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CLASSIFICATION OF NUTRITIONAL STATUS USING K-NEAREST NEIGHBOR (KNN) METHOD

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Abstract: According to a statement from the chairman of the Ngadimulyo village cadres, the prevalence of stunting in five-year-old babies (toddlers) in Ngadimulyo village in 2022 is 20%, which means there are 32 stunted toddlers out of 160 toddlers in Ngadimulyo village. The first 1000 days are the golden age for babies, but many toddlers aged 0-59 months still experience nutritional problems. In interviews with several mothers in Ngadimulyo village who have toddlers, many mothers still do not understand the calculation of nutritional status; they only rely on calculations from posyandu cadres recorded in the MCH book (Maternal and Child Health). Data recording is still conventional and produces physical data in the form of books, so data storage also has many risks, such as damage and loss. To reduce the risk of stunting, a system is needed that facilitates the calculation of under-five nutrition so that parents can independently calculate the nutritional status of their under-fives. Currently, many parents are still assisted in determining stunting criteria. Currently, parents only get stunting knowledge from counseling, so parents who have toddlers do not understand to analyze stunting symptoms independently. They are unaware if stunting occurs; therefore, with a system that can assist parents in calculating stunting rates, it is hoped that parents can provide maximum nutritional intake so that stunting cases decrease. Parents can also prevent stunting from occurring. One of the systems used to calculate the nutritional status classification of toddlers is the K-Nearest Neighbor Method (KNN). The reason for choosing the KNN method is because this method can meet other variables in determining the nutritional status of toddlers and is one of the most basic and simple grouping techniques.

Keywords: Classification, K-Nearest Neighbor (KNN), Stunting, Toddler Nutrition

1. INTRODUCTION

Even though Ngadimulyo village is not one of the villages with high stunting cases and is not in the red zone, Ngadimulyo village should not be left alone and sidelined by government monitoring of stunting; therefore to make it easier for posyandu cadres and Ngadimulyo village parents to monitor toddler nutritional developments, researchers create a system that can easily calculate the nutritional status of toddlers. According to a statement from the chairman of the Ngadimulyo village cadres, the prevalence of stunting in five-year-old babies (toddlers) in Ngadimulyo village in 2022 is 20%, which means there are 32 stunted toddlers out of 160 toddlers in Ngadimulyo village. The first 1000 days are the golden age for babies, but many toddlers aged 0-59 months still experience nutritional problems (Hidayat, 2017). In interviews with several mothers in Ngadimulyo village who

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have toddlers, many mothers still do not understand the calculation of nutritional status; they only rely on calculations from posyandu cadres recorded in the MCH book (Maternal and Child Health). Data recording is still conventional and produces physical data in the form of books, so data storage also has many risks, such as damage and loss. To reduce the risk of stunting, a system is needed that facilitates the calculation of under-five nutrition so that parents can independently calculate the nutritional status of their under-fives. Currently, many parents are still assisted in determining stunting criteria. Currently, parents only get stunting knowledge from counseling, so parents who have toddlers do not understand to analyze stunting symptoms independently (La Ode Alifariki, 2020). They are unaware if stunting occurs; therefore, with a system that can assist parents in calculating stunting rates, it is hoped that parents can provide maximum nutritional intake so that stunting cases decrease. Parents can also prevent stunting from occurring.

The KNN algorithm is a method for classifying objects based on learning data that is closest to the object (Sibyan, 2022). The class that appears the most will result from the classification. Based on the dataset obtained being of a numeric type, a method that supports numerical data is used using the KNN algorithm (Sidik, 2020). In classification techniques with implementation, KNN is one of the methods included in the Supervised Learning algorithm and can provide good accuracy results (Liantoni, 2016).

2. METHOD

This research was conducted in Ngadimulyo, Selomerto District, Wonosobo Regency, Central Java, Postal Code 56361. This research was conducted from September 19, 2022, starting from the commencement of research on the classification of the nutritional status of toddlers using the K-Nearest Neighbor (KNN) method. The data used in this study is on all toddlers who attend posyandu in Ngadimulyo village, totaling 160 toddlers.

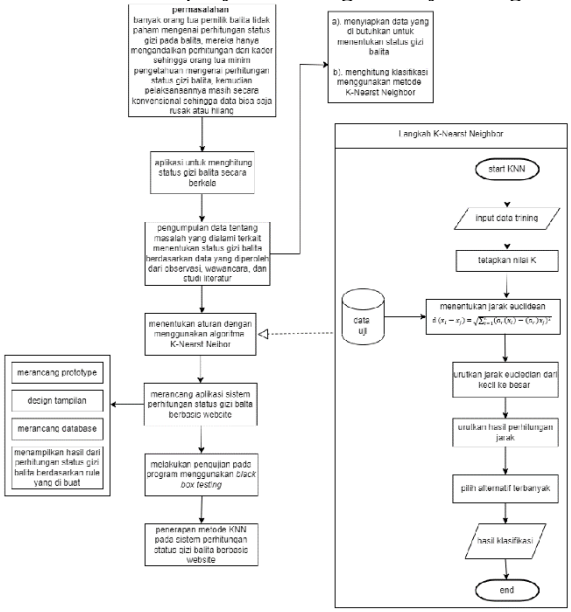

Fig. 1. Research Framework

3. RESULT AND DISCUSSION

System analysis aims to determine the extent to which the system to be made can handle existing problems. With system analysis, it will be easy to find out what needs are needed in developing a nutritional status classification system for toddlers and can evaluate problems and obstacles that occur so that they can be used as reference material for forming conclusions. In addition, system analysis will discuss how to calculate the nutritional status of toddlers using the K-Nearest Neighbor (KNN) algorithm, which will classify according to their class.

The system to be built is:

1. The application to be built is in the form of a website accessed by parents who have registered and logged in.
2. The classification method uses the K-Nearest Neighbor (KNN) algorithm

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K-Nearest Neighbor (KNN) Algorithm Analysis

Following will be a sample calculation using the K-Nearest Neighbor (KNN) algorithm for test data for the nutritional status of a small child aged 21 months, weight 10.1 kg, height 81.2 cm, head circumference 47 cm. While the training data is shown in the table below.

Table 1. Training Data

no	Name	Weight	Height	Head circumference	Age (Month)	Gender	BB/U
1	Toddler 1	7,3	71	43	15	L	Malnutrition
2	Toddler 2	15,4	103	50	56	L	good nutrition
3	Toddler 3	10	78	47	18	L	good nutrition
4	Toddler 4	13,7	97,5	50	53	L	good nutrition
5	Toddler 5	12,5	88,5	47	30	P	Malnutrition
6	Toddler 6	10,7	81,5	47	31	P	Malnutrition
7	Toddler 7	10,6	79	47	18	P	Malnutrition
8	Toddler 8	12,8	90,2	50	40	P	Malnutrition
9	Toddler 9	9,9	81,5	46	27	P	Malnutrition
10	Toddler 10	10,7	90	47	48	P	Malnutrition

a) Find the value of K

$$K = \sqrt{n}$$

where n = 10, so

$K = \sqrt{10}$ = 3,162 rounded to 3,

then value K = 3

b) Calculate the distance between the test data and the existing training data using the KNN formula, namely

$d_i = \sqrt{\sum_{r=1}^{n}(p_i - q_i)^2}$

$d_i = \sqrt{(p_i - q_i)^2 + (p_i - q_i)^2 + \cdots + (p_n - q_n)^2}$

$d_1 = \sqrt{(10{,}1 - 7{,}3)^2 + (81{,}2 - 71)^2 + (47 - 43)^2 + (21 - 15)^2}$
= 12,8

$d_2 = \sqrt{(10{,}1 - 15{,}4)^2 + (81{,}2 - 103)^2 + (47 - 50)^2 + (21 - 56)^2}$
= 41,6

$d_3 = \sqrt{(10{,}1 - 10)^2 + (81{,}2 - 78)^2 + (47 - 47)^2 + (21 - 18)^2}$
= 10,67

$d_4 = \sqrt{(10{,}1 - 13{,}7)^2 + (81{,}2 - 97{,}5)^2 + (47 - 50)^2 + (21 - 53)^2}$
= 36,21

$d_5 = \sqrt{(10{,}1 - 12{,}5)^2 + (81{,}2 - 88{,}5)^2 + (47 - 47)^2 + (21 - 30)^2}$
= 11,83

$d_6 = \sqrt{(10{,}1 - 10{,}7)^2 + (81{,}2 - 81{,}5)^2 + (47 - 47)^2 + (21 - 31)^2}$
= 10,01

$d_7 = \sqrt{(10{,}1 - 10{,}6)^2 + (81{,}2 - 79)^2 + (47 - 47)^2 + (21 - 18)^2}$
= 3,7

$d_8 = \sqrt{(10{,}1 - 12{,}8)^2 + (81{,}2 - 90{,}2)^2 + (47 - 50)^2 + (21 - 40)^2}$
= 21,40

$d_9 = \sqrt{(10{,}1 - 9{,}9)^2 + (81{,}2 - 81{,}5)^2 + (47 - 46)^2 + (21 - 27)^2}$
= 6,09

$d_{10} = \sqrt{(10{,}1 - 10{,}7)^2 + (81{,}2 - 90)^2 + (47 - 47)^2 + (21 - 48)^2}$
= 28,4

c) It is known that the result of K = 3, then order the smallest 3 from the calculation of the Euclidean Distancee

no	Nama balita	Berat badan	Tinggi badan	Lingkar kepala	Umur (bulan)	Jenis Kelamin	BB/U	Jarak Eucliedian Distance
1	Toddler 7	10,6	79	47	18	P	Malnutrition	3,7
2	Toddler 9	9,9	81,5	46	27	P	Malnutrition	6,09
3	Toddler 6	10,7	81,5	47	31	P	Malnutrition	10,01

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4	Toddler 3	10	78	47	18	L	good nutrition	10,67
5	Toddler 5	12,5	88,5	47	30	P	Malnutrition	11,83
6	Toddler 1	7,3	71	43	15	L	Malnutrition	12,8
7	Toddler 8	12,8	90,2	50	40	P	Malnutrition	21,40
8	Toddler 10	10,7	90	47	48	P	Malnutrition	28,40
9	Toddler 4	13,7	97,5	50	53	L	good nutrition	36,21
10	Toddler 2	15,4	103	50	56	L	good nutrition	41,6

In the data above there is an anthropometric index that produces 3 statuses of "good nutrition" because the most votes are good nutrition, so the final results obtained are: toddler with male gender, age 21 months, weight 10.1 kg, height 81 .2 cm, head circumference 47 cm has a status of "good nutrition"

System Implementation

Below is a display of the dataset page that is used to input the training data that will be used

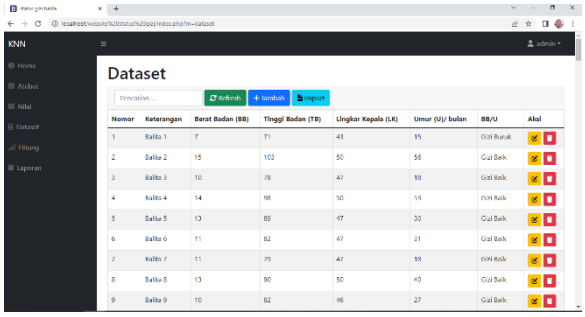

Fig. 2. Set Data

The image below displays the calculation page for data testing. Users can input data to be tested.

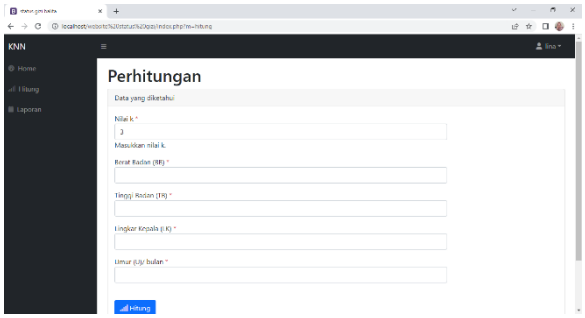

Fig. 3. Data Input Form

The results of the calculation or classification of nutritional status are shown in the figure below

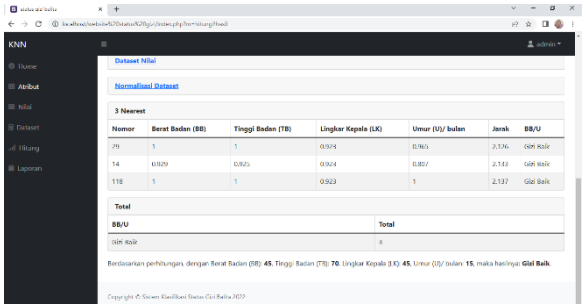

Fig. 4. Calculation Results

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4. CONCLUSION

The conclusions that can be drawn from the Nutrition Status Classification report in Ngadimulyo Village Using the Website-Based K-Nearest Neighbor (KNN) Method are as follows: The nutritional status classification system was successfully built using the K-Nearest Neighbor (KNN) method with the stages of determining the value of K for consideration of class determination, then calculating new data with each dataset, and then taking a number of K from the order of the smallest results and determining the class of the new data, The output produces categories of under-five nutritional status such as poor nutrition, undernutrition, good nutrition, over nutrition, The process of checking nutritional status takes training data from the Posyandu of Ngadimulyo village, Testing using a black box shows that the system is in accordance with the design.

5. REFERENCES

Hidayat, M. S., & Pinatih, G. N. I. (2017). Prevalensi stunting pada balita di wilayah kerja Puskesmas Sidemen Karangasem. E-Jurnal Medika, 6(7), 1-5.

La Ode Alifariki, S. K. (2020). Gizi Anak dan Stunting. Penerbit LeutikaPrio.

Liantoni, F. (2016). Klasifikasi Daun Dengan Perbaikan Fitur Citra Menggunakan Metode K-Nearest Neighbor. *Jurnal ULTIMATICS*, *7*(2), 98–104. https://doi.org/10.31937/ti.v7i2.356

Sibyan, H., & Hasanah, N. (2022). ANALISIS SENTIMEN ULASAN PADA WISATA DIENG DENGAN ALGORITMA K-NEAREST NEIGHBOR (K-NN). Jurnal Penelitian dan Pengabdian Kepada Masyarakat UNSIQ, 9(1), 38-47.

Sidik, A. D. W. M., Kusumah, I. H., Suryana, A., Artiyasa, M., & Junfithrana, A. P. (2020). Gambaran Umum Metode Klasifikasi Data Mining. FIDELITY: Jurnal Teknik Elektro, 2(2), 34-38.