	Clamp Seling	5	1	26	0	0	5	1	230	1	7	20	10	?
9	Anchor M10	70	30	50	33	45	63	45	26	65	55	48	36	?
10	Card Case A6	100	20	75	10	30	100	40	100	20	50	30	150	?

Manual Calculation

The manual calculation with the training and testing data mentioned above, using the K-Nearest Neighbor approach, is as follows:

1. In this study, the K value used is K=3.
2. Next, use the Euclidean Distance calculation to determine the distance between the training and testing data. Here is the calculation:

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$$d=\sqrt{(100-34)^2+(0-376)^2+(163-328)^2}+(200-4)^2+(144-0)^2+(10-60)^2+(0-0)^2+(0-4)^2+(0-0)^2+(0-2)^2+(40-34)^2+(100-0)^2=494{,}63623$$

Table 4. *Euclidean Distance* Calculation Results

No Urut	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1	494,636	270,416	296,120	227,871	314,935	344,526	329,586	387,307	263,019	287,124
2	468,848	214,826	59,076	161,555	298,102	233,942	47,159	237,966	166,445	255,098
3	471,495	219,089	65,422	157,321	304,951	235,879	68,367	243,060	162,585	254,804
4	444,625	166,033	153,000	71,323	215,963	184,505	188,820	257,226	97,944	166,108
5	480,665	194,296	34,511	116,108	260,196	210,090	56,648	226,727	127,558	220,195
6	560,543	373,722	387,789	337,843	354,946	427,845	400,167	458,587	350,328	405,922
7	472,096	187,603	46,936	86,342	256,156	193,639	78,823	220,002	91,504	189,526
8	519,428	290,952	227,673	190,691	301,655	282,149	261,693	309,175	168,395	217,343
9	534,684	293,815	257,614	226,223	343,293	274,780	289,194	342,595	214,422	296,921
10	458,466	189,270	108,485	73,301	229,264	163,511	131,807	242,081	100,980	204,005
...	...	...	...	...	...	...	...	...	...	...
100	500,451	216,885	45,684	161,521	292,612	235,593	12,689	230,363	162,982	249,588

3. Next, sort the data from the Euclidean Distance calculation. To be able to find the K value.

Table 5. Sorting Result Data

No Urut	No	D1	No	D2	No	D3	...	D10
1	32	494,63623	93	270,4163457	97	296,1199081	...	287,1236667
2	7	444,6245607	4	166,0331292	88	153	...	166,1083983
3	98	547,3170927	97	303,2754524	94	223,5307585	...	273,2599495
4	21	480,6651641	12	194,2961657	6	34,51086785	...	220,1953678
5	99	560,5425943	98	373,7218217	98	387,7886022	...	405,9224064
6	95	519,4275695	95	290,9518861	95	227,6730111	...	217,3430468
7	18	477,8367922	8	187,8829423	1	0	...	223,2375416
8	11	462,9557214	14	198,242276	86	129,0736224	...	145,6880228
9	41	498,48671	40	213,5813662	18	40,16217126	...	248,197502
10	17	477,2808398	16	200,2423532	81	71	...	210,7178208
...	...	...	...	...	...	...	...	...
100	57	500,4507968	65	216,884762	44	45,68369512	...	249,58766

4. After the process of sorting the calculated data. Next, select the value of K = 3 from the sorting result data table with the closest distance value to the farthest distance.
   a. Data 1

Table 6. Data Testing 1

No	Data	D1	Category
1	A89	159,700	Frequently Ordered
2	A48	363,483	Frequently Ordered
3	A29	400,884	Frequently Ordered

The prediction results from the calculation of Data 1 are shown in the table above, and indicate that the most frequently occurring category is the frequently ordered category.

   b. Data 2

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Table 7. Data Testing 2

No	Data	D2	Category
1	B48	73,185	Frequently Ordered
2	B63	134,566	Simply Booked
3	B17	161,722	Simply Booked

The prediction results from the calculation of Data 2 are shown in the table above, indicate that the most frequently occurring category is the Simply Booked.

c. Data 3

Table 8. Data Testing 3

No	Data	D3	Category
1	C7	0	Rarely Booked
2	C53	31,273	Rarely Booked
3	C39	32,711	Rarely Booked

The prediction results from the calculation of Data 3 are displayed in the table above, and show that the most frequently occurring category is the rarely ordered category.

d. Data 4

Table 9. Data Testing 4

No	Data	D4	Category
1	D8	33,912	Frequently Ordered
2	D2	71,323	Frequently Ordered
3	D16	73,301	Simply Booked

The table above presents the approximate findings obtained from the calculation of Data 4, which indicates that the most frequently occurring category is the frequently ordered category.

e. Data 5

Table 10. Data Testing 5

No	Data	D5	Category
1	E51	193,943	Frequently Ordered
2	E43	194,846	Simply Booked
3	E2	215,963	Frequently Ordered

The prediction results from the calculation of Data 5 are displayed in the table above, and show that the most frequently occurring category is the frequently ordered category.

f. Data 6

Table 11. Data Testing 6

No	Data	D6	Category
1	F16	163,511	Simply Booked
2	F8	169,231	Frequently Ordered
3	F29	179,497	Frequently Ordered

The prediction results from the calculation of Data 6 are displayed in the table above, and show that the most frequently occurring category is the frequently ordered

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category.

g. Data 7

Table 12. Data Testing 7

No	Data	D7	Category
1	G93	0	Rarely Booked
2	G45	11,358	Rarely Booked
3	G56	11,446	Rarely Booked

The prediction results from the calculation of Data 7 are displayed in the table above, and show that the most frequently occurring category is the rarely ordered category.

h. Data 8

Table 13. Data Testing 8

No	Data	D8	Category
1	H43	35,525	Simply Booked
2	H65	185,410	Rarely Booked
3	H27	190,615	Rarely Booked

The table above presents the forecasting results obtained from the calculation of Data 8, which shows that the rarely ordered category is the most frequently occurring category.

i. Data 9

Table 14. Data Testing 9

No	Data	D9	Category
1	I8	53,981	Frequently Ordered
2	I19	91,504	Simply Booked
3	I63	97,734	Simply Booked

The prediction results from the calculation of Data 9 are shown in the table above, indicate that the most frequently occurring category is the Simply Booked.

j. Data 10

Table 15. Data Testing 10

No	Data	D10	Category
1	J8	145,688	Frequently Ordered
2	J2	166,108	Frequently Ordered
3	J51	174,579	Frequently Ordered

The prediction results from the calculation of Data 10 are displayed in the table above, and show that the most frequently occurring category is the frequently ordered category.

5. The prediction results from calculations using the Eulidean Distance formula get a category of frequently ordered 5 data, Simply Booked 2 data and rarely ordered 3 data.

Table 16. Calculation Results

No	Item Data	Category
1	D1	Frequently Ordered
2	D2	Simply Booked

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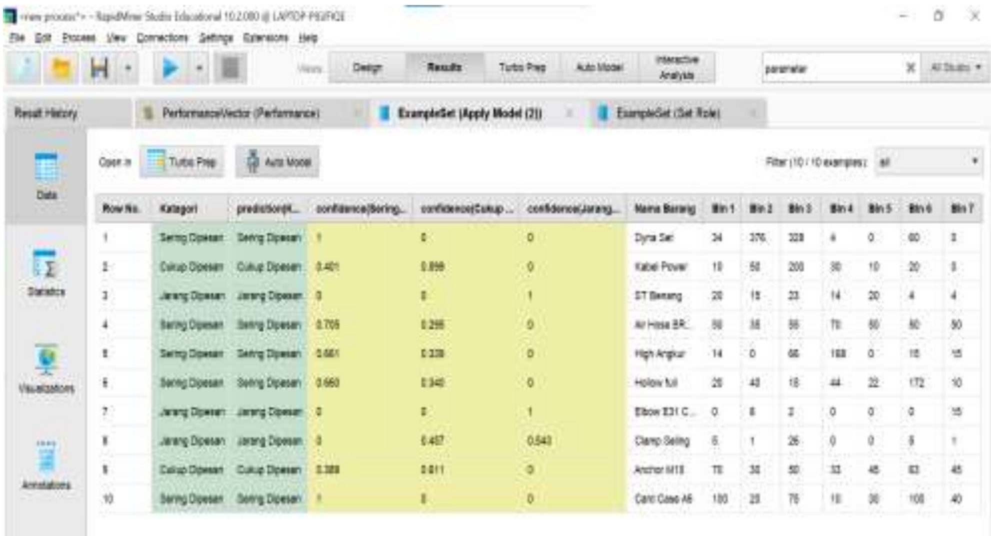
3	D3	Rarely Booked
4	D4	Frequently Ordered
5	D5	Frequently Ordered
6	D6	Frequently Ordered
7	D7	Rarely Booked
8	D8	Rarely Booked
9	D9	Simply Booked
10	D10	Frequently Ordered

RapidMiner Tools

The results of the last step of data mining with Rapidminer, which includes the prediction results of all data that meets the K=3 value, will appear in the results tab after the operator is connected.



Row No.	Kategori	prediction(K...	confidence(Sering...	confidence(Cukup ...	confidence(Jarang...	Nama Barang	Bin 1	Bin 2	Bin 3	Bin 4	Bin 5	Bin 6	Bin 7
1	Sering Dipesan	Sering Dipesan	1	0	0	Dyna Set	34	376	328	4	0	60	3
2	Cukup Dipesan	Cukup Dipesan	0.401	0.899	0	Kabel Power	10	58	200	30	10	20	3
3	Jarang Dipesan	Jarang Dipesan	0	0	1	ST Benang	20	15	23	14	20	4	4
4	Sering Dipesan	Sering Dipesan	0.705	0.295	0	Air Hose BR...	58	38	56	70	60	60	50
5	Sering Dipesan	Sering Dipesan	0.661	0.339	0	High Angkur	14	0	66	168	0	16	15
6	Sering Dipesan	Sering Dipesan	0.660	0.340	0	Holow full	26	43	16	44	22	172	10
7	Jarang Dipesan	Jarang Dipesan	0	0	1	Elbow E31 C...	0	8	2	0	0	0	15
8	Jarang Dipesan	Jarang Dipesan	0	0.457	0.543	Clamp Seling	6	1	26	0	0	5	1
9	Cukup Dipesan	Cukup Dipesan	0.389	0.611	0	Anchor M18	78	38	50	33	45	83	45
10	Sering Dipesan	Sering Dipesan	1	0	0	Card Case A6	100	23	76	18	36	108	40

Figure 2. Prediction Results

The prediction results, shown in the prediction column from a total of 10 data points, are from Figure 2 above. Three categories are rarely ordered, two categories are moderately ordered, and five categories are frequently ordered. The last is the stage to find out the amount of accuracy obtained in the prediction that has been done using the RapidMiner tool. This is the result of accuracy.

Table View Plot View

accuracy: 91.98% +/- 1.85% (micro average: 92.00%)

	true Sering Dipesan	true Cukup Dipesan	true Jarang Dipesan	class precision
pred. Sering Dipesan	9	1	0	90.00%
pred. Cukup Dipesan	3	5	0	62.50%
pred. Jarang Dipesan	0	4	78	95.12%
class recall	75.00%	50.00%	100.00%	

Figure 3. Prediction Data Accuracy Results

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Based on Figure 3 above, the results of tests that have been processed in data mining have data accuracy of 91.98% and are interpreted for each category as follows:

1. Class Precision
   a. Frequently Ordered Prediction, from a total of 10 data, the results show 9 frequently ordered data, 1 Simply Booked data and 0 rarely ordered data, where the class precision is 90%.
   b. Prediction Simply Booked, from a total of 8 data, the results show 3 frequently ordered data, 5 Simply Booked data, and 0 rarely ordered data, where the class precision is 62.50%.
   c. The results of the rarely ordered prediction show that, out of 82 data, 0 data is often ordered, 4 data is Simply Booked, and 78 data is rarely ordered. The class precision is 95.12%.
2. Class recall
   a. True Frequently Ordered, from a total of 12 data, the results are 9 frequently ordered data, 3 Simply Booked data and 0 rarely ordered data, where the class recall is 75%.
   b. True Simply Booked, from a total of 10 data, the results are 1 frequently ordered data, 5 Simply Booked data and 4 rarely ordered data, where the class recall is 50%.
   c. True Rarely ordered, from a total of 78 data, the results are 0 frequently ordered data, 0 Simply Booked data and 78 rarely ordered data, where the class recall is 100%.

From the comparison of the results of manual calculation of K-Nearest Neighbor using the Euclidean Distance formula and RapidMiner tools with ten test data, the results of the calculation of the same categories are five frequently ordered categories, two moderately ordered categories and three rarely ordered categories where the data accuracy value is 91.98%.

CONCLUSION

Comparison of the calculation of the K-Nearest Neighbor method and RapidMiner tools using ten test data for predicting data on demand for goods from customers, getting appropriate results where the frequently ordered categories amount to five data, moderately ordered amount to two data and rarely ordered amount to three data where the accuracy value achieved is 91.98%. New categories that are useful for anticipating items that will be ordered by customers and for inventory stock planning can be generated by this research. These results show that K-Nearest Neighbor can accurately anticipate future stock inventory and items that customers will order. Based on the prediction results that have been obtained, several recommendations for next steps can be taken. First, the company can improve stock inventory management by utilizing the identified demand patterns. This includes determining the optimal amount of stock that should be kept to avoid shortages or excess inventory, which in turn will reduce storage costs and the risk of expired or damaged goods. Furthermore, marketing strategies can be customized based on the demand patterns of goods. For example, companies can plan promotions or discounts in certain periods that show an increase in demand, or introduce new products that match demand trends. With these measures, the company is expected to improve customer satisfaction and overall operational performance.

REFERENCES

[1] M. Adi Swasono and A. Tri Prastowo, "Analisis Dan Perancangansistem Infomasi Pengendalian Persediaan Barang," *J. Inform. dan Rekayasa Perangkat Lunak*, vol. 2, no. 1,

Doi. https://doi.org/10.54209/jurnalinstall.v16i02.200

pp. 134–143, 2021.

[2] A. F. Qadafi and A. D. Wahyudi, "Sistem Informasi Inventory Gudang Dalam Ketersediaan Stok Barang Menggunakan Metode Buffer Stok," *J. Inform. dan Rekayasa Perangkat Lunak*, vol. 1, no. 2, pp. 174–182, 2020, doi: 10.33365/jatika.v1i2.557.

[3] S. Silvilestari, "Data Mining Menggunakan Algoritma K-Nearest Neighbor Dalam Menentukan Kredit Macet Barang Elektronik," *J. Media Inform. Budidarma*, vol. 5, no. 3, p. 1063, 2021, doi: 10.30865/mib.v5i3.3100.

[4] Y. Handayani, T. Hidayat, and H. Arruhama, "Implementasi Metode K-Nearest Neighbor Untuk Prediksi Penjualan Produk Terlaris Pada Toko Indah Jaya," *J. Tek. Inform. dan Desain Komun. Vis.*, vol. 2, no. 2, pp. 82–91, 2023.

[5] A. Muhadi and A. Octaviano, "Penerapan Data Mining Untuk Prediksi Hasil Keuntungan Lelang Mesin X-Ray Tahun 2020 Dengan Metode K-Nearest Neighbor (Studi Kasus : PT.Ramadika Mandiri)," *J. Inform. MULTI*, vol. 1, no. 2, pp. 2985–8860, 2023.

[6] A. A. Putri, "Penerapan Data Mining Untuk Memprediksi Penjualan Buah Dan Sayur Menggunakan Metode K-Nearest Neighbor (Studi Kasus : PT . Central Brastagi Utama)," vol. 1, no. 6, pp. 354–361, 2021.

[7] J. T. Industri *et al.*, "Jurnal SENOPATI," pp. 12–22, 2020.

[8] D. Kurniawan, "Sistem Pendataan Hasil Kinerja Akademik Mahasiswa Berbasis Data Warehouse Dan K-Nearest Neighbor," *J. Teknol. Pint.*, vol. 2, no. 5, pp. 1–14, 2022.

[9] R. R. Arisandi, S. Sumarno, and H. Setiawan, "Comment Sentiment Analysis of JNE Using K-Nearest Neighbor (KNN) Method on Twitter," *Indones. J. Innov. Stud.*, vol. 23, pp. 1–21, 2023, doi: 10.21070/ijins.v22i.883.

[10] M. Fansyuri, "Analisa algoritma klasifikasi k-nearest neighbor dalam menentukan nilai akurasi terhadap kepuasan pelanggan (study kasus pt. Trigatra komunikatama)," *Humanika J. Ilmu Sos. Pendidikan, dan Hum.*, vol. 3, no. 1, pp. 29–33, 2020.

[11] A. Alfani W.P.R., F. Rozi, and F. Sukmana, "Prediksi Penjualan Produk Unilever Menggunakan Metode K-Nearest Neighbor," *JIPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 6, no. 1, pp. 155–160, 2021, doi: 10.29100/jipi.v6i1.1910.

[12] A. Muhajirin, S. A. Sasosno, and T. Wangsalegawa, "Klasifikasi Algoritma K-Nearest Neigbhor Untuk Memprediksi Barang Pada PT Enesis Group," *J. Inf. Inf. Secur.*, vol. 2, no. 2, pp. 149–156, 2021.

[13] D. Virdaus and P. T. Prasetyaningrum, "Penerapan Data Mining Untuk Memprediksi Harga Bawang Merah Di Yogyakarta Menggunakan Metode K-Nearest Neighbor," *J. …*, no. 84, pp. 1–8, 2020.

[14] A. Alim Murtopo, B. Priyatna, and R. Mayasari, "Signature Verification Using The K-Nearest Neighbor (KNN) Algorithm and Using the Harris Corner Detector Feature Extraction Method," *Buana Inf. Technol. Comput. Sci. (BIT CS)*, vol. 3, no. 2, pp. 35–40, 2022, doi: 10.36805/bit-cs.v3i2.2763.

[15] D. Safitri, S. S. Hilabi, and F. Nurapriani, "Analisis Penggunaan Algoritma Klasifikasi Dalam Prediksi Kelulusan Menggunakan Orange Data Mining," *Rabit J. Teknol. dan Sist. Inf. Univrab*, vol. 8, no. 1, pp. 75–81, 2023, doi: 10.36341/rabit.v8i1.3009.

[16] H. Andriana, S. Shofia Hilabi, and A. Hananto, "Penerapan Metode K-Nearest Neighbor pada Sentimen Analisis Pengguna Twitter terhadap KTT G20 di Indonesia," *JURIKOM (Jurnal Ris. Komputer)*, vol. 10, no. 1, pp. 60–67, 2023, doi: 10.30865/jurikom.v10i1.5427.

[17] T. Widyanti, S. S. Hilabi, A. Hananto, Tukino, and E. Novalia, "Implementasi K-Means dan K-Nearest Neighborspada Kategori Siswa Berprestasi," *J. Inf. dan Teknol.*, vol. 5, no. 1, pp. 75–82, 2023, doi: 10.37034/jidt.v5i1.255.

[18] T. Hidayat, "Data Mining untuk Meningkatkan Efisiensi dan Prediksi Produk Garmen

Doi. https://doi.org/10.54209/jurnalinstall.v16i02.200

Menggunakan Algoritma K-Nearest Neighbor di PT Mas Silueta," *J. Kridatama Sains Dan Teknol.*, vol. 6, no. 01, pp. 160–173, 2024, doi: 10.53863/kst.v6i01.1085.

[19] D. Damayanti, "Perbandingan Akurasi Software Rapidminer dan Weka Menggunakan Algoritma K-Nearest Neighbor (K-NN)," *J. Syntax Admiration*, vol. 2, no. 6, pp. 994–1006, 2021, doi: 10.46799/jsa.v2i6.247.

[20] Pradana Rizki Maulana, April Lia Hananto, Agustia Hananto, and Bayu Priyatna, "Klasterisasi Tingkat Penjualan Kedai Kopi Hallo Burjois Menggunakan Algoritma K-Medoids Sebagai Evaluasi," *J. Fasilkom*, vol. 14, no. 1, pp. 226–233, 2024, doi: 10.37859/jf.v14i1.6912.

[21] N. E. Pratiwi, L. Suryadi, N. E. Pratiwi, F. Ardhy, and P. Riswanto, "Penerapan Data Mining Prediksi Penjualan Mebel Terlaris Menggunakan Metode K-Nearest Neighbor (K-Nn) (Studi Kasus : Toko Zerita Meubel)," *JUSIM (Jurnal Sist. Inf. Musirawas)*, vol. 7, no. 2, pp. 174–184, 2022.

[22] J. Teknika, J. Fitriana, and J. Triloka, "Teknika 17 (2): 435-445 Prediksi Stok Bahan Baku Minuman Pada Cafe Kiyo Menggunakan Machine Learning," *Ijccs*, vol. x, No.x, no. x, pp. 1–5, 2023.

[23] C. Anisa and Andri, "Penerapan Algoritma k-Nearest Neighbor untuk Prediksi Penjualan Obat pada Apotek Kimia Farma Atmo Palembang," *Bina Darma Conf. Comput. Sci.*, pp. 199–208, 2020.