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Application of Bayes' Theorem Method to Diagnose Miscarriage in Pregnant Women

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ABSTRACT

The expert system for diagnosing the causes of miscarriage in pregnant women is an expert system designed as a tool to diagnose the type of food that causes miscarriage. Computer programs intended as a provider of tools in solving problems in certain areas of specialization such as miscarriage problems in pregnant women. This knowledge is obtained from various sources including books and the internet related to the causes of miscarriages. The knowledge base is arranged in such a way into a database with several tables of food types and tables of effects to facilitate the performance of the system in drawing conclusions in this expert system using Bayes' theorem. This expert system will display a selection of symptoms that can be selected by the user, where each effect selection will read the user to the next effect choice until the final result is obtained. In the final result, the expert system will display a selection of user effects, types of foods that cause miscarriage, and solutions.

INTRODUCTION

Pregnancy is something that married couples who have mostly just gotten married. The arrival of a baby in marriage is a very encouraging thing in the family. When the long-awaited pregnancy comes and will bring the baby or child in the warmth of the family, it is necessary to keep the pregnancy so that the fetus in the mother-to-be's belly can be born safely. But what happens if the baby who is expected to bring happiness and warmth in the family disappears or disappears before he is born. The shadow of the presence of a tiny and cute baby disappears when the mother-to-be has a miscarriage. Plus the stress, pain, and trauma after the miscarriage that caused the mother-to-be not to want to get pregnant again.

Miscarriage is one of the most common pregnancy complications and can have a profound psychological impact on pregnant women. According to data from the World Health Organization (WHO), about 10-15% of pregnancies end in miscarriage, most of which occur in the first trimester. Given this high incidence rate, early and accurate diagnosis is essential to provide appropriate treatment and reduce the risk of further complications. There are several causes of miscarriage that are often experienced by women, both from the outside and from inside the woman's own body. Miscarriage generally occurs in one in five pregnancies. And most of them occur in the first 12 weeks of pregnancy. Recurrent miscarriage is when a woman loses a pregnancy for three or more consecutive times but this is only one in every 100 couples.

In this context, the development of more effective and accurate diagnostic methods is urgently needed. One method that has great potential in this field is Bayes' Theorem. Bayes' Theorem is a statistical approach that allows decision-making based on the probability of previous conditions, which in this case is the possibility of miscarriage based on the symptoms or risk factors experienced by pregnant women.

The use of Bayes' Theorem in medical diagnosis is not new; This method has been used in various studies to predict diseases and other medical conditions. However, its specific application to diagnose miscarriage in pregnant women is still relatively limited. This study aims to fill this gap by exploring the application of Bayes' Theorem in diagnosing miscarriage in pregnant women, as well as testing the effectiveness of this method compared to other diagnostic methods.

Thus, this study is expected to make a significant contribution in improving the accuracy of miscarriage diagnosis, so that it can provide direct benefits for better prevention and treatment efforts for pregnant women.

METHOD

This study uses a quantitative approach to apply and test the effectiveness of the Bayes Theorem Method in diagnosing miscarriage in pregnant women. The data used in this study consisted of primary data collected through interviews, questionnaires, and reviews of medical records of pregnant women, as well as secondary data taken from journals, books, and other sources. The data obtained will include demographic information, health history, symptoms experienced, and risk factors related to miscarriage. Irrelevant or incomplete data will be eliminated through a data cleansing process before being used in analysis.

Furthermore, Bayes' Theorem will be applied to build a probabilistic model that calculates the likelihood of miscarriage based on a combination of symptoms and risk factors identified in pregnant women. This process involves calculating the initial probability (prior) and conditional probability (likelihood) for each relevant symptom or risk factor, which is then used to calculate the posterior probability value or likelihood of miscarriage after considering all factors. The developed model will be validated using different test data to ensure its accuracy in predicting new cases.

Finally, the results of the application of Bayes' Theorem will be analyzed and compared with other diagnostic methods to assess its accuracy and effectiveness. This analysis will provide an overview of the reliability of the model in diagnosing miscarriage and its clinical implications. This research is expected to contribute to improving the accuracy of miscarriage diagnosis in pregnant women and open up opportunities for wider application in the diagnosis of other medical conditions.

RESULTS AND DISCUSSION

Analysis

Bayes' theorem is a probabilistic method used to renew or revise the odds of a hypothesis based on new evidence. In the context of diagnosing miscarriage in pregnant women, this theorem can help doctors in estimating the likelihood of a mother having a miscarriage based on clinical data and certain test results.

Algorithm for Diagnosing Foods That Cause Miscarriage

A : Patient data;
B: Food effect;
C : Type of food;
D: Diagnostic process;
P (Hi\E) (The probability of the hypothesis Hi is correct if evidence E is given);
P (E\H) (Probability of evidence E appearing if, hypothesis H occurs);
The result of the calculation of P(H1\E);
Input
A,B,C;
Process
If B = "Yes"
Then B saves the answer
For i = 1 To 3

$$P(Hi\backslash E) = \frac{P(E|Hi)*P(Hi)}{P(E\backslash Hi)*P(Hi)}$$

$$P(H1\backslash E) = \frac{0.7*0.4375}{0.51875} = 0.59036$$

If B = " No "
Then B saves the answer

$$P(H1) = \frac{N1}{\sum_{k=1}^{3}} = 0$$

If B is diagnosed
Then Next on D
#Output
Data of patient A and the results of the calculation of the P(Hi\E) value in the diagnosis process.

Implementasi

The next stage after design is the program implementation stage. At this stage of implementation, the form design that has been created is applied using Microsoft Visual Basic 2008. The system implementation of this software concerns the specification of hardware and software requirements as well as software testing.

The interface design, in this form contains the User Name and Password to be able to enter the main menu.

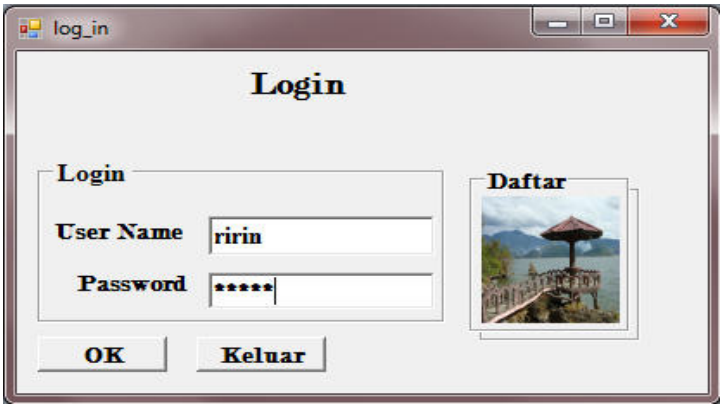

Figure 1. Login Form Display

Figure 2. List Form Display

On the display of the main menu form is the form or description of the front page design which contains several menus including the admin menu, login menu and diagnostic menu, can be seen in the image below:

Figure 3. Main Menu Initial Form Display

The food type data form display is to input data on the type of food that causes miscarriage.

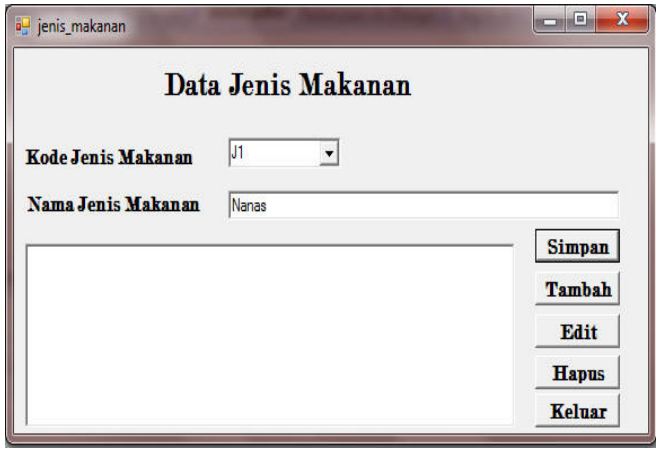

Figure 4. Food Type Data Form Display

The food effect data form is to input food effect data that causes miscarriage.

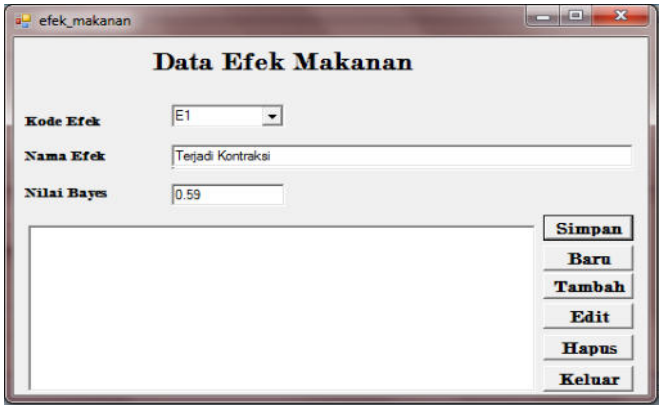

Figure 5. Food Effect Data Form Display

On the display of the patient data input form to input patient data, it can be seen in the image below:

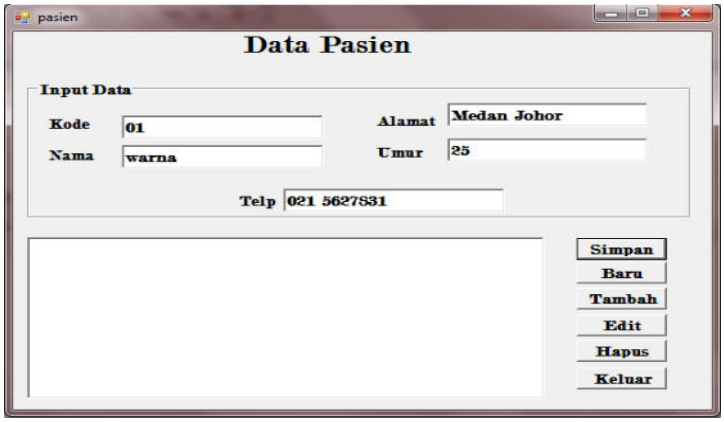

Figure 6. Display of Patient Data Input Form

The diagnostic form display is to display the results of the diagnosis on each type of food.

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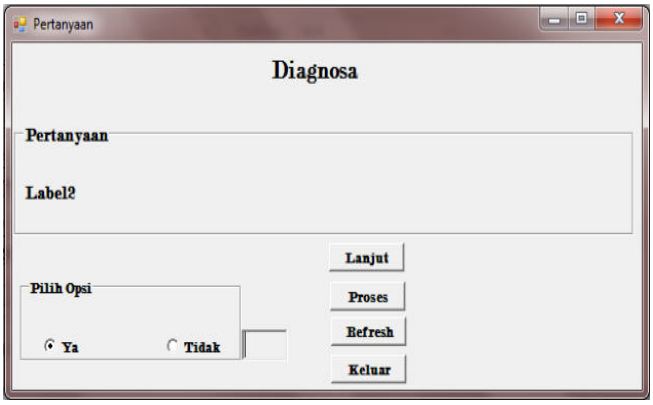

Figure 7. Diagnostic Form Display

In this display when the diagnosis process is carried out, the consultation form will display the results of the Bayes calculation and can be seen in the image below can be seen in the image below:

Figure 8. Display of Consultation Results Form

CONCLUSION

With the process of diagnosing miscarriage in pregnant women, it is possible to find out the effects of food from the process carried out by the system based on the type of food consumed by pregnant women. By applying the Bayesian theorem method so that it can diagnose the type of food and can provide quick diagnosis results along with the value of the risk level of each type of food effect consumed. Expert system application design uses Microsoft Visual Studio 2008 to produce a system that can perform the process of diagnosing food types. The knowledge contained in the knowledge base is recommended to always be updated according to the development of science and technology. This system can be further developed by the reader by using a more complete system to diagnose miscarriages in the future. This expert system program needs to be evaluated regularly so that it can be seen whether there is a need for improvement or refinement.

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