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Backward Chaining Method for Diagnosis Disorders of Women's Menstrual Cycle

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A R T I C L E I N F O

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ABSTRACT

Menstrual cycle disorders are disorders of the female reproductive system that occur when women do not care for and maintain their health. From disruption of the menstrual cycle can be a disease that is dangerous for women. The problem that occurs is that many women rarely want to check the symptoms of menstrual cycle disorders. This is due to the laziness of going to the doctor or the distance from where the doctor is and the reason for the high cost of making a diagnosis to a doctor. So we need an expert system application to diagnose the disease from menstrual symptoms. In this study, the method used is Backward Chaining, the Backward Chaining method solves every symptom that appears and continues on to the next symptom in the same rule so that a decision tree is formed. Utilization of an expert system in the application can help women to find out the diagnosis of the menstrual cycle in the form of: hypermenorrhea (menorrhagia), hypomenorrhea, polimenorrhea, oligomenorrhea, and amenorrhea. The application is able to display diseases from menstrual symptoms quickly and accurately.

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1. INTRODUCTION

The health of the human body is a very common problem and is a problem in itself. Especially health problems in women that are common are disorders of the menstrual cycle. Menstrual cycle disorders are disorders of the female reproductive system that occur when women do not care for and maintain their health. Menstrual cycle disorders can become a disease that is dangerous for women, including: hypermenorrhea/menorrhagia (menstrual bleeding for more than 8 days) Hypomenorrhea (less menstrual bleeding than usual) Polymenorrhea (menstrual cycle less than 21 days) Oligomenorrhea (menstrual cycle more than 35 days) and amenorrhoea (a state of not menstruating for at least 3 consecutive months) (Fahmi, Agushybana, & Winarni, 2018).

The problem faced is that most women still don't know the impact of ignoring menstrual cycle disorders due to lack of information about menstruation for women's reproductive health. In addition, they have limited time to consult directly with doctors. In fact it is very important for women to know their cycle. what menstruation is experienced,

so that in the future prevention and treatment can be carried out (Yusuf, SF, & Damiri, 2014). Therefore we need a system that can help women in consulting without having to directly see a doctor. The system that can be applied is an Expert System. An expert system is a program from a computer application that contains some knowledge from one or more related human experts from a field so that it can be used for consulting media. It is this expert who will later pour his knowledge into the application so that it is processed easily to solve the problem (Sihotang, 2014). The expert system runs optimally using a method. In this research, the method applied is Backward Chaining.

An expert system is an information system that contains knowledge from an expert so that it can be used as a consultation medium. Knowledge from an expert owned by this system as a tool to answer questions from a user (Elfani, 2013). The development of science can be poured into a system and work more quickly and efficiently by diagnosing disease. Then this system will work to confirm the diagnosis of the disease, provide advice and therapy (Nugroho & Wardoyo, 2013).

Backward Chaining is a way to do a search that leads to the search for a data. The search process will be carried out by starting from a goal, namely to find a conclusion that will make it a solution to the problems that are being experienced. The inference engine works to find rules in the form of knowledge which results will make a solution. It is from these symptoms that lead to the conclusion. Backward Chaining is an inference method that works backwards towards the initial conditions. The process starts from the goal (which is in the THEN part of the IF-THEN rule), then a search is started to match whether the existing facts match the rules in the IF section. If the rule matches are executed, then the THEN part of the hypothesis is placed in the database as a new fact (Hadi, 2016).

2. RESEARCH METHOD

The design of menstrual diagnosis is needed as a stage to collect system requirements. The following is a diagnostic diagram:

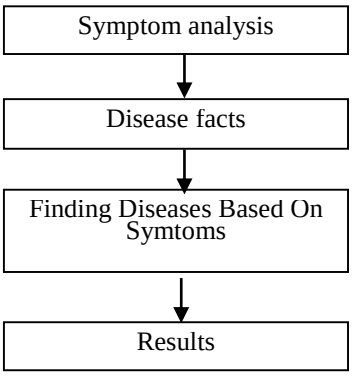

Figure 1. Diagnostic Diagram of *Backward Chaining*

Based on the diagram above, it can be concluded that in order to diagnose *backward chaining,* it is *necessary* to first determine the symptoms and facts of the disease from the menstrual cycle. Then *backward chaining* looks for disease facts based on symptoms that have been determined by an expert.

3. RESULTS AND DISCUSSIONS

In this section, it is explained the results of research and at the same time is given the comprehensive discussion. Results can be presented in figures, graphs, tables and others that make the reader understand easily (Grieshaber, 2020). The discussion can be made

in several sub-chapters. The data analysis consists of data on symptoms of menstrual cycle disease and the name of the disease from symptoms of menstrual cycle disorders .

Symptoms Facts

In fact, the symptom code is symbolized by the symbol G. The facts about the symptoms of menstrual cycle disorders are as follows :

Table 1. Facts of Menstrual Cycle Disorders

Symptom Code	Symptom Name
G0001	Menstrual bleeding that is longer than normal (more than 8 days)
G0002	Excessive menstrual blood
G0003	Pain during menstruation
G0004	Shorter menstrual bleeding (less than 7 days)
G0005	Hormonal Disorder
G0006	Menstrual cycles that are shorter than usual (less than 21 days)
G0007	Depression, mental stress and physical stress (excessive exercise)
G0008	Longer menstrual cycles (more than 35 days)
G0009	Ever had menstruation but stopped in a row join for 3 months
G0010	Malnutrition
G0011	Metabolism Disorder

Disease Facts

The facts of the disease in this study consisted of 5 diseases taken from the results of interviews. On the facts of the disease, the disease code is denoted by the symbol P. The facts of the disease of menstrual cycle disorders are as follows:

Table 2. Facts of Menstrual Cycle Disorders

Disease Code	Disease Name
P0001	Menorrhagia/Hypermenorrhea
P0002	Hypomenorrhea
P0003	Polymenorrhea
P0004	Oligomenorrhea
P0005	Amenorrhea

Disease Facts From the Types of Menstrual Cycle Symptoms

The facts of the disease from the symptoms of the menstrual cycle are as follows:

Table 3. Disease Facts from Symptoms of Menstrual Cycle Disorders

No	Name / Code Disease	Symptom Name / Symptom Code
1	Menorrhagia / Hypermenorrhea / P0001	1. Menstrual bleeding longer than normal (more than 8 days) / G0001 2. Excessive menstrual blood / G0002 3. Pain during menstruation / G0003 4. Hormonal Disorders / G0005
2	Hypomehorrhoea / P0002	1. Shorter menstrual bleeding (less than 7 days) / G0004 2. Hormonal Disorders / G0005

3	Polymenorrhea / P0003	1. Excessive menstrual blood / G0002 2. Hormonal Disorders / G0005 3. Cycle of menstruation is shorter than usual (le ss than 21 days) / G0006 4. Depression, mental and physical stress (excessive exercise) / G0007
4	Oligomenorrhea / P0004	1. Depression, mental and physical stress (exerciseexcessive) / G0007 2. Longer menstrual cycle (more than 35 days) / G0008
5	Amenorrhea / P0005	1. Hormonal Disorders / G0005 2. Ever had menstruation but stopped in a row for 3 months / G0009 3. Disorders Nutrition / G0010 4. Metabolic Disorders / G0011

Application of the *Backward Chaining* Method

Formation of Expert System *Rules*
Based on the results of research and interviews, the facts of menstrual disease are obtained from several symptoms that have been made in table 4.3. The expert system *rules are* as follows:

Table 4. Formation of Expert System *Rules*

Rules	Information
Rule 1	**If** menstruation is longer than normal (> 8 days), accompanied by heavy menstrual flow, pain during menstruation and hormonal disorders **then** indicated to suffer from *Menorrhagia / Hipermenorea*
Rule 2	**If** bleeding periods shorter than usual (<7 days), accompanied by a hormonal disorder **Then** indicated disease *hypomenorrhea*
Rule 3	**If the** menstrual cycle is shorter than normal (<21 days), accompanied by depression, mental stress, physical stress, excessive menstrual blood and hormonal disorders **then** indicated disease *Polimenorea*
Rule 4	**If the** menstrual cycle is longer (> 35 days), accompanied by depression, mental stress, physical stress **then** indicated disease *oligomenorrhea*
Rule 5	**If** ever menstruate but stopped consecutively for 3 months, accompanied by nutritional disorders, hormonal disorders and metabolic disorders **then** indicated to suffer from *amenorrhoea*

Decision Tree Formation

Based on the results of the *rule* formation , the next step is to form a decision tree. A tree is a depiction of a hierarchical structure. Where *the nodes* that show the object of the symptoms indicated by the sufferer of menstrual disease and the *ars* (arc) which shows the relationship between the symptoms with other symptoms to conclude from the disease suffered by the menstrual cycle disease. The search in this case will use a *breadh-first search* technique which will start from *the* initial *node* of the diagram denoted by G0001, from that *node* branching to *the* next *node* with a yes or no rule . If one of the rules is not met, the search will continue on *the* next *nodes* in sequence until a *node* that can fulfill all the rules that have been set is met. The disease symptom code will be symbolized by G and the *node* starting with 0001. For disease it is denoted by P starting with 0001.

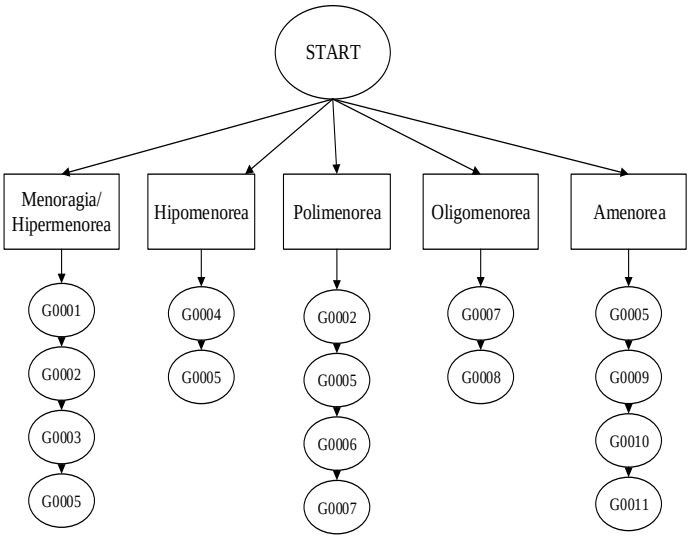

Figure 2. Menstrual Disease Decision Tree

Discussions

Implementation of User Application Program Display

Implementation of the *user* application program display into the expert system application diagnoses menstrual cycle diseases and conducts consultations according to the symptoms of the disease felt to get the results of disease diagnosis quickly and accurately.

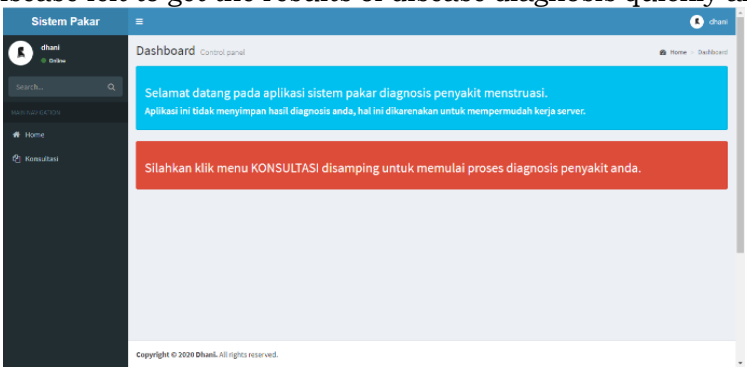

Figure 3. User dashboard menu display

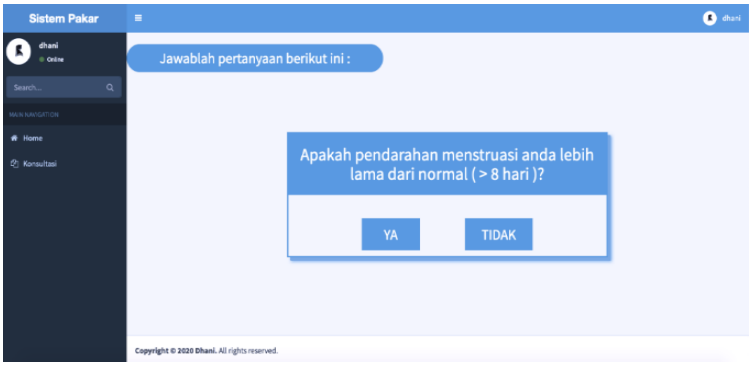

Figure 4. Consultation Menu Question Display

Figure 5. Display a list of quesstions according to sympt

Figure 6. Display of consultation diagnotic results

4. CONCLUSION

Based on the results of the implementation process of the expert system application for diagnosing menstrual diseases, it can be concluded that: The application system has succeeded in determining the user's disease diagnosis according to the Backward Chaining algorithm rule. The application system for the diagnosis of menstrual disease is able to produce a diagnosis of the disease quickly and accurately without having to go to the doctor immediately, which can take time. The dynamic website -based application system is very easy to understand with the support of a fresh and attractive display.

REFERENCES

Yusuf, CR, SF, DD, & Damiri, DJ. “Designing an Expert System for Diagnosing Amenorrhea Using the Expert System Development Life Cycle Method”. *Journal of Algorithms* , pp. 1-10. 2014.

Abdurahman, D., & Prasetyo, TP. “Measuring the Level of Student Satisfaction in Learning Using an Expert System”. *Journal of E-ensic* , pp. 20-24. 2016.

Nas, C. “Expert System for Diagnosing Thyroid Disease Using the Dempster Shafer Method”. *Journal of Technology and Open Source* , pp. 1-14. 2019.

Nasution, YR, & Khairuna. “An Expert System for Early Detection of Tuberculosis Using the Bayes Method”. *CHLOROPHIL* , pp. 17-23. 2017.

Nugroho, AK, & Wardoyo, R. “Expert System Using Bayes Theorem To Diagnose Pregnancy Disease”. *MIPA Periodic* , pp. 247-254. 2013.

Kusbianto, D., Ardiansyah, R., & Hamadi, DA . “Implementation of Forward Chaining Expert System for Identification and Treatment of Facial Acne”. *Polynewa Journal of Informatics* , pp. 71-80. 2017.

Furqan, M., & et al. (2013). *Computer Networks And Databases Using Mysql.* Willem Iskandar Street, Market V: IAIN PRESS.

Hadi, F. (2016). Implementation of a Rules-Based Expert System for Diagosa Poultry Livestock Productivity Using Forward Chaining Method. *Scientific Magazine* , 1-11.

Kusbianto, D., Ardiansyah, R., & Hamadi, DA (2017). Implementation of Forward Chaining Expert System for Identification and Treatment of Facial Acne. *Polynewa Journal of Informatics* , 71-80.

Nas, C. (2019). Expert System for Diagnosing Thyroid Disease Using the Dempster Shafer Method. *Journal of Technology and Open Source* , 1-14.

Nasution, YR, & Khairuna. (2017). An Expert System for Early Detection of Tuberculosis Using the Bayes Method. *CHLOROPHIL* , 17-23.

Nugroho, AK, & Wardoyo, R. (2013). Expert System Using Bayes Theorem To Diagnose Pregnancy Disease. *MIPA Periodic* , 247-254.

Nur, A., Ikhsan, D., Ariadi, I., Rosyid, MB, & Ridwan, M. (2016). Design of an expert system using the backward chaining method for web-based disease diagnosis in cattle. *National Seminar on Information Technology and Multimedia* , 19-24.

Ongko, E. (2013). Design of an Expert System for Diagnosing Diseases of the Eye. *TIME Journal* , 10-17.

Prawirohardjo, S. (2008). *Content Science.* Jakarta: PT Bina Pustaka Sarwono Prawirohardjo.

Purwadi, Astuti, TB, & Utomo, FS (2016). An Expert System for Diagnosis of Menstrual Disorders Based on Web Service With Forward Chaining Method. *CITISEE* , 16-20.

Putri, AT, Santoso, BS, Izzatillah, M., & Senjaya, R. (2015). Expert System of Recommendation and Prohibition of Food Based on Type of Disease with Forward Chaining Method. *CITTE* , 18-23.

Santoso, & Nurmalina, R. (2017). Planning and Development of Student Attendance Applications Using Smart Cards for Smart Campus Development. *Journal of Integration* , 84-91.

Sitoayu, L., Pertiwi, DA, & Mulyani, EY (2017). Macronutrient Adequacy, Nutritional Status, Stress, and Menstrual Cycle in Adolescents. *Indonesian Journal of Clinical Nutrition* , 121-128.

Tarigan, FA (2014). Expert System To Diagnose Kidney Disease With Backward Chaining Method. *Jural TIMES* , 25-29.

Verawati, & Liksha, PD (2018). Accounting Applications for Data Processing Services at PT. Budi Berlian Motor Lampung. *Journal of Accounting Information Systems (JUSINTA)* , 1-14.

Yusuf, CR, SF, DD, & Damiri, DJ (2014). Designing an Expert System for Diagnosing Amenorrhea Using the Expert System Development Life Cycle Method. *Journal of Algorithms* , 1-10.