Analysis of the Healing Rate of Broken Bone Patients in the Traditional Treatment of Malumta Broken Shamans Medan Johor Using Decision Tree Method

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Abstract
Bone fractures are common injuries that require proper treatment for optimal recovery. In addition to conventional medical treatment, traditional treatments, such as those performed by traditional bone setters, are still widely sought after, especially in certain areas like the Malumta traditional bone setter in Medan. This study aims to analyze the healing time of bone fracture patients who seek treatment from traditional bone setters in Malumta, Medan Johor, and identify the factors that influence the speed of healing using the decision tree method. Data were obtained from the Malumta traditional bone setter in Medan Johor and through interviews to obtain several factors that differentiate the healing time of bone fracture patients. The variables examined included the type of fracture, patient age, severity of the fracture, duration of treatment, and healing time. Data were collected based on patients from the last 2 years. The decision tree method was used to identify the most influential factors on healing. This research provides information to understand the factors affecting the healing time of bone fracture patients treated by traditional bone setters.

Keywords: Bone fracture, Traditional treatment, Decision tree, Data Mining, Malumta

Introduction

Fractures are one of the most common health problems experienced by people, either due to accidents or excessive physical activity. Fracture treatment can be done through two approaches, namely medical treatment and traditional medicine. Traditional health services that are quite popular in Indonesian society are fracture treatment or often referred to by the community as fracture shamans[1][2]. The difference in the principles of scientific handling of fractures between modern medicine and traditional medicine includes that modern reduction, retention and immobilization are carried out by applying casts and or Orif (Open Reduction Intra Fixation) through surgery, while traditional medicine is simpler, namely by sequencing or pulling the broken bone and then fixing it using improvised materials [3]. Traditional treatment by fracture shamans, such as the Malumta fracture shaman in Medan Johor, has become an alternative for the community in overcoming fracture problems. Malumta fracture shamans are known to have special abilities in treating patients with fractures using traditional methods. Malumta's treatment has been established for 20 years and has a wide range of patients ranging from sprains, broken bones[4].Malumta's traditional fracture treatment is also found in various places, especially in North Sumatra.

However, the level of healing time of this traditional treatment is not known for certain. Therefore, this study aims to analyze the level of healing time of fracture patients who undergo traditional treatment at Dukun Patah Malumta Medan Johor. This research applies the Decision Tree method to identify factors that influence the level of healing time of patients. Decision tree can turn facts into a decision tree that can present a rule [5]. Decision tree uses a tree structure representation, where each node represents an attribute, branches represent attribute values, and nodes represent classes [6][7]. Decision Tree is one of the most popular classification methods in machine learning, which is known for its ability to break down complex decision-making processes into simpler and more understandable structures[8].Through decision tree analysis, it is hoped that clearer information can be obtained about the effectiveness of the healing time of Malumta's traditional broken shaman treatment and the factors that influence the level of healing time.

Research Methodology

2.1 Research Stages

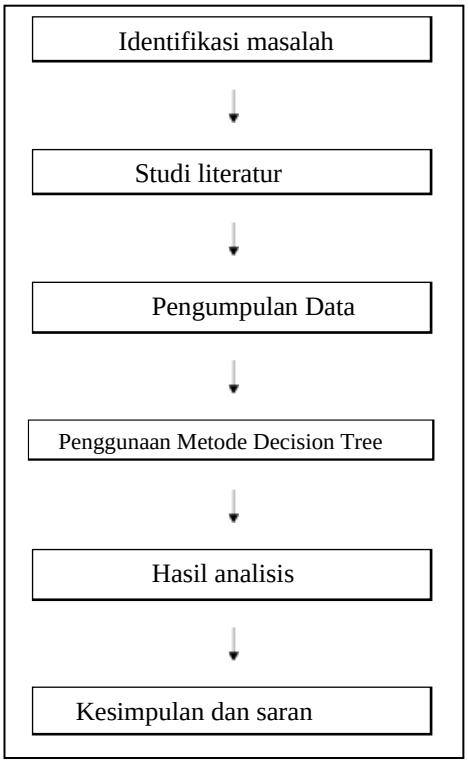

Figure 1. Research Stages

A. Problem identification

In this context, the author analyzes the problems that occur especially in the traditional treatment of traditional healers broken malumta medan johor, this analysis is carried out important to analyze how the healing time of patients who seek treatment at the broken malumta shaman medan johor.

B. Literature study

After identifying the existing problems, the author searches for references from existing journals to find the right method in conducting the analysis that the author does. this process also aims to provide a strong foundation to overcome the problems to be analyzed.

C. Data collection

The author gets the data needed directly from the broken malumta dukun medan johor, the data used to analyze in this study based on data from 2022 to 2024.

D. Using the decision tree method

Decision tree is used in this analysis process because it can identify the problem of the level of healing time of fracture patients at the shaman broken malumta medan johor.

E. Analysis result

Produce a decision tree visualization that describes the factors that cause the level of healing time of fracture patients in the treatment of shaman broken malumta medan johor.

F. Conclusions and suggestions

The conclusion is a summary of the research that answers the objectives briefly and on target based on the results of the process that has been made. Suggestions are recommendations from the author for further research or application of the results.

Data Mining

Data mining is the process of finding interesting patterns or information in selected data using certain techniques or methods. The techniques, methods, or algorithms in data mining vary widely. The selection of the right method or algorithm is highly dependent on the objectives and the overall Knowledge Discovery in Database (KDD) process[9]. The term knowledge discovery is appropriately used because the main purpose of data mining is to obtain knowledge that is still hidden in chunks of data [10]. Rizky, et al [11] summarize the meaning of data mining from several other quotes, namely data mining is the analysis of data sets to find relationships and conclude data in a clear way, where the results are understandable and useful for data owners. In this study, the authors used decision tree techniques in the data mining process.

Decision Tree

The C4.5 algorithm or commonly referred to as a decision tree has a training sample in the form of a set of data that will later be used to build a tree that has been tested[12][13].Decision Tree is one of the methods widely used in Machine Learning, Image Processing, and Pattern Identification[14]. This algorithm has functions related to class categories and class labels and processes newly obtained data classifiers. In addition, this algorithm performs training data sorting by collecting information from the dataset [15]. Therefore, researchers use the decision tree method in this study because it can process data that has several factors and is classified to get the desired results. The C4.5 Algorithm formula is divided into 2 formulas, the first is the formula for finding the gain value. The gain formula is as follows [16]:

$$\text{Gain (S,A)} = \text{Entropy (S)} - \sum_{i=1}^{n} \frac{|S_1|}{|S|} * Entropy\ (Si)$$

Description:
S : Case Set
A : Attributes
N : Number of Partitions of Attribute A
$|S_1|$: Number of Cases in the i-th Partition
$|S|$: Number of Cases in S

And the second formula is:

$$Entropy(S) = \sum_{i=1}^{n}(-p_i) * \log_2 p_i$$

Description:
S : Set of Cases
N : Number of Partitions S
Pi : the probability obtained from case i divided by the total cases.

Results and Discussion

A. Data Selection

At this stage the author takes data from the shaman broken malumta medan johor, the data taken is only data on patients with hand fractures and leg fractures, the data taken is based on patients from 2022 to 2024 the latest patients.

B. Table Data

Table data is prepared so that it can be easy to continue the analysis process that researchers do.

	A	B	C	D	E	F	G	H	I	J	K
1	iddata_p	nama	Patah_P	usia	alamat	nggal_pengobatan	lama_pe	jenis_kel	tingkat_kepar	keterangan_us	lama_penyembuhan
2	1	Arsila	Tangan	18	JL Taman Putri Deli	7/1/2022	30	P	ringan	Muda	Sub-akut
3	2	M Sauvi Lubis	Kaki	34	JL Karya Muda	8/1/2022	70	L	berat	Dewasa	Kronis
4	3	Dedi Subagio	Tangan	41	JL Binjai Km12	14/1/22	40	L	ringan	Dewasa	Sub-akut
5	4	Akmal	Kaki	23	JL Eka Warni	26/1/22	45	P	ringan	Muda	Kronis
6	6	Tiar	Kaki	60	JL Melati	4/2/2022	80	P	berat	Lansia	Kronis
7	7	Zakhwan	Tangan	20	JL Tanjung Morawa	4/2/2022	14	L	ringan	Muda	Akut
8	9	Joni Irawan	Kaki	36	JL Tengku Heran Kualanamo	8/2/2022	70	L	berat	Dewasa	Kronis
9	10	Bagus	Tangan	15	JL AH Nasution	8/2/2022	20	L	ringan	Muda	Akut
10	11	Fais	Tangan	4	JlP 2 Karya Wisata	18/3/22	16	L	ringan	Anak-anak	Akut
11	12	Asep	Kaki	29	JL Sm Raja	18/3/22	60	L	sedang	Muda	Kronis
12	13	Revan	Tangan	9	JL Komplek JBBC	18/3/22	20	L	ringan	Anak-anak	Akut
13	14	Fitri	Tangan	12	JL Amaliun	4/8/2022	20	P	ringan	Muda	Akut
14	16	Dinda	Tangan	28	JL Brigjen Katamso	5/2/2022	45	P	sedang	Muda	Kronis
15	17	Akil	Kaki	17	JL Delitua	5/5/2022	55	L	berat	Muda	Kronis
16	18	Cibro	Tangan	32	JL Namorambe	5/14/2022	40	L	sedang	Dewasa	Sub-akut
17	19	Eva	Kaki	35	JL Namorambe Blok C 22	22/5/22	50	P	berat	Dewasa	Kronis
18	20	Bu Ati	Tangan	53	JL Pelopor	22/5/22	37	P	sedang	Dewasa	Sub-akut
19	21	Siregar	Tangan	34	JL Setiabudi	29/5/22	44	L	sedang	Dewasa	Kronis
20	22	Heri	Tangan	37	JL Karya Darma	31/5/22	37	L	sedang	Dewasa	Sub-akut
21	23	Salsa	Tangan	16	JL Karya Kasih	31/5/22	24	P	ringan	Muda	Akut
22	24	Doni	Tangan	20	JL Katamso	3/6/2022	30	L	ringan	Muda	Sub-akut
23	25	Ihsan	Kaki	21	JL Karya Wisata Ujung	14/6/22	55	L	sedang	Muda	Kronis
24	26	Arita	Kaki	32	JL Pd Bulan	25/6/22	75	P	berat	Dewasa	Kronis
25	27	Rahmi Utami Lubis	Tangan	21	JL Karya Wisata Ujung Johor 1 Blok C	2/7/2022	30	P	ringan	Muda	Sub-akut
26	28	Azhar Novrizal	Tangan	17	JL Nogeo 1 Delitua	9/7/2022	24	L	ringan	Muda	Akut
27	29	Zaki	Tangan	6	JL Delitua	9/7/2022	14	L	ringan	Anak-anak	Akut
28	30	David	Tangan	38	JL Jamin Ginting	15/7/22	74	L	berat	Dewasa	Kronis
29	32	Andra	Tangan	30	JL Simalingkar	20/8/22	37	L	sedang	Muda	Sub-akut
30	33	Zul	Tangan	42	JL STM	30/8/22	44	L	sedang	Dewasa	Kronis

Figure 2. Data table

The data above has been categorized by the author, where the patient's age information is grouped into 4 parts, namely, children (under 10 years), young (10-30 years), adults (30-59 years), elderly (over 59 years) and also the author categorizes based on healing time into 3 parts, namely, acute (under 25 days), sub-acute (25-40 days), chronic (over 40 days). The results of this research analysis show consistency with the findings of previous studies, where chronic fracture cases require more than 40 days of healing time and treatment of sub-acute fractures takes approximately 1 month. According to Anggriani Nian, et al results For fracture patients who are considered severe, it is recommended to come again once a week for 2-3 for patients

who have severe fractures in general, it takes about 3 months and patients with less severe fractures, it is recommended to come again once a week for 1 month for patients who have less severe fractures in general, it takes about 1 month [17].

C. Data preprocessing

At this stage, the original data processing is carried out to take what data you want to use to proceed to the data analysis stage.

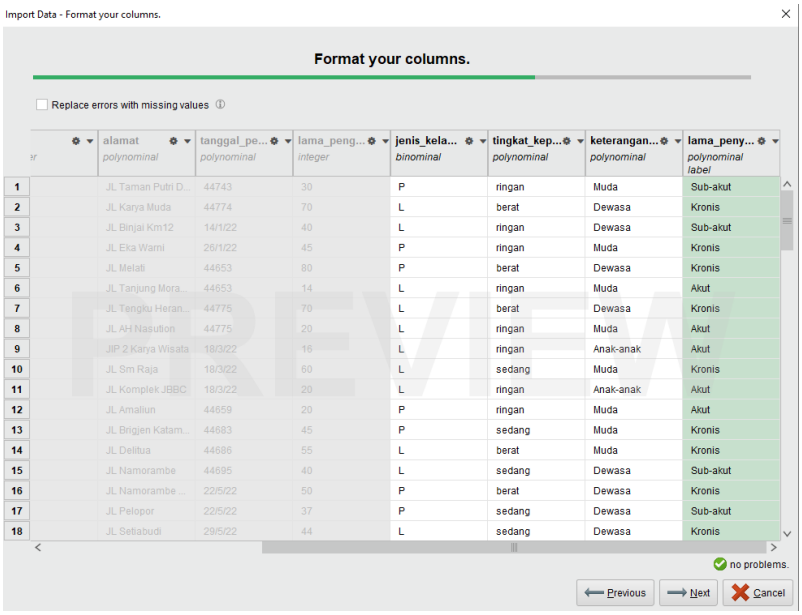

Figure 3. Data preprocessing

D. Analysis Design

This analysis design uses the AI Studio application using the decision tree module as in the following figure

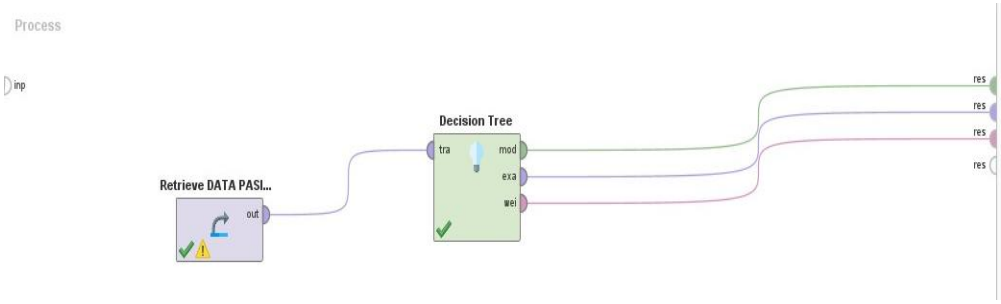

Figure 4. Analysis Design with Decision Tree

E. Decision Tree Results

After the analysis design process is successful, the results of the decision tree analysis will appear as shown below.

Figure 5. Decision Tree Analysis Results

From the picture above, it can be interpreted that every patient who has a leg fracture and if the patient's age is above adulthood, the healing period is included in the chronic group or above 40 days.

Conclusions and Suggestions

This study aims to analyze the healing time of fracture patients undergoing traditional treatment at Dukun Patah Malumta, Medan Johor, and identify the factors that influence it. Through the application of the *decision tree* method with the help of the AI Studio 2024 application, this study successfully classified patients based on their characteristics and disease history, and predicted the healing time rate. The analysis showed that patients with leg fractures and adults tend to have a longer healing time of more than 40 days or fall into the chronic category. This indicates that the type of fracture and the age of the patient are significant factors that influence the length of healing time. In addition, this study also proved that the AI Studio 2024 application is very helpful in analyzing data using the *decision tree* method. Nonetheless, this study has limitations in terms of the variety of fracture types and other factors that may affect healing time. Therefore, future research is recommended to expand the scope of fracture types, consider other factors such as the patient's health condition and the type of treatment given, and compare the effectiveness of traditional treatment with modern medical treatment. Future research can also try to apply other classification methods or compare several methods to find the most efficient method in predicting the healing time of fracture patients.

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