Login : Jurnal Teknologi Komputer
ISSN : 2302-9692 (print) | 2723-8695 (online)
Vol. 15, No. 2, Desember 2021, pp. 87-91
LOGIN http://login.seaninstitute.org/index.php/Login

Breast Cancer Disease Expert System using Forward Chaining Method Web-Based

Ayu Patmawati[1], R. Mahdalena Simanjorang[2]
[1,2]Informatics Engineering Study Program, STMIK Pelita Nusantara, Medan, Indonesia.

Article Info

Article history:

Received, Nov 18, 2021
Revised, Dec 18, 2021
Accepted, Dec 20, 2021

Keywords:

Diagnosis,
Forward Chaining,
Breast Cancer,
Expert System.

ABSTRACT

Breast cancer is still one of the biggest causes of death in Indonesia. But on the other hand the lack of attention from the public to this breast cancer and the lack of knowledge about the early symptoms of breast cancer causes the general public to be susceptible to the disease. Lack of experts to handle cancer in health centers, especially health centers located far from the city. This of course has an impact on the delay in handling patients with breast cancer. To overcome this problem, appropriate action is needed to diagnose breast cancer. An expert system using the Forward Chaining method for diagnosing breast cancer is the best solution for recognizing the symptoms of breast cancer as early as possible, knowing the causes of the disease and how to control it. In making this system, it takes experts who are experts in the field of breast cancer to get accurate data about breast cancer information. This expert system for diagnosing breast cancer is designed using a web-based PHP programming language. The design of the knowledge base in this system is made dynamically to make it easier to manage data such as adding, changing and deleting data.

Corresponding Author:

Ayu Patmawati
Informatics Engineering Study Program, STMIK Pelita Nusantara, Medan, Indonesia,
Jl. Iskandar Muda No.1, Merdeka, Kec. Medan Baru, Kota Medan, Sumatera Utara 20154.

Email: realfatma039@gmail.com

1. INTRODUCTION

In this digital era, speed and accuracy in obtaining information is very important. Technology has an important role which is certainly related to information technology. To obtain and produce information, computers and technology are the most appropriate tools, one of which is to obtain information about breast cancer.

Breast cancer is a type of malignant tumor that develops in breast cells. This cancer can grow if there is an abnormal growth of cells in the breast.

In general, in diagnosing diseases, doctors still use conventional media where doctors write down patient symptom data and recap and determine the patient's breast cancer. As is the case at Sultan Sulaiman Hospital, patients who want to consult for breast cancer must come to the hospital to register and wait in line before being examined by a cancer specialist. Therefore we need a system that can diagnose breast cancer, the system is an expert system.

Expert system is one of the knowledge about artificial intelligence. This expert system serves to solve a specific problem. In this case health problems such as skin diseases. To build an expert system there are several methods including Forward Chaining, Bayes, and others. However, in the

application of the cancer diagnosis system using the Forward Cahining method. This method is very well used in expert systems because this method is also called bottom-up reasoning because reasoning from facts at the lower level to conclusions at the top level is based on facts. Bottom-up reasoning in an expert system can be likened to conventional bottom-up programming. Facts are the basic unit of a knowledge-based paradigm because they cannot be broken down into the smallest units that have meaning.

2. RESEARCH METHOD

The research framework contains the steps in conducting a study that will be carried out by the researcher to solve the problem. The following are the stages in the research framework:

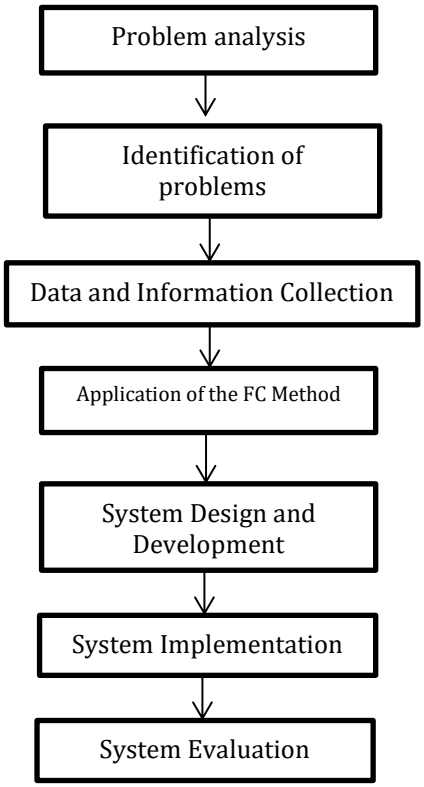

Figure 1. Research Framework

3. RESULTS AND DISCUSSION

He results data that have been obtained in conducting interviews with Breast Cancer Specialists at Sultan Sulaiman General Hospital in the Expert System for Breast Cancer Diagnosis Using the Forward Chaining Method. The results of his research are as follows:

Table 1. Stages of Breast Cancer Disease

Disease Code	Stadium	Percentage (%)
P1	Breast Cancer Stage I	0-25
P2	Breast Cancer Stage II	26-50
P3	Breast Cancer Stage III	51-75
P4	Breast Cancer Stage IV	76-100

Table 2. List of Symptoms of Breast Cancer

Disease Code	Name Of Symptoms
G01	Breast has lumps
G02	Breasts feel hot and sore
G03	A lump in the breast like a boil that bursts

G04	A lump in the breast that is filled with fluid
G05	On the nipples discharge a yellowish white liquid similar to pus
G06	Itchy breasts
G07	Body feels chills/high fever and chills
G08	The body sweats a lot
G09	Decreased endurance
G10	Decreased consciousness
G11	Breasts look inflamed (red and warm) with depressions
G12	Thickened breast edges
G13	The skin in the breast area becomes red or pink with a texture and thickness like orange peel
G14	Bruises on the breasts are continuous
G15	There is swelling in the breast
G16	Nipple pulled in
G17	Nipples leak fluid continuously
G18	The skin on the breasts becomes cracked
G19	The outer skin of the breast is reddened
G20	Breast ulcers or ulcers (sores)
G21	Boundary ulcers (wounds) are very clearly visible on one breast
G22	Breasts feel like they are being stabbed and burned in one nipple
G23	Nipples are deformed, there are breasts, there are no lumps
G24	Nipple discharge mixed with blood and pus
G25	One breast thickened about 3 to 4 cm
G26	New areas of the breast that look full or swollen
G27	Breast skin texture or condition such as wrinkled or thickened
G28	There is no primary tumor in the breast
G29	No metastases to regional lymph nodes in the armpit/axilla
G30	No distant metastases
G31	In the breast there is a tumor measuring 2 cm or less in diameter
G32	In the breast there is a tumor measuring between 2-5 cm in diameter.

Table 3. Breast Cancer Knowledge Base

RULE BASE	
Consequent	**Antecedant**
P1	G01 and G02 and G03 and G04 and G05 and G06 and G07 and G08

P2	G01 and G02 and G03 and G04 and G05 and G06 and G07 and G08 and G09 and G10 and G11 and G12 and G13 and G14 and G15 and G16
P3	G01 and G02 and G03 and G04 and G05 and G06 and G07 and G08 and G09 and G10 and G11 and G12 and G13 and G14 and G15 and G16 and G17 and G18 and G19 and G20 and G21 and G22 and G23 and G24
P4	G01 and G02 and G03 and G04 and G05 and G06 and G07 and G08 and G09 and G10 and G11 and G12 and G13 and G14 and G15 and G16 and G17 and G18 and G19 and G20 and G21 and G22 and G23 and G24 and G25 and G26 and G27 and G28 and G29 and G30 and G31 and G32

A patient selects the following symptoms:

a. G01 (Breast has lumps)
b. G02 (Breast feels hot and painful, pain)
c. G03 (Lump on the breast like a boil that bursts)
d. G04 (Lump in breast filled with fluid)
e. G05 (White yellowish discharge similar to pus on the nipple)
f. G06 (Itchy breasts)
g. G07 (Body feels chills/high fever and chills)
h. G08 (The body sweats a lot)

Settlement with Forward Chaining:
IF Patient Has Symptoms G01 (Breast has a lump) AND G02 (Breast feels hot and painful, painful) AND G03 (Lump in the breast like a boil that bursts) AND G04 (Lump in the breast filled with fluid) AND G05 (Lump in the nipple discharges fluid) yellowish white color similar to pus) AND G06 (breasts feel itchy) AND G07 (body feels feverish/high fever and chills) AND G08 (body sweats a lot) THEN Patients Indicated for Stage I Breast Cancer.

4. CONCLUSION

Application of the Forward Chaining method to the Disease Diagnosis Expert System Breast Cancer is successfully applied with the steps of the method Forward Chaining from the initial stage to the final stage so that you get yield 25% Stage I Breast Cancer. Design and manufacture of Cancer Diagnosis Expert System Breast using the php and myql programming languages as its database. With the system built, it can be implemented on Sultan Sulaiman Hospital to make it easier for the hospital in diagnosing breast cancer.

REFERENCES

[1] Dicki Alamsyah, A. P. (2019). Sistem Pakar Diagnosa Penyakit Ginjal Menggunakan Metode Forward Chaining Berbasis Android. *International Journal of Artificial Intelligence*, *6*(1), 53–74. https://doi.org/10.36079/lamintang.ijai-0601.32

[2] Fitri Ayu and Nia Permatasari. (2018). perancangan sistem informasi pengolahan data PKL pada divisi humas PT pegadaian. *Jurnal Infra Tech*, *2*(2), 12–26. http://journal.amikmahaputra.ac.id/index.php/JIT/article/download/33/25

[3] Handayani, S. (2018). Perancangan Sistem Informasi Penjualan Berbasis E-Commerce Studi KaHandayani, S. (2018). Perancangan Sistem Informasi Penjualan Berbasis E-Commerce Studi Kasus Toko Kun Jakarta. ILKOM Jurnal Ilmiah, 10(2), 182–189. https://doi.org/10.33096/ilkom.v10i2.310. *ILKOM Jurnal Ilmiah*, *10*(2), 182–189. https://doi.org/10.33096/ilkom.v10i2.310.182-189

[4] Julita, R. (2018). Sistem Pakar Pemilihan Menu Makanan Berdasarkan Penyakit Dan Golongan Darah. *Pseudocode*, *5*(1), 56–67. https://doi.org/10.33369/pseudocode.5.1.56-67

[5] Komputer, J. I., Matematika, F., Ilmu, D. A. N., & Alam, P. (2017). *Chaining Untuk Mendiagnosa Penyakit*.

[6] Kristen, U., & Wacana, K. (2020). *PERANCANGAN SISTEM PAKAR DIAGNOSIS PENYAKIT GINJAL MENGGUNAKAN METODE DEMPSTER-SHAFER BERBASIS WEBSITE JISICOM (Journal of*

Information System , Informatics and Computing) p-ISSN : 2579-5201 (Printed) JISICOM (Journal of Information System , Informati. *4*(1), 107–115.

[7] Kusbianto, D., Ardiansyah, R., & Hamadi, D. A. (2017). Implementasi Sistem Pakar Forward Chaining Untuk Identifikasi Dan Tindakan Perawatan Jerawat Wajah. *Jurnal Informatika Polinema*, *4*(1), 71. https://doi.org/10.33795/jip.v4i1.147

[8] M Teguh Prihandoyo. (2018). Unified Modeling Language (UML) Model Untuk Pengembangan Sistem Informasi Akademik Berbasis Web. *Jurnal Informatika: Jurnal Pengembangan IT*, *3*(1), 126–129.

[9] Maiyendra, N. A. (2018). Perancangan Sistem Pakar Mendiagnosa Penyakit Kulit Pada Anak Dengan Menggunakan Metode Backward Chaining. *Jursima*, *6*(2), 6. https://doi.org/10.47024/js.v6i2.120

[10] Muhammad, A. (2019). *Serba-serbi gagal ginjal* (M. Ulfah (ed.); ke2 ed.). DIVA Press.

[11] Murtadho, A. (2020). *NASKAH PUBLIKASI RANCANG BANGUN SISTEM INFORMASI PENJUALAN SMARTPHONE BERBASIS WEB (STUDI KASUS: Gemah Ripah Sellular)*.

[12] Muslim, B., Yadi, & Harta, M. (2017). Sistem Pakar Diagnosa Awal Penyakit Ginjal Berbasis Web Menggunakan PHP DAN MYSQL. *Jurnal Ilmiah Betrik*, *8*(03), 115–122. https://doi.org/10.36050/betrik.v8i03.72

[13] Negeri, S. M. A., Hulu, B., & Web, B. (2020). *menyimpan data dan menampilkannya data (*. *8*(2).

[14] Nurajizah, S., Saputra, M., Informatika, M., & Informasi, S. (2018). *SISTEM PAKAR BERBASIS ANDROID UNTUK DIAGNOSA PENYAKIT*. *14*(1), 7–14.

[15] Prof.Dr.Rully MA Roesli, dr., SpPD-KGH, D. R. B. dr. S.-K. (2019). *SIMPOSIUM DIALISIS 2019*. Perhimpunan Nerfrologi Indonesia (Pernefri) korwil jabar.

[16] Putri Barka; Seniwati, Erni, A. E. S. (2018). Implementasi Metode Forward Chaining Pada Sistem Pakar Pendiagnosis Gangguan Ansietas (Studi Kasus: Pijar Psikologi). *Jurnal Mantik Penusa*, *2*(Vol 2, No 2 (2018): Computer Science), 9–14. http://e-jurnal.pelitanusantara.ac.id/index.php/mantik/article/view/369

[17] Rosmawanti, N., & Kusumawardhani, G. P. (2021). *Model Sistem Pakar Diagnosa Penyakit Gagal Ginjal*. *9*.

[18] Sanger, J. B., Insani, F., & Nugroho, P. (2018). *Pengembangan Sistem Pakar Untuk Mengidentifikasi Permasalahan Layanan Jaringan Internet*. *14*(1). https://doi.org/10.31227/osf.io/xmku5

[19] Sanubari, I., Rosely, E., & Wijayanto, P. W. (2020). Aplikasi Pelaporan Kerusakan Fasilitas Yang Ada Di Stasiun Dan Dalam Gerbong Kereta Api Berbasis Web. *EProceedings of Applied Science*, *6*(1), 101–112.

[20] Septiani, M., & Kuryanti, S. J. (2018). Sistem Pakar untuk Mendiagnosa Penyakit Saluran Pernapasan pada Anak. *Publikasi Jurnal & Penelitian Teknik Informatika*, *2*(2), 23–27. https://jurnal.polgan.ac.id/index.php/sinkron/article/download/99/62/

[21] Sitanggang, D., Pasaribu, W., & Turnip, M. (2017). Sistem Pakar Untuk Mendiagnosa Penyakit Ginjal Menggunakan Metode Backward Chaining. *Jurnal Informatka Kaputama (JIK)*, *1*(2), 42–49.

[22] Syarif, M., & Nugraha, W. (2020). Pemodelan Diagram UML Sistem Pembayaran Tunai Pada Transaksi E-Commerce. *Jurnal Teknik Informatika Kaputama (JTIK)*, *4*(1), 70 halaman. http://jurnal.kaputama.ac.id/index.php/JTIK/article/view/240

[23] Tazkia, Z. Z. (2019). Perancangan Sistem Informasi Akuntansi Laporan Keuangan Laba Rugi pada Restoran Eatboss Dengan Menggunakan PHP dan MySQL. *Is The Best [Accounting Information System & Information Technology Business Enterprise]*, *4*(1), 426–440. https://doi.org/10.34010/aisthebest.v4i1.1831

[24] Techno, J., Mandiri, N., Xiii, V., & September, N. (2016). *ISSN 1978-2136 | Rancang Bangun Sistem ... ISSN 1978-2136 | Rancang Bangun Sistem ... XIII*(2), 63–71.

[24] Wahyuti, W., Permana, I., & Salisah, F. N. (2018). Aplikasi Sistem Pakar Berbasis Android untuk Diagnosa Awal Penyakit Ginjal Manusia Menggunakan Metode Forward Chaining. *Sntiki*, *10*(November), 121–128.

[26] Zulfian Azmi, S.T., M.kom dan Verdi Yasin , S.Kom., M. K. (2019). *pengantar sistem pakar dan metode*. Mitra Wacana Media.