

SEARCHING CERTAINTY FACTOR METHOD IN DIAGNOSIS OF SKIN DISEASES IN CHILDREN

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Abstract

Background : Skin diseases in Indonesia are generally caused by bacterial, fungal, viral infections, and due to allergies, in contrast to Western countries which are heavily influenced by degenerative factors. Other skin disease factors are people's habits and an unclean environment. The purpose of this research is to build a web-based expert system for diagnosing skin diseases in children. Calculation of uncertainty in the system can be done with several possible expert uncertainties. **Method :** One of them is to use the Certainty Factor method. CF is a method that defines a measure of facts or rules to describe an expert on the problem at hand. **Results :** The result of the implementation of the system is that the system provides options in the form of symptoms that must be answered by the patient based on the symptoms experienced by the patient and from the results of the process the system will provide information about what skin type the disease in children is experiencing to get a solution. **Conclusion :** The expert system application draws conclusions using the case based reasoning method based on the types and symptoms of children's skin diseases that can be selected by the user, the user also provides predictive values about gastric disease then the machine will search and issue the best diagnosis and solution results.

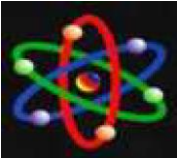
Keywords: Expert System, Diagnosis, Skin Diseases in Children, Certainty Factor, Web

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INTRODUCTION

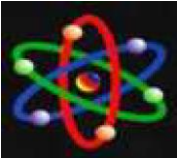
The development of technology is so rapid, especially in the field of computers, so it is not excessive if the computer is used as a tool to lighten the workload of humans. The development of technology causes more jobs that require certain skills. The period of child growth is where the growth of both physical, mental and thinking power, therefore stamina and health must be really maintained. Keeping the environment clean and providing nutritious food needs to be done so that children's health can be maintained properly. Skin diseases in Indonesia are generally caused by bacterial, fungal, viral infections, and due to allergies, in contrast to Western countries which are heavily influenced by degenerative factors. Another factor of skin disease is people's habits and an unclean environment. Patients who have skin infections caused by fungi. In the human body, fungi can grow in damp areas, such as in skin folds (eg armpits), between the fingers, and intimate organs. Fungi are organisms that can live in water, soil, air, or even in the human body (B. K. Asahan, 2021). It is hoped that the use of the Certainty Factor method can reduce uncertainty so that it can produce a valid diagnosis (T. F. Ramadhani et al., 2020). According to Muhammad Arhami, an expert system is a computer software package intended as a provider of aids in solving problems in certain specialist fields such as science, medicine, education and so on. Expert systems use the knowledge of an expert that is entered into a computer (D. Gusmaliza et al., 2022). According to Ahmad Husein, an expert system is a system that stores the knowledge of an expert in a knowledge database (knowledge

base) used by computer equipment to search for knowledge in solving a particular problem. Decision making on certain problems becomes faster, easier and more accurate when an expert system is used (A. Husin et al., 2018). The skin is an organ in the human body that is very important because it is located in the the outer part of the body that functions to receive stimuli such as touch, pain and other external influences (Dr. dr. Ago Harlim., 2017). Skin disease is one of the diseases that are often found in tropical countries such as Indonesia (D. D. Putri et al., 2018) However, it is very good if the child's parents read the right advice to help your child deal with bad times, when he catches the disease. Hopefully this article can help you recognize the common symptoms of diseases that are commonly faced by children and help them recover too, of course (Dr. dr. Ago Harlim., 2017). Prevent it with vaccination. To prevent the possibility of contracting or contracting chickenpox, vaccination can be given. Even if exposed after vaccination, it is usually not severe (Dr. dr. Ago Harlim., 2017).

RESEARCH METHODS

An expert system is a system that seeks to adopt human knowledge to computers, in order to solve problems as is usually done by experts. According to Ahmad Sucipto, Certainty Factor (CF) is a method that defines a measure of certainty against facts or rules to describe an expert's belief in the problem at hand. Certainty Factor (CF) shows a measure of the certainty of a fact (A. Sucipto., 2019). According to Rahman, Certainty Factor (CF) is a method to prove whether a fact is certain or uncertain in the





form of a metric that is usually used in expert systems. This method is very suitable for expert systems that diagnose something that is not certain (R. Rachman et al., 2018). Based on the explanation above, the researcher makes an understanding that the Certainty Factor method is a method that defines a measure of certainty against facts or rules to describe an expert's belief in the problem at hand. Certainty Factor is defined by the equation (B. K. Asahan, 2021).

Where :

$[h,]$: Certainty Factor

$[h,]$: A measure of confidence or level of confidence in hypothesis H, if given or influenced by evidence E (between 0-1).

$[h,]$: A measure of distrust or the level of disbelief in hypothesis H, if given or influenced by evidence E (between 0-1).

There are three things that might happen to Certainty Factor, namely:

Some evidence is combined to determine the Certainty Factor of a hypothesis. If e_1 and e_2 are observations, then:

$$[h, e_1 \wedge e_2] = \{ 0 MB[h, e_1] + MB[h, e_2] \}$$

$$(1 - [h, e_1]) MD[h, e_1 \wedge e_2] = 1$$

lainnya $MD[h, e_1 \wedge e_2] = \{ 0 MD[h, e_1] + MD[h, e_2] \}$

$$(1 - [h, e_1]) [h, e_1 \wedge e_2] = 1$$

lainnya

1. Certainty Factor is calculated from a combination of several hypotheses.

If h_1 and h_2 are hypotheses, then:

$$MB[h_1 \wedge h_2, e] = \min (MB[h_1, e], MB[h_2, e])$$

$$MB[h_1 \wedge h_2, e] = \max (MB[h_1, e], MB[h_2, e])$$

$$MD[h_1 \wedge h_2, e] = \min (MD[h_1, e], MD[h_2, e])$$

$$MD[h_1 \wedge h_2, e] = \max (MD[h_1, e], MD[h_2, e])$$

2. Several rules go hand in hand, the uncertainty of one rule becomes the input for other rules, then the equations see equation

$$[h, s] = MB' [h, s] * \max (0, [s, e])$$

3. In the rule with single evidence e (single evidence e) and single hypothesis h , where the Certainty Factor formula can be seen the equation

$$[h, e] = (e)(rule)$$

Where:

CF (rule) is determined by experts or experts.

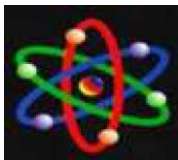
CF(e) is determined by the user when consulting the system (J. A. Widians & F. N. Rizkyani., 2020)

RESULTS AND DISCUSSION

Data on Skin Diseases in Children

No.	Disease Code	Disease Name	Definition	Solution
1	p01	Roseola Infantum	Roseola infantum is a disease caused by the herpes virus type 6. This virus is actually not dangerous, but can be transmitted easily through splashes of saliva when an infected child coughs or sneezes. Roseola infantum virus most often affects infants aged 6 months to 1.5 years.	In general, roseola is not a dangerous disease and does not require special treatment. Patients can recover with self-care at home, namely by: 1. Get enough rest. Drink enough water. 2. Compress the forehead with a cloth dipped in warm water to reduce fever.





3	p03	Impetigo	Impetigo is a skin infection that often occurs in children, often called pyoderma. Impetigo generally affects children aged 2-5 years. The cause is the bacterium <i>Staphylococcus aureus</i> or also <i>Streptococcus hemolyticus</i> .	Antibiotic ointments or creams, such as mupirocin, are used if the infection is mild, affects only one area of the body, and has not spread too widely. Before applying an antibiotic cream or ointment, it is recommended to soak the wound with warm water or a warm compress to soften the scab.
4	p04	Cacar air	It is a disease that is often found in children. Chickenpox or chicken pox is caused by the Varicella zoster virus. This virus attacks the skin.	The main preventive steps that can be taken are:

Table 1 Data on Skin Diseases in Children

Data on Symptoms of Skin Diseases

No.	Symptom Code	Symptom
1	G001	Fever
2	G002	A pink rash appears when the body temperature returns to normal
3	G003	Itchy skin
4	G004	Cough, runny nose and sore throat
5	G005	Child has no appetite
6	G006	Mild diarrhea
7	G007	Swollen eyelids
8	G008	Swollen glands in the neck

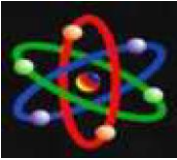
9	G009	Runny nose
10	G010	Respiratory disorders
11	G011	A red rash appears on the cheek like a slap
12	G012	Itchy red patches appear around the mouth and nose
13	G013	Wounds on the spots due to scratching
14	G014	Irritation of the skin around the wound
15	G015	Brownish yellow scabs around the wound
16	G016	Red marks on the skin due to missing scabs
17	G017	The appearance of red spots on the skin

Table 2 Data on Skin Diseases in Children

Data Rule

Code Rule	Symptom
IF	<ul style="list-style-type: none"> • G001 AND fever • G002 A pink rash appears when the body temperature returns to normal AND • G003 Itchy skin AND • G004 Cough, runny nose and sore throat AND • G005 Child has no appetite AND • G006 Mild diarrhea AND • G007 Swollen eyelids AND • G008 Swollen glands in the neck
THEN	<ul style="list-style-type: none"> • p01 Roseola Infantum
IF	<ul style="list-style-type: none"> • G001 AND fever • G009 runny nose AND • G010 AND breathing problems • G011 A red rash appears on the cheek like a slap
THEN	<ul style="list-style-type: none"> • p02 Sindrom Pipi Merah (Parvovirus B19)





IF	<ul style="list-style-type: none"> • G012 Itchy red patches appear around the mouth and nose • AND • G013 Wounds on the spots due to scratching AND • G014 Irritation of the skin around the wound AND • G015 Brownish yellow scabs around the wound AND • G016 Red marks on the skin due to missing scabs
THEN	<ul style="list-style-type: none"> • p03 Impetigo
IF	<ul style="list-style-type: none"> • G001 AND fever • G005 Child has no appetite AND • G017 The appearance of red spots on the skin which eventually forms a liquid bubble AND • G018 Tired or feeling unwell AND • G019 Muscle or joint pain AND • G020 Symptoms such as runny nose or cough AND • G021 AND headache • G022 A scab appears from the blisters due to the rash
THEN	<ul style="list-style-type: none"> • p04 Chicken pox

Table 3 Data Rule

CF Production Rules

Kaidah Produksi CF

NO	Symptom	CF	Name Disease
1	G001Fever	Disease CF : 0.8	p01 Roseola Infatum
	G002A red rash appears	CF Symptoms : 0.2	
	G003young when body temperature returns to normal	CF Disease : 0.8 CF Symptoms : 0.2	
	G004Itchy skin	Disease CF : 0.8	

G005Cough, runny nose and sore throat	CF Symptoms : 0.4	
G006Child has no appetite	CF Disease : 0.6 CF Symptoms : 0.4	
G007Mild diarrhea	Disease CF : 0.4	
G008Swollen eyelids	CF Symptoms : 0.2	
2 G001Swelling of the glands in the	Disease CF : 0.4	p02 Sindrom Pipi Merah (Parvovirus B19)
G009Neck	CF Symptoms : 0.2	
G010Fever	Disease CF : 0.4	
G011Runny nose	CF Symptoms : 0.2	

Table 4 CF Production Rules

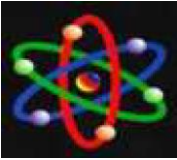
RESULT

1. Homepage

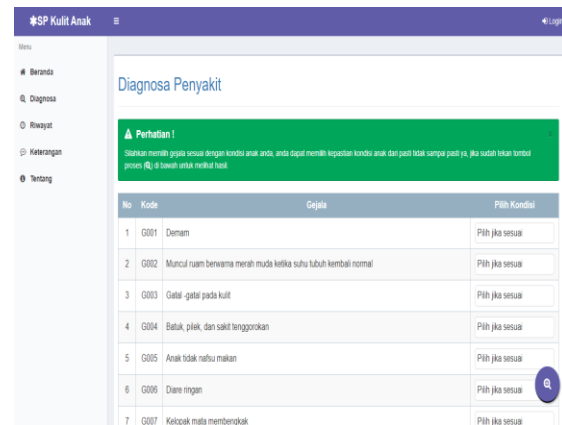


2. Diagnosis Page Display

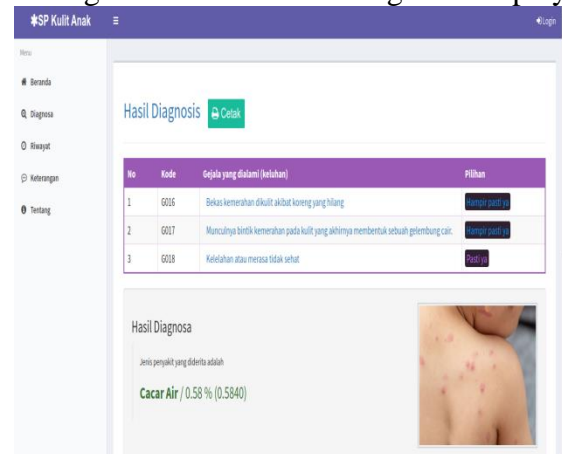




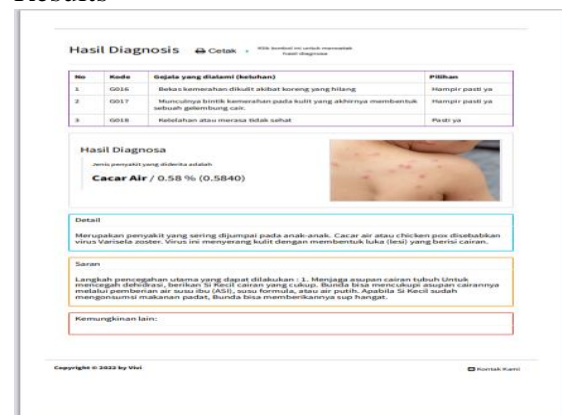
3	G012 Itchy red patches appear around the mouth and	CF Disease : 0.8 CF Symptoms : 0.4	p03 Impetigo
	G013 Nose	Disease CF : 0.6	
	G014 Wounds on the spots due to	CF Symptoms : 0.6	
	G015 scratched	Disease CF : 0.8	
	G016 Irritation of the skin around the wound	CF Symptoms : 0.6	
4	G001 Brownish yellow scabs around the wound	CF Disease : 0.6 CF Symptoms : 0.4	P 0 4 C a c a r a i r
	G005 Red marks on the skin due to missing scabs	CF Disease : 0.4 CF Symptoms : 0.2	
	G017 Fever	CF Disease : 0.6 CF Symptoms : 0.2	
	G018 Child has no appetite	CF Disease : 0.8 CF Symptoms : 0.4	
	G019 The appearance of red spots on the skin which eventually form a liquid bubble.	CF Disease : 0.8 CF Symptoms : 0.2	
	G020 Fatigue or feeling not	Disease CF : 0.6	
	G021 Healthy	CF Symptoms : 0.4	
	G022 Muscle or joint pain	Disease CF : 0.8	



3. Diagnose Results Page Display

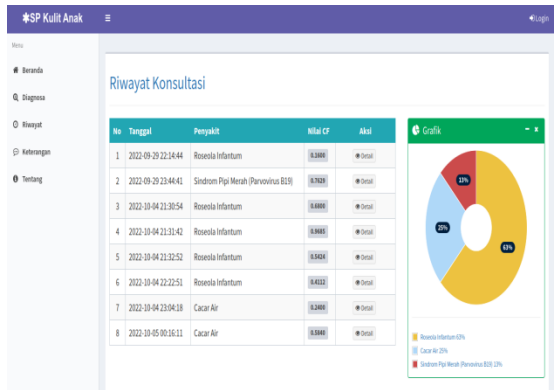
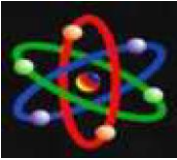


4. Print Display of Disease Diagnosis Results

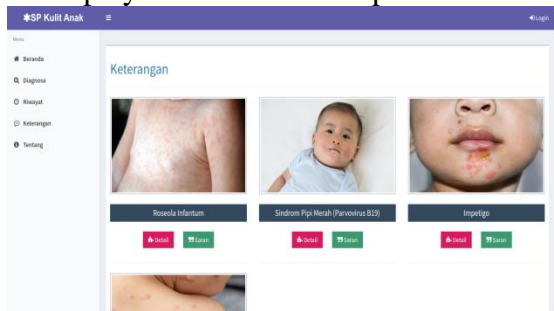


5. Display User Diagnostic History

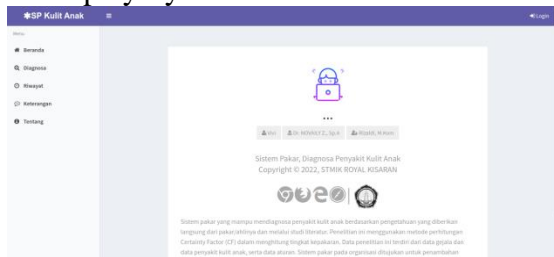




6. Display of Disease Description

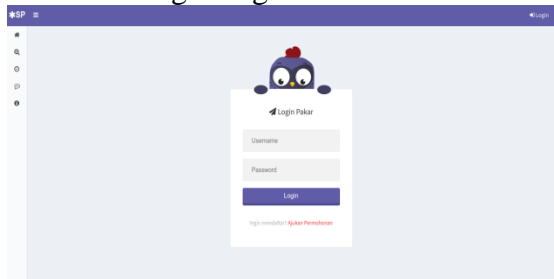


7. Display System



Admin View

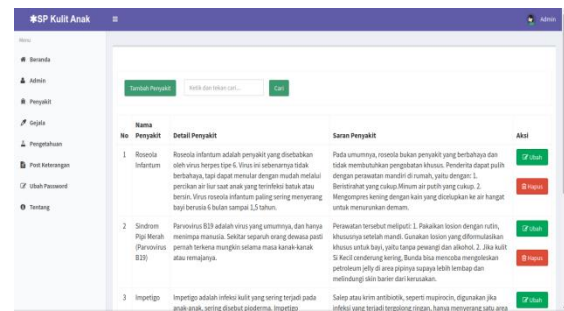
1. Admin Login Page



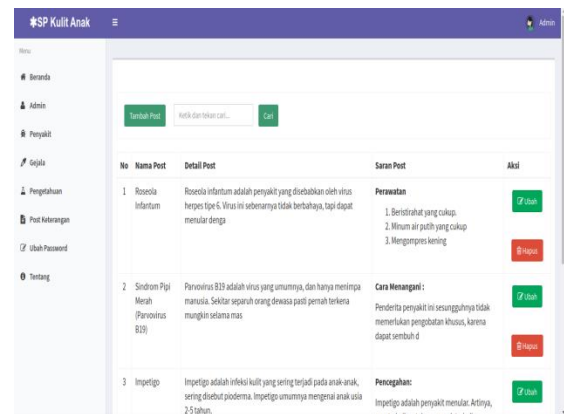
2. Page Home



3. Pages Manage Child Skin Disease Type Data



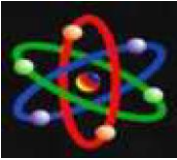
4. Page Manage Information Regarding Disease



CONCLUSION

From writing this thesis, starting from the analysis stage, to testing the new system





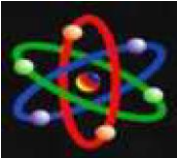
application, several conclusions can be drawn, namely:

1. The system built can help the community in recognizing the types and disorders of children's skin diseases, by printing the results of the diagnosis after conducting the consultation so that the user can get data on the results of the consultation in the form of symptoms and solutions for handling children's skin diseases.
2. The expert system application can be used as a medium for early detection of children's skin diseases.
3. The expert system application draws conclusions using the case based reasoning method based on the type and symptoms of children's skin diseases that can be selected by the user, the user also provides a predictive value about gastric disease then the machine will perform a search and issue the results of the diagnosis and the best possible solution.

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