

Analysis of the Number of Children Owned by Nursing Home Residents Using the C4.5 Algorithm


Muhammad Indra¹, Darmeli Nasution²

^{1,2}Master of Information Technology, Universitas Pembangunan Panca Budi

ABSTRACT

Advances in information technology, particularly in data mining and machine learning, offer opportunities to increase the efficiency of nursing home management. This research aims to analyze the pattern of the number of children in nursing homes using the C4.5 algorithm, providing insight for managers to design more effective programs. The data used in this research is secondary data from the UPTD population list for Elderly Social Services for the period January to September 2024. Using RapidMiner software, a decision tree model was built to group the population based on the number of children. The analysis revealed five categories of citizens: no children, one child, two children, three children, and five children. The largest number of residents (285 people) have no children, followed by residents who have one child (63 people), three children (45 people), two children (9 people), and five children (8 people). These findings indicate that residents who do not have children are more likely to choose to live in nursing homes. This study provides a basis for increasing interaction between residents and their families, especially for those who do not have children. Further research with larger samples is needed to explore other factors influencing nursing home residents' decisions.

Keyword : Nursing Home, C4.5 Algorithm, Data Mining.

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Corresponding Author:

Muhammad Indra,
Master of Information Technology
Universitas Pembangunan Panca Budi
Jl. Jend. Gatot Subroto Km. 4,5 Sei Sikambing 20122, Medan, Indonesia.
Email : or6kp9@gmail.com

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1. INTRODUCTION

The rapid advancement of information technology has had a significant impact on various sectors, including social services. The continuous development of information technology enables increased efficiency and effectiveness across various services, including the management of nursing homes. In this regard, the presence of software that supports data processing, such as data mining algorithms and machine learning, has become an invaluable tool for analyzing various patterns and information, including in the context of nursing homes. The rapid progress of information technology offers hope for many parties to facilitate activities and streamline business processes (Pratama & Sutabri, 2023), including in the management of nursing homes, which require accurate data and precise analysis.

In this context, RapidMiner, as a software platform for data science and machine learning (Nahjan et al., 2023), becomes a relevant choice. One technique that can be utilized in the data processing process is data mining, which is a method for extracting valuable information from large datasets (Asyuti & Setyawan, 2023). One popular algorithm in data mining is C4.5, which is used to build decision trees for classification and prediction based on available data (Gaol, 2020). This algorithm allows the creation of rules that can be used to classify or predict various aspects of life, including the number of children owned by nursing home residents.

A nursing home, as a social institution providing services to the elderly, has the need to understand the profiles of its residents, including their family status, in order to provide better services (Kumalasari et al., 2023). One relevant aspect to analyze is the number of children the nursing home residents have. By using the C4.5 algorithm, this analysis can reveal existing patterns and provide insights into the factors influencing the residents' decisions to choose to live in a nursing home.

This study aims to analyze the number of children that nursing home residents have using the C4.5 algorithm. By understanding the classification patterns of the number of children among nursing

home residents, this research is expected to provide valuable insights for nursing home managers in designing more effective programs, such as enhancing interactions between residents and their families..

2. RESEARCH METHOD

- Data Classification, The number of children of the residents is classified as "0" if they have no children, "1" for one child, "2" for two children, "3" for three children, "4" for four children, and "5" for five children.
- Data Collection, The data collection used in this study is secondary data. Secondary data refers to data obtained indirectly, which is already available in the form of finished data such as books or documents (Paramitha, 2024). This secondary data was taken from the document titled "DAFTAR PENGHUNI UPTD PELAYANAN SOSIAL LANJUT USIA KISARAN JL.PERINTIS KM.8 SIMPANG TIGA LEMANG, KEC.SIMPANG EMPAT, KAB.ASAHAN", covering the period from January to September 2024.
- Preprocessing, The data collected undergoes preprocessing. According to Purbolaksono, preprocessing is an important step in the data mining process (Putera et al., 2024).
- Modeling and Analysis, The processed data is used to create a decision tree model using the RapidMiner application, and from this model, an analysis is conducted to evaluate the patterns that emerge.

3. RESULTS AND DISCUSSION

A. Data Collection

| A | B | C | D | E | F | G |
|----|---------------------------|---------------------|--------------------|--------|----------|------------|
| NO | NAME | HUSBAND/WIFE'S NAME | NUMBER OF CHILDREN | GENDER | AGE | ROOM |
| 1 | Jasa Surbakti | - | | 3 M | 71 Years | Grapes |
| 2 | Rusli | - | | 0 M | 71 Years | Grapes |
| 3 | Nuraini Br Damanik | Alm.Ramli Hasibuan | | 1 W | 76 Years | Apple |
| 4 | Mursiem | - | | 1 W | 74 Years | Apple |
| 5 | Nursyamsiah | Agung Abdurahman | | 1 W | 61 Years | Apple |
| 6 | Surtinah | Alm.Sutejo | | 3 W | 71 Years | Duku |
| 7 | Siah | Alm.Sirat | | 3 W | 77 Years | Duku |
| 8 | Wan Laila Safina | - | | 0 W | 72 Years | Duku |
| 9 | Suwarni | - | | 0 W | 64 Years | Duku |
| 10 | Roliyah | - | | 2 W | 80 Years | Duku |
| 11 | Nggayang Br.Palawi | Alm.Kitab | | 1 W | 82 Years | Durian |
| 12 | Norma Lubis | Bayu Abdul Azis | | 3 W | 71 Years | Durian |
| 13 | Nurlia | - | | 0 W | 75 Years | Durian |
| 14 | Aminah | - | | 0 W | 61 Years | Pineapple |
| 15 | Buyung Lubis | - | | 0 M | 64 Years | Guava |
| 16 | Saman Ilyas | Darmawati | | 1 M | 74 Years | Guava |
| 17 | Toga Sinambela | - | | 0 M | 63 Years | Orange |
| 18 | Supardi | - | | 0 M | 84 Years | Orange |
| 19 | DTM.Dahri | Rusnah | | 0 M | 60 Years | Orange |
| 20 | Kusnadi | - | | 0 M | 61 Years | Orange |
| 21 | Naffiah | - | | 0 W | 74 Years | Langsat |
| 22 | Gustina Wati Sitorus | - | | 0 W | 64 Years | Langsat |
| 23 | Rahmawati | - | | 0 W | 75 Years | Langsat |
| 24 | Siti Maryam | - | | 1 W | 64 Years | Pineapple |
| 25 | Sumiati | Prawiro | | 1 W | 60 Years | Pineapple |
| 26 | Rubiah | Alm.Sukarno | | 3 W | 66 Years | Pineapple |
| 27 | Siti Fatimah | Alm.Amin Panjaitan | | 0 W | 61 Years | Pineapple |
| 28 | Damaris Eklima Hutagalung | - | | 0 W | 78 Years | Watermelon |
| 29 | Asnah | - | | 0 W | 60 Years | Duku |
| 30 | Tomoh Sihombing | - | | 0 M | 64 Years | Mango |
| 31 | Mukhlisah Hasibuan | - | | 0 W | 60 Years | Pineapple |

Figure 1: Resident List

In Figure 1, it can be seen that the data from the resident list consists of 410 residents, which includes NO, NAME, HUSBAND/WIFE'S NAME, NUMBER OF CHILDREN, GENDER, AGE, and ROOM.

B. Preprocessing

| | A | B | C | D | E | F | G | H | I | J | K | L |
|----|--------------------|------------------|---|---|---|---|---|---|---|---|---|---|
| 1 | Number of children | Description | | | | | | | | | | |
| 2 | | 3 three children | | | | | | | | | | |
| 3 | | 0 No Children | | | | | | | | | | |
| 4 | | 1 one child | | | | | | | | | | |
| 5 | | 1 one child | | | | | | | | | | |
| 6 | | 1 one child | | | | | | | | | | |
| 7 | | 3 three children | | | | | | | | | | |
| 8 | | 3 three children | | | | | | | | | | |
| 9 | | 0 No Children | | | | | | | | | | |
| 10 | | 0 No Children | | | | | | | | | | |
| 11 | | 2 two children | | | | | | | | | | |
| 12 | | 1 one child | | | | | | | | | | |
| 13 | | 3 three children | | | | | | | | | | |
| 14 | | 0 No Children | | | | | | | | | | |
| 15 | | 0 No Children | | | | | | | | | | |
| 16 | | 0 No Children | | | | | | | | | | |
| 17 | | 1 one child | | | | | | | | | | |
| 18 | | 0 No Children | | | | | | | | | | |
| 19 | | 0 No Children | | | | | | | | | | |
| 20 | | 0 No Children | | | | | | | | | | |
| 21 | | 0 No Children | | | | | | | | | | |
| 22 | | 0 No Children | | | | | | | | | | |
| 23 | | 0 No Children | | | | | | | | | | |
| 24 | | 0 No Children | | | | | | | | | | |
| 25 | | 1 one child | | | | | | | | | | |
| 26 | | 1 one child | | | | | | | | | | |
| 27 | | 3 three children | | | | | | | | | | |

Gambar 2 : Preprocessing

In Figure 2, the data has undergone preprocessing, leaving only the attributes Number of Children and Description.

C. Modeling and Analysis

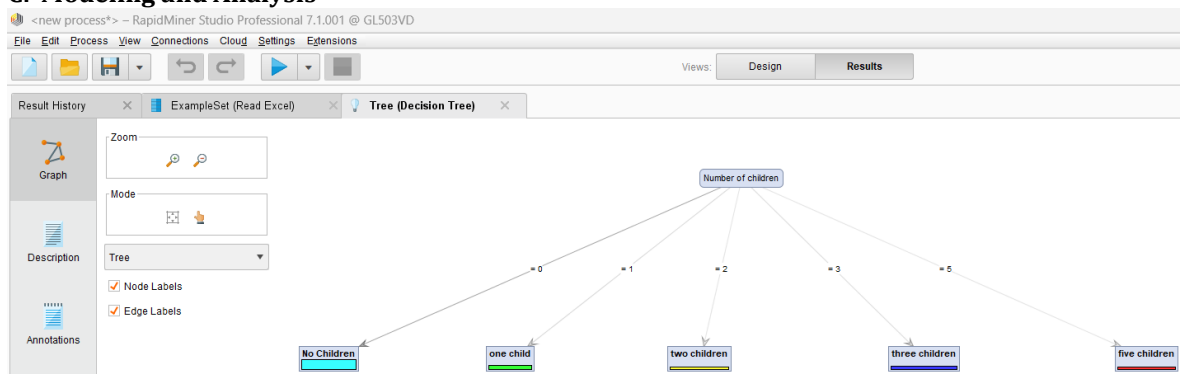


Figure 3: Modeling and Analysis

In this Tree modeling, the results show that there are 5 branches in the decision tree, each representing a different category of the number of children. Each branch refers to the number of children the resident has: 0 children (No Children), 1 child (One Child), 2 children (Two Children), 3 children (Three Children), and 5 children (Five Children). Therefore, there are a total of 5 branches, each leading to a different category.

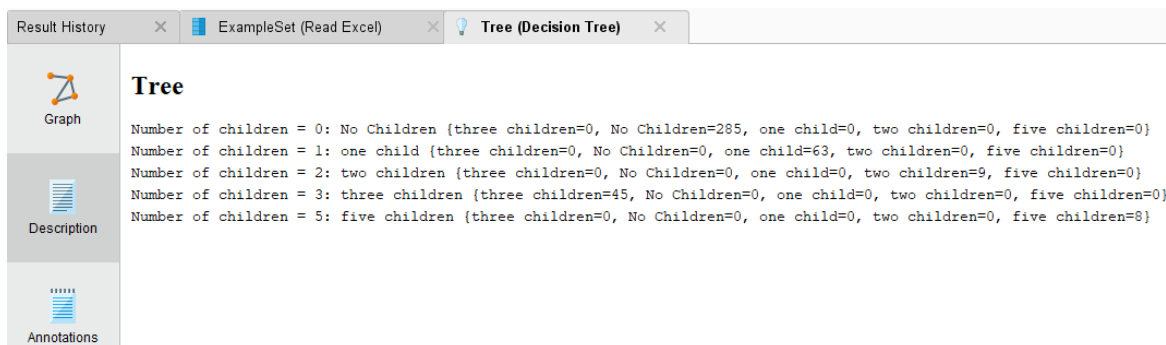


Figure 4: Description Tree

In the explanation of this decision tree, nursing home residents are grouped based on the number of children they have. The first branch represents residents with 0 children (No Children), totaling 285 individuals. The next branch illustrates residents with one child, numbering 63 people, followed by branches for residents with two children (9 people), three children (45 people), and lastly, five children (8 people). Thus, this decision tree shows five categories of nursing home residents based on the number of children they have.

4. CONCLUSION

This study analyzes the number of children of elderly residents in a nursing home using the C4.5 algorithm to identify patterns in the distribution of children among the residents and to provide insights for nursing home managers in designing more effective programs. The analysis results reveal five categories of nursing home residents based on the number of children they have: (No Children), (One Child), (Two Children), (Three Children), and (Five Children). Decision tree modeling indicates that the majority of nursing home residents are in the (No Children) category, with 285 individuals, followed by (One Child) with 63 residents, (Three Children) with 45, (Two Children) with 9, and (Five Children) with 8. These findings suggest that the number of children may influence the decision of nursing home residents to live in the facility, with those without children more likely to choose to stay in a nursing home. This study provides a basis for nursing home managers to design programs that enhance interactions between residents and their families, particularly for those without children. However, this study is limited to secondary data from a single nursing home, so further research with a broader and more varied sample is needed to deepen the understanding of this pattern and identify other factors that influence the decisions of nursing home residents.

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