

DESIGNING AN EXPERT SYSTEM TO DIAGNOSE MYOPIC EYE DISEASE USING MOBILE-BASED FORWARD CHAINING METHOD

Mhd. Furqan¹, Yusuf Ramadhan Nasution², Hafiz Al Irsyad³, Abdul Halim Hasugian⁴

^{1,2,3,4} Computer Science Study Program Faculty of Science and Technology, North Sumatera, State Islamic University

Email : mfurqan@uinsu.ac.id¹, ramadhannst@uinsu.ac.id², hafizalirsyad0604@gmail.com³, abdulhalimhasugian@uinsu.ac.id⁴

Abstract

Article Info

Received : 10 September 2021

Revised : 25 October 2021

Accepted : 04 November 2021

Android adapted also in human civilization. The development of information technology affects many fields such as work, activities outside the home, vehicles and others. Eye health is a gift that cannot be paid for. Seeing how important eyes are to our lives, maintaining eye health is the main thing that we need to do every day. Maintaining eye health is very important because unfortunately our eyesight is lost. Many argue that in Southeast Asia many people suffer from eye diseases, especially myopia. Before something happens to the eye, we should take good care of it. A type of farsightedness when all types of myopia is actually an irregularity in focusing on the image of a visible object or a refractive error (ametropia). Using an expert system and applying a direct chain method designed to make it easier for patients to identify the type of myopic eye disease. And as knowledge for internet users about the importance of maintaining eye health in terms of myopia eye symptoms in the system.

Keywords: Myopic Eye, Forward Chaining Method, Mobile Based.

1. Introduction

The mobile application system can be used by users in diagnosing symptoms and gaining knowledge related to myopic eyes. This application can find solutions for types of myopic diseases according to the symptoms experienced by the patient. This application can diagnose and find out the results of the diagnosis of myopic eye disease in patients by using the direct chain method, namely the direct chain method. applies to applications in the form of establishing relationship rules by selecting symptoms and solutions. Symptoms and solutions are entered one by one according to the symptoms.

2. Method

This study uses the following data collection methods :

- a) Library Research
- b) Literature Studies
- c) Interview.

3. Results and Discussion

The following data are obtained from the results of Library Research, Literature Studies and Interviews, namely :

3.1 Symptom Data

The symptom data used in the myopic eye disease expert system has 19 symptoms. The data for this symptom may be shown in table 3.1 below:

Tabel 3.1 Symptom Data

Symptom Code	Symptom Name
--------------	--------------

G01	Blurred vision when viewing objects from a distance
G02	To see better, you need to squint or partially close your eyelids
G03	Headache due to tired eyes
G04	Vision problems while driving, especially at night
G05	Eyes squinted
G06	Have to sit close to the TV, big screen, or in front of the class
G07	Appears unconscious to distant objects
G08	Excessive blinking
G09	Computer use more than 3 hours a day
G10	Unfocused vision when looking at close objects
G11	Often watery when reading for a long time
G12	Eye fatigue or headaches after long-term near vision, such as when writing, reading, or using a computer
G13	The vision is cloudy like fog
G14	The surrounding colors seem faded
G15	Consider the part of the light around the lamp
G16	Dual view
G17	Better vision at night
G18	Change the size of your glasses as often as possible

3.2 Disease data

The number of diseases that are processed in the application of this myopic eye disease there are 3 types of diseases. Data on this disease can be seen in table 3.2:

Tabel 3.2 Disease Data

Disease Code	Disease Name
P01	Rabun Jauh (<i>Myopi</i>)
P02	Rabun Dekat (<i>Hipermetropi</i>)
P03	Katarak <i>Senilis</i>

The knowledge base can be seen in table 3.3 :

Tabel 3.3 Myopic Eye Disease Decision

Symptom Code (G)	Disease Code (P)		
	01	02	03
G01	*		*
G02	*	*	
G03	*	*	
G04	*	*	*
G05	*	*	
G06	*		
G07	*		
G08	*	*	
G09	*	*	
G10		*	
G11		*	
G12		*	
G13	*		*
G14			*
G15			*
G16			*
G17	*		*

G18	*		*
-----	---	--	---

Verification of the level of accuracy considered consists of determining the percentage of accuracy in the process of classifying test data. The level of accuracy is calculated by the formula :

$$\text{Akurasi} = \frac{\sum \text{match}}{\sum \text{tp}} \times 100\%$$

$\sum \text{match}$ = jumlah klasifikasi yang benar

$\sum \text{tp}$ = jumlah data testing

Expert System : Myopic Eye Disease Advisor

Case : Tarmizi wants to consult whether he has myopic eye disease?

The basic knowledge base of symptom and scale knowledge can be seen in the following table :

Tabel 3.4 Knowledge Database

No	Code	Sympton	Probability Value
1	G01	Blurred vision when viewing objects from a distance	1
2	G02	To see better, you need to squint or partially close your eyelids	1
3	G04	Vision problems while driving, especially at night	1
4	G06	Have to sit close to the TV, big screen, or in front of the class	1
5	G07	Appears unconscious to distant objects	1
6	G08	Excessive blinking	1
7	G09	Computer use more than 3 hours a day	1
8	G12	Eye fatigue or headaches after long-term near vision, such as when writing, reading, or using a computer	1
9	G15	Consider the part of the light around the lamp	1
10	G17	Better vision at night	1

Based on the knowledge representation to diagnose it, a list of rules is compiled as in the following table :

Tabel 3.5 Rule

No	Aturan (rule)
1	If G01 = True, then Probability Value = 1 If G01 = False, then Probability Value = 0
2	If G02 = True, then Probability Value = 1 If G02 = False, then Probability Value = 0
3	If G04 = True, then Probability Value = 1 If G04 = False, then Probability Value = 0
4	If G06 = True, then Probability Value = 1 If G06 = False, then Probability Value = 0
5	If G07 = True, then Probability Value = 1 If G07 = False, then Probability Value = 0
6	If G08 = True, then Probability Value = 1

	If G08 = False, then Probability Value = 0
7	If G09 = True, then Probability Value = 1 If G09 = False, then Probability Value = 0
8	If G12 = True, then Probability Value = 1 If G12 = False, then Probability Value = 0
9	If G15 = True, then Probability Value = 1 If G15 = False, then Probability Value = 0
10	If G17 = True, then Probability Value = 1 If G17 = False, then Probability Value = 0

Manual Count :

P01 : Mata Rabun Jauh

G1 = 1

G2 = 1

G4 = 1

G6 = 1

G7 = 1

G8 = 1

G9 = 1

G12 = 0

G15 = 0

G17 = 1

$$\text{Accuracy} = \frac{1+1+1+1+1+1+1+1+0+0+1}{12} \times 100\% = 66,667$$

P02 : Mata Rabun Dekat

G1 = 0

G2 = 1

G4 = 1

G6 = 0

G7 = 0

G8 = 1

G9 = 1

G12 = 1

G15 = 0

G17 = 0

$$\text{Accuracy} = \frac{0+1+1+0+0+1+1+1+0+0}{9} \times 100\% = 55,55 \%$$

P03 : Mata Katarak Senilis

G1 = 1

G2 = 0

G4 = 1

G6 = 0

G7 = 0

G8 = 0

G9 = 0

G12 = 0

G15 = 1

G17 = 1

$$\text{Accuracy} = \frac{1+0+1+0+0+0+0+0+1+1}{8} \times 100\% = 50 \%$$

Tarmizi was diagnosed with the disease Mata Rabun Jauh with an accuracy value of 66.67% or 67%.

4. Conclusions

Based on the research conducted in making this system, it can be concluded that this application can diagnose and find out the results of the diagnosis of myopic eye disease in patients by using the direct chain method, namely the direct chain method. applies to applications in the form of establishing relationship rules by selecting symptoms and solutions. Symptoms and solutions are entered one by one according to the symptoms. From the expert system made, develop a system that can process the diagnosis of myopic eye disease in humans using the direct chain method. This is indicated by the similarity of diagnostic results using the direct chain method in the system. The use of the direct chain method can strengthen the resulting diagnosis because the system not only relies on rules, but also has data to make the confidence level more accurate.

Reference :

- [1] Bagus Fery, Indah Werdiningsih dan Endah Purwanti 2017, *Aplikasi Sistem Pakar Diagnosa Penyakit Pada Anak Bawah Lima Tahun Menggunakan Metode Forward Chaining*. Journal of Information Systems Engineering and Business Intelligence Vol. 3, No. 1.
- [2] Evi Dewi dan Irna Nur Restianie 2016, *Aplikasi Sistem Pakar Untuk Mendiagnosis Penyakit Anak (Balita) Dengan Menggunakan Metode Forward Chaining*. Jurnal STMIK AMIKOM Yogyakarta.
- [3] Taufik Ramadhan dan Victor G Utomo 2014, *Rancang Bangun Aplikasi Mobile Untuk Notifikasi Jadwal Kuliah Berbasis Android (Studi Kasus : Stmik Provisi Semarang)*. Program Studi Teknik Informatika STMIK PROVISI Semarang.
- [4] Tatag Abiyoso Utomo, Bambang Darmo Yuwono, dan Fauzi Janu Amarrohman 2017, *Aplikasi Sistem Informasi Geografis Berbasis Web Dan Android Untuk Pemilihan Jalur Alternatif Menuju Tempat Pariwisata (Studi Kasus: Kota Wisata Cibubur Dan Jungleland, Kabupaten Bogor)*. Jurnal Geodesi UNDIP.
- [5] Hasanah, Ridarmin, dan Sukri Adrianto 2017, *Aplikasi Sistem Pakar Pendeteksi Kerusakan Laptop/Pc Dengan Penerapan Metode Forward Chaining Menggunakan Bahasa Pemrograman JAVA*. Jurnal Informatika, Manajemen dan Komputer, Vol. 9 No. 2 , Desember 2017.
- [6] Windah Supartini dan Hindarto 2016, *Sistem Pakar Berbasis Web Dengan Metode Forward Chaining Dalam Mendiagnosis Dini Penyakit Tuberkulosis di Jawa Timur*. KINETIK, Vol.1, No.3, 2016, November Hal. 147-15
- [7] Yunia Ervinaeni, Aziz Setyawan Hidayat dan Eri Riana 2019, *Sistem Pakar Diagnosa Gangguan Hiperaktif Pada Anak Dengan Metode Naive Bayes Berbasis Web*, JURNAL MEDIA INFORMATIKA BUDIDARMA, Vol 3, No 2, April 2019.
- [8] Yusuf Ramadhan Nasution 2018, *Penerapan Aplikasi Online Angket Persepsi Mahasiswa Terhadap Kinerja Dosen Uin Sumatera Utara Medan*, JISTech, Vol.3, No.2, Juli - Desember 2018.
- [9] Abdullah Husin, Usman dan Muhammad Putra Faren 2018, *Sistem Pakar Pendeteksi Penyakit Berdasarkan Keluhan Buang Air Kecil Menggunakan Metode Forward Chaining*, JURNAL IPTEK TERAPAN.
- [10] Iqbal Kamil Siregar dan Faisal Taufik 2017, *Perancangan Aplikasi Sms Alert Berbasis Web*, JIMP - Jurnal Informatika Merdeka Pasuruan Vol.2 No.2 Agustus 2017.
- [11] Haspiani M, *Karakteristik Penderita Katarak Senilis Yang Telah Dilakukan Pembedahan Katarak Di Rumah Sakit Pendidikan Universitas Hasanuddin Periode 1 Januari 2017 – 30 Juni 2017*, Skripsi Desember 2017 Fakultas Kedokteran Universitas Hasanuddin Makassar.
- [12] Yusuf Ramadhan Nasution Dan Khairuna 2017, *Sistem Pakar Deteksi Awal Penyakit Tuberkulosis Dengan Metode Bayes*, KLOROFIL Vol. 1 No. 1, 2017: 17-23.