



# Expert System to Diagnose Appendicitis with the Certainty Factor Method

Andi Lesmana<sup>1</sup>, R Mahdalena Simanjorang<sup>2</sup>

<sup>1,2</sup>Informatics Engineering Study Program, STMIK Pelita Nusantara, Medan, Indonesia.

## Article Info

### Article history:

Received Apr 26, 2021

Revised Mei 23, 2021

Accepted Jun 19, 2021

### Keywords:

Factor Method,  
Microsoft Visual Studio 2010,  
Diagnosing Appendicitis.

## ABSTRACT

Health is the main key to human life, for that the author also needs health in writing a thesis entitled appendicitis so that readers can understand and recognize appendicitis more quickly. According to Kusri, S.Kom (2006:11). An expert system is a computer-based system that uses knowledge, facts and reasoning techniques in solving problems that can usually only be solved by an expert in the field. Basically expert systems are applied to support problem solving activities. According to (T. Sujoto, Edy Mulyanto, Dr. Vincen Suhartono, 2011: 125) the Certainty Factor (CF) theory is to accommodate the inexact reasoning of an expert proposed by Shortliffe and Buchanan in 1975. Here the author will discuss on the Expert System for Diagnosing Appendicitis, Certainty Factor Method is one of the Expert System Methods for diagnosing appendicitis. To make the application the author uses Microsoft Visual Studio 2010.

*This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.*



## Corresponding Author:

Andi Lesmana,  
Informatics Engineering Study Program, STMIK Pelita Nusantara, Medan, Indonesia,  
Jl. Iskandar Muda No.1, Merdeka, Kec. Medan Baru, Kota Medan, Sumatera Utara 20154.  
Email: [andi190997@gmail.com](mailto:andi190997@gmail.com)

## 1. INTRODUCTION

Health is the main key to human life, for that the author also needs health in writing a thesis entitled appendicitis so that readers can understand and recognize appendicitis more quickly. And the intestine is a normal intestine that has a worm-like shape so it is also called an appendage of worms, measuring 5 to 10 cm long which is connected to the large intestine. Appendicitis when the intestine becomes inflamed, in the medical name appendicitis is also called appendicitis generally located in the lower right inner abdomen. When inflammation occurs, the intestine will swell full of pus in which bacteria and dead cells cause infection. If appendicitis is not treated quickly, the appendix will swell more and more, and when the appendix swells, it will cause the intestine to burst, and the contents of the intestine will spread throughout the abdominal cavity and result in infection and life-threatening.

Appendicitis can occur at any age, but is most common between the ages of 10 and 30. Appendicitis can be caused by a blockage in the appendix, either partially or totally. Complete obstruction of the appendix is an emergency and needs to be treated immediately with surgery. For public awareness about appendicitis is still very little, because people think this disease is not so dangerous to life, it will endanger lives if appendicitis is not treated immediately.

Not so many people know about the symptoms of appendicitis, therefore I as a writer want to implement this system to make it easier for people to know about the symptoms of appendicitis. The main symptom of appendicitis is abdominal pain. The pain can start from the navel, then move to the lower right part of the abdomen. However, the position of the pain may vary, depending on age and the position of the appendix itself. Within a few hours, the pain can get worse, especially

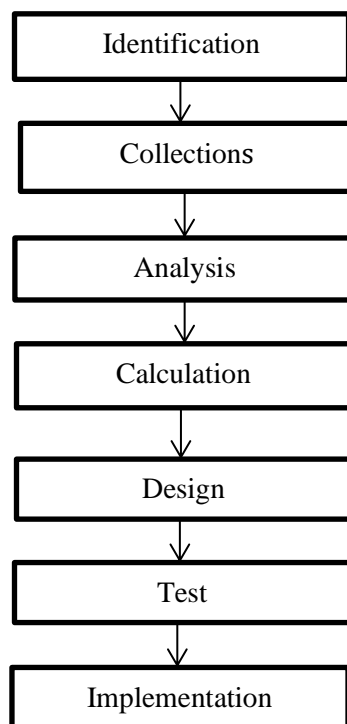
when we move, take deep breaths, cough, or sneeze. In addition, this pain can also appear suddenly, even when the patient is sleeping. If appendicitis occurs during pregnancy, pain can appear in the upper abdomen, because the position of the appendix becomes higher during pregnancy.

There are also many hospitals that do not yet have expert doctors, especially for appendicitis, for that the author gets one of the advantages of making this system easier for the community. The diagnosis of appendicitis begins after the doctor asks the patient's symptoms and performs a physical examination. The examination aims to assess pain, and is done by pressing the area that feels pain. Appendicitis is characterized by pain that gets worse after the pressure is released quickly.

Artificial intelligence or artificial intelligence is part of computer science that makes machines (computers) able to do work as well as humans do. One of the things learned in artificial intelligence is using the Certainty Factor method of certainty. The reason for using Certainty Factor is because there is a certainty value compared to other methods where there is no comparison material in making solutions and solving problems.

## 2. RESEARCH METHOD

To complete the research, the stages of the research carried out are described as shown in Figure 1 below:



**Figure 1.** Research Stages Flow

## 3. RESULTS AND DISCUSSION

While the symptoms of appendicitis obtained based on research results, can be seen in the following table:

Code	Symptom Name
G01	Pain in the lower right that appears suddenly.
G02	Abdominal pain that starts from the heart (similar to an ulcer), then moves to the lower right abdomen.
G03	Lower right abdominal pain that gets worse when coughing, walking or moving.
G04	Nausea and vomiting
G05	Loss of appetite.
G06	Mild fever.
G07	Constipation or diarrhea.
G08	Stomach bloat.

G09 Constipation.  
G10 Can't pass gas (fart)

**Table 1.** Disease

Code	Disease Name	Treatment
P1	Appendix	Appendicitis can be prevented by getting used to practicing a healthy lifestyle, such as drinking enough water, reducing eating seeds.
P2	Inflammation of the intestine	To relieve symptoms, you can change the type of food and drink, stop smoking, exercise regularly

**Table 2.** Relationships and Weights

Diseases/Symptoms	P1	P2	Weight
G01	✓	✓	0,9
G02	✓		0,7
G03	✓	✓	0,9
G04	✓	✓	0,6
G05	✓	✓	0,8
G06	✓		0,9
G07	✓	✓	0,8
G08	✓	✓	0,9
G09	✓		0,9
G10	✓	✓	0,7

**Table 3.** Confidence Level of User Answers

Certain Term	Certainty Faktor
Not sure	0
Do not know	0.2
A little sure	0.4
Pretty sure	0.6
Certainly	0.8
Very sure	1

One of the cases of diagnosis of appendicitis, namely the symptoms of the disease and the answers given by the user are as follows:

CF[H,E]1 Sudden onset of right lower abdomen pain Very certain

CF[H,E]2 Nausea and vomiting A little sure

CF[H,E]3 Loss of appetite Definitely

CF[H,E]4 Constipation Definitely

CF[H,E]5 Can't pass gas (fart) A little sure

CF[H,E]6 Mild fever Slightly for sure

Then the value of CF(H,E) is:

$$CF[H,E]1 = CF[H]1 * CF[E]1$$

$$= 0.9 * 1$$

$$= 0.9$$

$$CF[H,E]2 = CF[H]2 * CF[E]2$$

$$= 0.6 * 0,6$$

$$= 0.36$$

$$CF[H,E]3 = CF[H]3 * CF[E]3$$

$$= 0.8 * 1$$

$$= 0.8$$

$$CF[H,E]4 = CF[H]4 * CF[E]4$$

$$\begin{aligned}
&= 0.9 * 0,4 \\
&= 0.36 \\
CF[H,E]5 &= CF[H]5 * CF[E]5 \\
&= 0.7 * 0.6 \\
&= 0.42 \\
CF[H,E]6 &= CF[H]6 * CF[E]6 \\
&= 0.9 * 1 \\
&= 0.9
\end{aligned}$$

The combination of CF[H,E] values based on the above calculations for each disease symptom is as follows:

$$\begin{aligned}
CF_{combine} CF[H,E]1,2 &= CF[H,E]1 + CF[H,E]2 * (1 - CF[H,E]1) \\
&= 0.9 + 0.36 * (1 - 0.9) \\
&= 0.9 + 0.126 \\
&= 1.026 \rightarrow \text{old1} \\
CF_{combine} CF[H,E]old1,3 &= CF[H,E]old1 + CF[H,E]3 * (1 - CF[H,E]old1) \\
&= 1.026 + 0.8 * (1 - 1.026) \\
&= 1.026 - 0.047476 \\
&= 0.978524 \rightarrow \text{old2} \\
CF_{combine} CF[H,E]old2,4 &= CF[H,E]old2 + CF[H,E]4 * (1 - CF[H,E]old2) \\
&= 0.978524 + 0.36 * (1 - 0.978524) \\
&= 0.978524 + 0.028746141 \\
&= 1.007270141 \text{ old3} \\
CF_{combine} CF[H,E]old3,5 &= CF[H,E]old3 + CF[H,E]5 * (1 - CF[H,E]old3) \\
&= 1.007270141 + 0.42 * (1 - 1.007270141) \\
&= 1.007270141 - 0.01037645 \\
&= 0.996893691 \text{ old4} \\
CF_{combine} CF[H,E]old4,6 &= CF[H,E]old4 + CF[H,E]6 * (1 - CF[H,E]old4) \\
&= 0.996893691 + 0.9 * (1 - 0.996893691) \\
&= 0.996893691 + 0.005892338 \\
&= 1.002786029
\end{aligned}$$

So the percentage value of the user's level of trust in the expert system that diagnoses appendicitis and based on the above cases is:

$$\begin{aligned}
\text{Percentage} &= CF_{Disease} * 100 \\
&= 1.002786029 * 100 \\
&= 100.27\%
\end{aligned}$$

#### 4. CONCLUSION

By applying the weighted product method for determining the provision of electronic and furniture loans, it really helps the leadership in selecting who deserves to receive it by looking at the results of the calculations according to the criteria and weights that have been given.

#### REFERENCES

- [1] Ade Hendini "UML Modeling Information System for Monitoring Sales and Stock of Goods (Case Study: Distro Zhezha Pontianak)", city of Pontianak indonesia, 2016.
- [2] Adhar Arifuddin, Lusia Salmawati, Andi Prasetyo (2017) "Risk Factors for Appendicitis Incidence in the Inpatient Section of Anutapura General Hospital Palu" Palu, 2017.
- [3] Annisa Amalia, Avit Suchitra and Deddy Saputra "The Relationship between Pre-Operational Leukocyte Count and Post-operative Complications of Appendectomy in Perforated Appendicitis Patients at Dr.M. Hospital. Djamil Padang" Padang, 2018.
- [4] Kusriani, S. Kom." Expert Systems Theory and Applications "Andi Yogyakarta, 2017.
- [5] Muhammad Arhami "Basic Concepts of Expert System" Andi Yogyakarta 2005.
- [6] Nur Hidayat, Norsalan "Patient Characteristics and Treatment Patterns of Appendicitis At Dr. Hospital. Sardjito" Yogyakarta January 2010 - December 2014.

- [7] Novi Mega Shilvia, Sri Rahayu "Development of an Expert System for Early Diagnosis of Internal Medicine Based on Android" jl. Major syamsu no. 1 jayaraga arrowroot, 2016.
- [8] Ninuk Wiliani, Syadid Zambani "Designing a Ticket Cashier Application to Watch Ball Goods at X Cashiers at X Locations With Visual Basic 2010 and Mysql" South Jakarta, 2017.
- [9] Nanda Jarti, Roden Trisno, "Web-based Expert System for Diagnosing Allergic Diseases in Children Using Forward Chaining Methods in Batam City" Faculty of Putra University, Batam, 2017.
- [10] Rini Asmara, S.Kom, M.Kom "Information System for Disaster Management Data Processing at the Office of the Regional Disaster Management Agency (Bpbd) Padang Pariaman Regency" Jl. resin. No. 69 E Padang, 2016.
- [11] Rini sMiranda, Nelly Astute Hasibuan, Pristiwanto and Mesran "Expert System for the Diagnosis of White Root Fungus (Rigidoporus Lignosus) on Rubber Plants (Havea Brasiliesis) Using Certainty Factor Method" jl.Sisingamangaraja no.338 sp. Lemonade, 2016.