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Mosque Financial Management Information System Using Naive Bayes Algorithm

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Abstract: The mosque is a place for Muslims to carry out worship activities, social activities and other religious activities, one of the activities carried out by mosque administrators is financial management provided by the community. Financial management activities must be carried out carefully because financial information is very important for the community, regardless of the amount it must be accurately informed so as not to cause misunderstandings between managers and the community. The problem at this time is that there is no software for mosque financial managers and donors who are not on time in giving donations to mosques, so that it becomes a consideration for the eligibility of donors. With these problems, the researchers designed a financial management information system that can facilitate DKM administrators in managing finances and neat documentation. The Naive Bayes algorithm aims to classify data into certain classes, then the pattern can be used to estimate the eligibility of donors, so that the Mosque Prosperity Council (DKM) knows whether or not regular donors are eligible.

Keywords: Information Systems; Financial Information System; Mosque; Naive Bayes; Software

I. INTRODUCTION

The mosque is a place of worship for Muslims, other social and religious activities. One of the activities carried out by mosque administrators is financial management provided by the community. Financial information is very important for the community, therefore financial management must be careful, because the amount must be informed as accurately as possible so that there is no misunderstanding between the mosque management and the community. The problem that occurs at this time is that there is no software that helps the mosque's financial management process, so that financial records are still using bookkeeping and then processed in Microsoft Excel, and regular donors who are not on time in giving donations to mosques, so it is necessary to consider whether the donor is eligible to become a permanent donor.

II. LITERATUR REVIEW

At this time the development of technology is so rapid, such as in research [1] using the fuzzy method to control traffic lights. Likewise, information systems are needed to help human work in every field. In research, management information systems can facilitate and assist event activities and activities outside the event based on the existing problems, the researcher designed a mosque financial management information system using the Naive Bayes algorithm.

This research aims to facilitate DKM administrators in managing finances and neatly recorded documentation. The Naive Bayes algorithm functions to classify data in certain classes, then the pattern can be used to estimate the eligibility of the donor, so that the mosque prosperity council (DKM) knows whether or not the permanent donor is worthy. In order to continue to participate in developing mosque construction and activities.

According to [2] Software is an important part for organizations and companies in storing, processing data, and accessing information. The financial information system is an information system (subsystem of CBIS) that provides information to people or groups both within the company and outside the company regarding the company's financial problems [3].

The Naive Bayes method can help health practitioners to make decisions with more confidence in predicting diseases [4] . The Naive Bayes algorithm aims to classify data in certain classes [5] , then this pattern can be used to estimate the eligibility of donors, so that the mosque prosperity council (DKM) knows whether the regular donor is worthy or not.
A data mining model was developed on a clinical laboratory database using the naïve Bayes classifier to detect cardiovascular risk, and tested for its accuracy in predicting three levels of risk [6]. system is used for analysis of different data sets. Health diagnosis performance can be significantly improved by treatment many class labels in the prediction process [7].

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naive algorithm bayes is used to classify data sets because accurate results, regarding the heart disease outcome of the person being estimated [8]. In research [9], the Naïve Bayes algorithm can be recognized as the best document classifier, which fulfills the literary results.

III. RESEARCH METHODOLOGY

$$P(H|X) = P\frac{(X|H).P(H)}{P(X)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Information :
X : Data with unknown class

H : Hypothesis data X is a specific class

P(H|X) : Probability of hypothesis H based on condition X

P(H) : Probability of the hypothesis H

P(X|H) : Probability of X based on conditions in hypothesis H

P(X) : Probability of X

To explain the Naive Bayes theorem, there are the terms H (Hypothesis) and E (Evidence). It should be noted that the classification process requires instructions to determine what class is suitable for the sample to be analyzed. Therefore, Bayes' theorem is adjusted as follows:

$$P(H|E_1 \ldots E_n) = \frac{P(H)P(E_{1\ldots}.E_n|H)}{\sum_{k=1}^{m} P(E_{1\cdot\ldots}E_n)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

The above formula can also be written simply as follows:

$$Posterior = \frac{Prior \times likelihood}{evidence} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$p(H_i|E_1E_2 \ldots E_n) = \frac{p(E_1|H_i)\times p(E_2|H_i)\times\ldots\times p(E_n|H_i)\times p(H_i)}{\sum_{k=1}^{m} p(E_1|H_k)\times p(E_2|H_k)\times\ldots\times p(E_n|H_k)\times p(H_k)} \quad \ldots\ldots\ldots\ldots\ldots\ldots(4)$$

IV. RESULTS AND DISCUSSION

A. Calculation of the Naïve Bayes Algorithm

Calculation of the naïve Bayes algorithm will be carried out if the administrator wants to know whether donors are still eligible to become permanent donors or not. The following is the calculation of the Naïve Bayes algorithm:

- **Naïve Bayes Question Data**

There are several questions in table 4.16 to determine the eligibility of donors and there are results from the answers that have been selected.

TABLE 1 NAÏVE BAYES QUESTION DATA

No	Question	Answer Yes	Answer No
1	Are you willing to become a donor?	ready	not willing
2	Have You Been a Donor?	ever	never
3	Is Your Address Located in the Mosque Environment?	Around the Mosque	Not Around the Mosque
4	Are You Over 25 Years Old?	Over 25 Years	Less Than 25 Years
5	Are you married?	Yes	Not yet

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6	Do you have dependents (husband/wife, children)?	Have	Don't have
7	Do you have a regular job?	Have	Don't have
8	Is Your Income Less Than 5 Million Per Month?	Income Less Than 5 Million Per Month	Income Over 5 Million Per Month
9	Is Your Infaq Nominal Less Than Rp. 100,000?	Yes	No
10	Do you routinely pay donations in a month?	Yes, Routine	Sometimes
11	Are You Sure You Want To Be A Regular Donor?	Sure to Be a Permanent Donor	Not Sure To Become A Regular Donor

B. Feasibility Value Data

In the table there is 1 criterion that is considered, feasible and not feasible. Calculations that will be calculated on the Naive Bayes formula, from the answers chosen to the existing questions.

TABLE 2 FEASIBILITY VALUE DATA

No	Question	Considered	Worthy	Not Feasible
1	Are you willing to become a donor?	0.7	1	0.6
2	Have You Been a Donor?	0.2	0.4	0.3
3	Is Your Address Located in the Mosque Environment?	0.3	0.4	0.3
4	Are You Over 25 Years Old?	0.4	0.4	0.5
5	Are you married?	0.4	0.4	0.6
6	Do you have dependents (husband/wife, children)?	0.6	0.6	0.3
7	Do you have a regular job?	0.5	0.5	1
8	Is Your Income Less Than 5 Million Per Month?	0.4	0.4	0.7
9	Is Your Infaq Nominal Less Than Rp. 100,000?	0.5	0.5	0.4
10	Do you routinely pay donations in a month?	0.5	0.6	0.2
11	Are You Sure You Want To Be A Regular Donor?	0.5	1.44	0.1

C. Feasible Calculation

The board of the mosque prosperity council (DKM) determines the eligibility of donor A on the naïve Bayes system, the total data must be 1. The answer is adjusted according to the current condition of the donor and only the "correct" answer to the question is counted

- **Feasible Calculation**

  The administrator detects donors on the Naive Bayes system by answering questions sequentially true, no, no, true, no, no, true, no, true, no, true.

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TABLE 3 FEASIBLE CALCULATION DATA

Probability	*Hypothesis*		
	Considered P	Worthy L	Not feasible T
1	0.7	1	0.6
4	0.4	0.4	0.5
7	0.5	0.5	1
9	0.5	0.5	0.4
11	0.5	1.44	0.1

$$P = \frac{0.7 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 0.5}{0.7 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 0.5 + 1 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 1.44 + 0.6 \cdot 0.5 \cdot 1 \cdot 0.4 \cdot 0.1} = 0.2$$

$$L = \frac{1 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 1.44}{0.7 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 0.5 + 1 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 1.44 + 0.6 \cdot 0.5 \cdot 1 \cdot 0.4 \cdot 0.1} = 0.7$$

$$T = \frac{0.6 \cdot 0.5 \cdot 1 \cdot 0.4 \cdot 0.1}{0.7 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 0.5 + 1 \cdot 0.4 \cdot 0.5 \cdot 0.5 \cdot 1.44 + 0.6 \cdot 0.5 \cdot 1 \cdot 0.4 \cdot 0.1} = 0.1$$

Considered + Worthy + Not feasible = 0.2 + 0.7 + 0.1 = 1

Calculation of naïve Bayes from determining the eligibility of permanent donors is the biggest result of the calculation considered, feasible and not feasible. Then the result is feasible at 0.7

- **Not Feasible Calculation**

The administrator detects donors on the Naive Bayes system by answering questions sequentially true, no, no, true, true, no, true, true, no, no, no.

TABLE 4 INFEASIBLE CALCULATION DATA

Probability	*Hypothesis*		
	Considered P	Worthy L	Not feasible T
1	0.7	1	0.6
4	0.4	0.4	0.5
5	0.4	0.4	0.6
7	0.5	0.5	1
8	0.4	0.4	0.7

$$P = \frac{0.7 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4}{0.7 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 1 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 0.6 \cdot 0.5 \cdot 0.6 \cdot 1 \cdot 0.7} = 0{,}1$$

$$L = \frac{1 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4}{0.7 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 1 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 0.6 \cdot 0.5 \cdot 0.6 \cdot 1 \cdot 0.7} = 0.2$$

$$T = \frac{0.6 \cdot 0.5 \cdot 0.6 \cdot 1 \cdot 0.7}{0.7 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 1 \cdot 0.4 \cdot 0.4 \cdot 0.5 \cdot 0.4 + 0.6 \cdot 0.5 \cdot 0.6 \cdot 1 \cdot 0.7} = 0.7$$

Considered + Eligible + Not Eligible = 0.1 + 0.2 + 0.7 = 1

Calculation of naïve Bayes from determining the eligibility of permanent donors is the biggest result of the calculation considered, feasible and not feasible. Then the result is not feasible at 0.7

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D. Application Design Results

- In Figure 1 is the login display to access the menu page

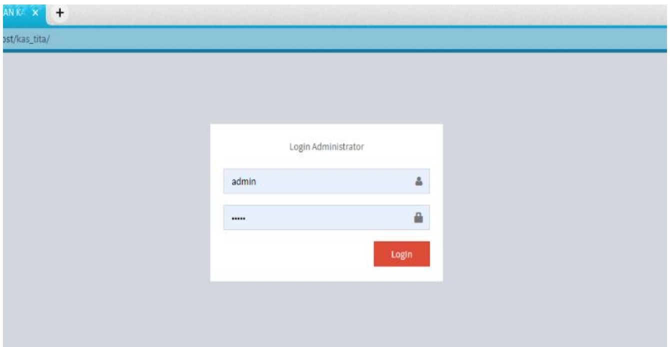

Fig. 1 Login Display

- In Figure 2 is the dashboard display.

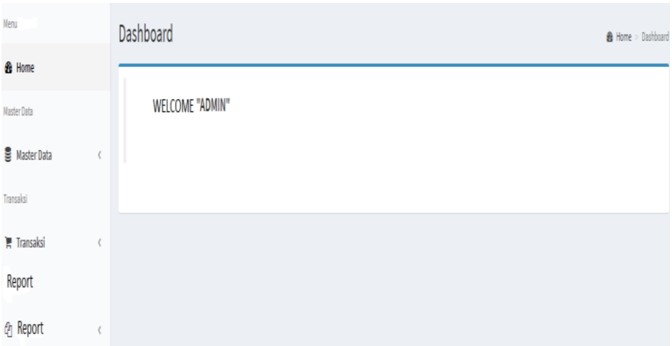

Fig. 2 Dashboard Display

IV. Conclusion

Based on the results of the research conducted, it can be concluded as follows:

1. The mosque's financial information system can facilitate the management of the Mosque Family Council (DKM) in the process of financial management and financial reports
2. Data is stored neatly and is not easily lost because it is stored in the system database
3. This mosque's financial information system uses the naïve Bayes algorithm, with the aim of easily determining the criteria of eligibility or ineligibility for regular donors, both old and new.

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