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House Selection Decision Support System with Fuzzy Tsukamoto Method

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ABSTRACT

Housing is a basic human need and needs to be fostered and developed for the sake of continuity and improvement of people's lives and settlements which cannot be seen as they mean of need, but more than that it is a human settlement in creating a space of life to promote themselves in revealing their identity. During this time the decision making of home selection desired by consumers still experienced several obstacles, namely the slow process of decision making, inconvenience to the housing environment, credit installments and so on. This is because there is no objective method for deciding on a fast choice based on housing data which is right in accordance with consumer desires. By referring to the solution given by Fuzzy Tsukamoto in helping to make a decision, a decision maker can make decisions about housing according to the desired quickly by comparing all existing criteria. Decision support systems are generally defined as a system that is capable of producing solutions and handling problems. Decision support systems are not intended to replace the role of decision makers, but to help and support decision makers. This Fuzzy Tsukamoto method can determine the preference value of each alternative, and can select the best alternative from a number of alternatives.

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1. INTRODUCTION

The house in general can be interpreted as a place to take shelter or shelter from the influence of the surrounding natural conditions (rain, sun, etc.) (Fitriani & Darsono, 2017). As well as a place to rest after serving to meet daily needs and as a place to spend time with family. The house also provides peace and comfort for its residents. For that everyone tries to make their home as comfortable as possible to live in. For some people, home ownership is a luxury that must be ignored, but along with the development of housing needs as well as community needs. Buying a house today is not difficult anymore, along with the development of today's increasingly developing technology, a prospective buyer can choose his dream home (Azhari & Septiarini, 2016).

For that we need a computerized system that can help prospective buyers to help them get a good decision according to the needs and desires of potential buyers. Decision Support Systems (DSS) in addition to getting information can also help provide various alternatives that can be taken in the decision-making process. Decision Support Systems that are often used today usually use quantitative data. By using these data, one can handle data that is definite or structured (Harianja,

2016). However, to make decisions in semi-structured and even unstructured problems such as data obtained in the field in the form of data except letters, unclear or the problem is complex where there is no definite solution method so it is not appropriate to be used as a reference for decision making. As a result of the uncertainty that accompanies the received data or information as a result of data processing, fuzzy logic application is needed to support decisions that cannot only be answered with 'Yes' or 'No' (Azhari & Septiarini, 2016).

Fuzzy logic is an appropriate way to map an input space into an output space. The concept of fuzzy logic is easy to understand, because fuzzy logic uses the basis of set theory, the mathematical concepts underlying fuzzy reasoning are quite easy to understand (Wibowo, 2015). In fuzzy logic, the data obtained is classified into qualitative data. The data has a degree of membership of each. The role of the degree of membership as a determinant of the existence of elements in a set is very important because it shows the mapping of data input points into their membership values (degrees of membership) with an interval between 0 to 1. For house selection problems, Fuzzy logic plays a role as decision support because in the real world buyers often find it difficult to choose their dream house with several criteria that suit their needs. With fuzzy logic, these criteria can be formed into qualitative data by classifying the data (can be classified) which in fact is easier to understand by users. After the classification is done, then the minimum inference method is used which aims to consider between several alternative choices that have the highest consideration value or ranking to be selected (Widyassari & Yuwono, 2018).

The set theory of fuzzy logic was developed by Prof. Lofti Zadeh in 1965. Zadeh argues that the logic of right and wrong in conventional logic cannot solve the problem of gradation in the real world. To solve the infinite gradation problem, Zadeh developed a fuzzy set. Unlike Boolean logic, fuzzy logic has a continuous value. Obscurity is expressed in degrees of membership and degrees of truth. Therefore something can be said to be partly right and partly wrong at the same time (Murti, Abdillah, & Sobri, 2015).

In the Tsukamoto method, every consequence of the rule in the form of IF-THEN must be represented by a fuzzy set with a monotonic membership function. As a result, the inference output of each rule is given in a crisp (crisp) based on the -predicate (fire strength) (Prayogi, 2017). The final result is obtained using the weighted average. Suppose there are 2 input variables, Var-1 (x) and Var-2 (y), and 1 output variable, Var-3 (z), where Var-1 is divided into 2 sets, namely A1 and A2 divided into 2 sets B1 and B2, Var-3 is also divided into 2 sets, namely C1 and C2 (C1 and C2 must be monotonous).

2. RESEARCH METHOD

2.1 Analysis

The analysis of the system to be built includes analysis of system users, analysis of system requirements and analysis of fuzzy variables that will be used by the system. At the system design stage, the design of the program functions that will be used will be discussed, the design of the Data Flow Diagram (DFD), the design of the flowchart and the design of the interface. At the initial stage, the user must determine the choice of the desired criteria from each of the specification variables presented in the system. For example, for house prices, the "cheap" criteria can be selected. After each criterion has been selected, the system will then carry out the process of changing the criteria value into the membership degree value that has been stored in the database. Then the degree of membership that represents each criterion will go through a minimum method inference process to get the total value of the degree of membership for each house. Then the results will display a list of houses according to the criteria selected by the user. These results are sorted by ranking or the total value of the highest to lowest membership degrees.

2.2 System planning

Based on the analysis that the author did the system to be built, the author designed the software, namely:

a. Context Diagram
   Context Diagram is a data logic model or process that is created to describe where the data comes from and where the data comes out of the system, where the data is stored, what processes produce the data and the interaction between the stored data and the processes imposed on the data.
b. Data Flow Diagrams
   At this level DFD, the general recommendation process shown in the Context Diagram is broken down into more details such as login authentication by checking username and password, calculating membership degrees, and processing house data.

3. RESULTS AND DISCUSSIONS

3.1 Implementation of the Stage in the House Selection Decision Support System.

In this case the author will describe the steps for making the program to the implementation that will be carried out in completing the SPK design for house selection. With the Tsukamoto algorithm, these are:

a. Completing System Design
   Where the author must prepare data flow diagrams, decision tables, input and output models for the Decision Support System to analyze the selection of houses that are the object of research.
b. Providing Hardware and Software
   This stage is the stage where the author must provide all the software including the computer operating system, the language used is the programming language and the hardware needed, including the DVD Room (Visual Disk Drive Read Only Memory), and Flesdisk as a medium for installing the operating system. or other software as well as a tool for entering and storing data needed so that the computer can be operated properly and the implementation of the completion of the program can be completed as much as possible.
c. Writing Computer Program Listings
   When the software and computer hardware have been prepared, the author will copy or type the instructions (listing) for the system design into the computer according to the programming language used.
d. Testing System
   This stage is a step that is shown to evaluate whether the system that has been made is in accordance with the established procedures.
e. Conducting Guidance on System Operation Steps
   At this stage, the author performs several guidelines regarding the operation of the system on the operator or the user of the program (user).
f. System Maintenance
   Even though the implemented system is running well, maintenance of the system is no less important to the system, the system will not always run well.

The implementation of this program system includes specification of hardware requirements (hardware) and software specifications (software).

3.2 Hardware and Software Specifications

This program is recommended to be run using hardware that has the following specifications:

1. At least use a 1.6 Ghz Core Duo Processor
2. With 1GB Memory.
3. 10GB hard disk.

4. VGA card 1GB.
5. Monitor with a resolution of 800 600 pixels.
6. Keyboard and Mouse.Login form

The software used to run this application is the Windows 7 operating system environment.

a. Login Form

This form is used to enter the system that has been created. In this login there are users, namely admin and user. The form can be seen in the image below.

Figure 1. Login Form

b. Main Menu Form

The main form is the second form that is displayed after displaying the choice menus on the Decision Support System. This form contains Menu, Data Input, Reports, and Exit. The form can be seen in the image below.

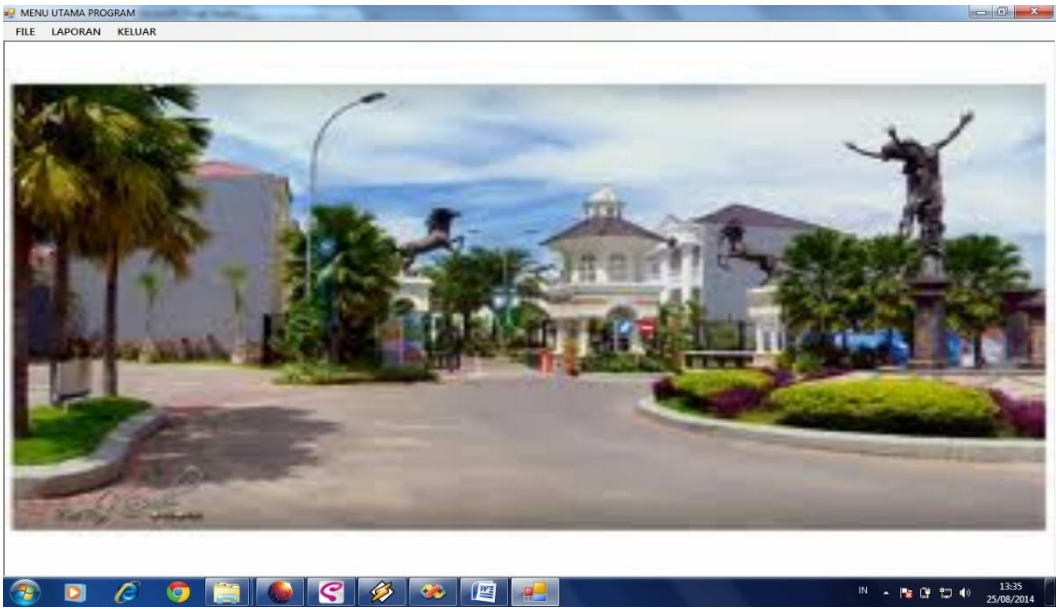

Figure 2. Main Menu Form

c. House Selection Form

The Data Form on the house selection is a display for inputting data on the selection of the house to be selected into the database. The appearance of the Data form on the house selection is as shown in the following figure:

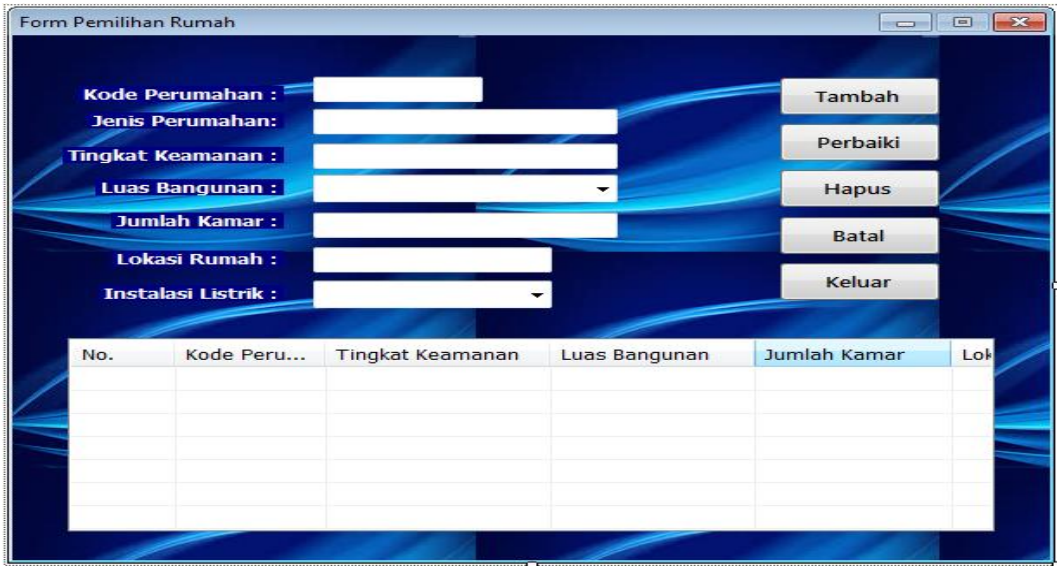

Figure 3. Home Selection Menu Display

d. Criteria Matrix Form

The Sub Criteria form for house selection is a form for inputting assessment data on house selection based on specified criteria. The form can be seen in the image below

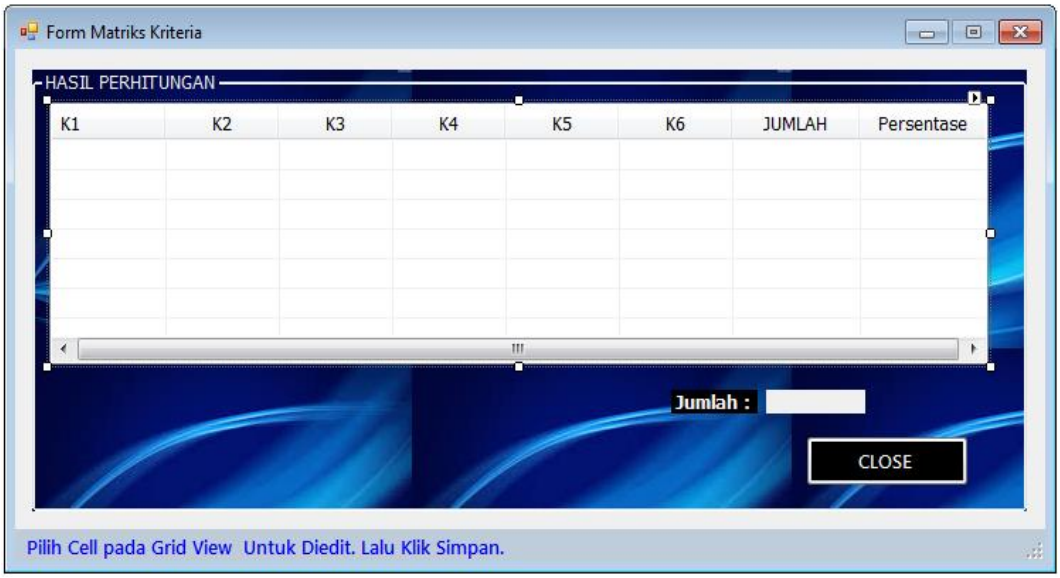

Figure 4. Criteria Data Form

e. Sub Criteria Process Form

The Decision Making Form on the selection of houses is a form to choose and determine which houses are selected and feasible. The form can be seen in the image below.

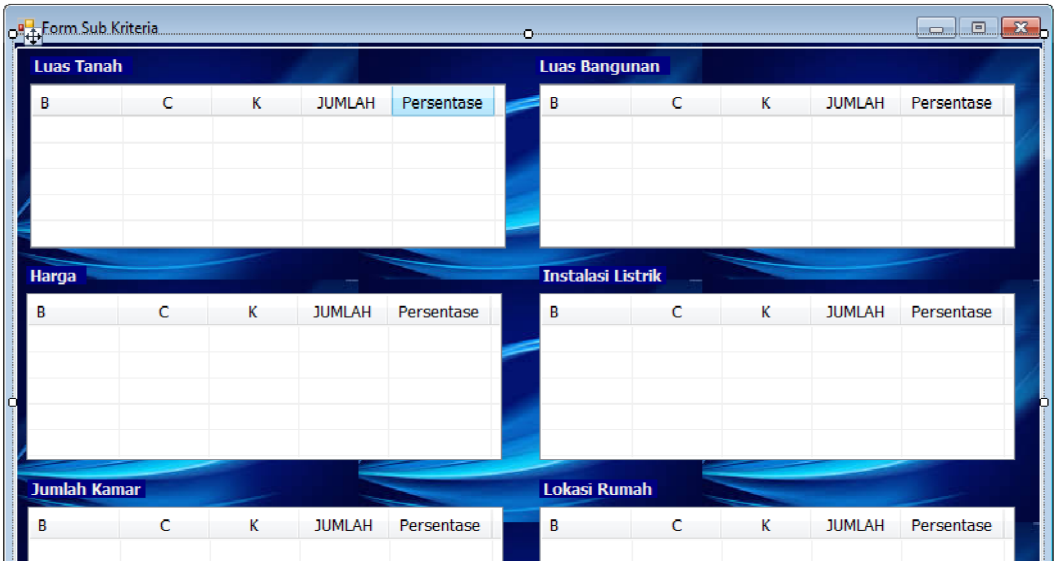

Figure 5. Sub Criteria Process Menu Form

4. CONCLUSION

The design of the House Selection Decision Support System application with the Tsukamoto Method that has been completed, several conclusions can be drawn including Based on the results of the analysis show that by using the Tsukamoto logic method, it can be used to create a decision support system that functions in determining the search for house selection. This system can be used as a recommendation system in determining the feasibility of the house. The Tsukamoto method can be applied as a support system for forecasting houses, which is shown based on the results of processing, analyzing, and testing the accuracy of the data studied

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