EXPERT SYSTEM APPLICATION DESIGN FOR CUP TREATMENT USING THE DEMPSTER SHAFER METHOD

Surmayanti*[1], Hadi Syaputra[2], Sepsa Nurrahman[3], Nadya Alinda Rahmi[4], Fariz Assyaukhi[5]

[12345]Universitas Putra Indonesia YPTK Padang
Jl. Lubuk Begalung Kampus UPI-YPTK Padang
email: surmayanti@upiyptk.ac.id

Abstract

At this time to determine cupping points at cupping clinics still use conventional methods which take a long time. One of the problems faced by a therapist in cupping treatment is still having to open a book or magazine if they find a new special case in the process of providing cupping treatment to patients, which will hinder the process of cupping treatment for patients. Thus a computer-based tool is needed that can help them to obtain information about the point of cupping in the patient's disease. The expert system is one of artificial intelligence where the system can work according to the thoughts of an expert who aims to get a solution and solve a problem. This expert system application produces output in the form of an application that aims to determine the point of cupping with the Dempster Shafer method. Testing the expert system application with the Dempster Shafer method starts with disease data entry, symptoms and rules by the owner and then trapis can determine the point of cupping to the patient according to the expert's thinking, namely the owner himself.

Keywords: Expert System, Dempster Shafer, Cupping, Cupping Point and Cupping Clinic

INTRODUCTION

Health is one of the most important needs in society to carry out various activities to meet their needs. One way to fulfill this health can be by means of cupping therapy. Cupping is a term known in Malay, Arabic knows it as Hijamah , in English it is known as cupping , the Chinese know it as gua-sha , while the Indonesians know it as cantuk or kop. Cupping Therapy is believed by the Islamic community in Indonesia as a method recommended by Rasulullah SAW to treat various disease conditions[1][2][3].

In the field of cupping treatment, it can be seen that all this time cupping treatment experts have been lacking tools that are faster, more precise and efficient because so far they have only used conventional tools which often make it difficult for experts to translate difficult and complex concepts[4][5][6][7].

Making an expert system application for the treatment of cupping can help in solving problems that have been faced by experts in the field of cupping treatment such as determining the patient's diagnosis to determine the point of cupping according to the results of the diagnosis obtained. Expert system knowledge is

taken from the knowledge of experts so that the running system is able to match the ability to make decisions in accordance with the knowledge of an expert. With the existence of an expert system for the treatment of cupping, it is hoped that it can help the experts who work at the Seruni Healthy Home in taking the results of the diagnosis and determining the exact point of cupping. So that precisely the results obtained by the cupping experts can accelerate the action in providing cupping treatment to patients[8][9][10][11][12].

METHOD

In conducting this research the authors used the Dempster Shafer method. The Dempster-Shafer method is also known as the belief function theory. This method uses Belief, which is a measure of the strength of evidence in supporting a set of propositions. If it is 0 (zero), it indicates that there is no evidence, and if it is 1, it indicates certainty [13][14].

Dempster shafer is a method introduced by Dempster in 1976 and a Bayesian subjective probability mathematical theory. Used for proof based on the belief function and plausible reasoning. By combining some separated information to be linked into an event.

RESULT

Which belief is a measure of the strength of evidence in supporting a set of propositions. Meanwhile , plausibility is an equation notation, which has a value of 0 to 1 . If it has a value of 0 then it indicates that there is no evidence, and if it has a value of 1 it indicates certainty. Plausibility is denoted as equation 1:

$$Pl(s) = 1 - Bel(s)$$

Plausibility also has a value of 0 to 1. If we believe it, it can be said that Bel(s)=1, and Pl(s)=0. Meanwhile, if there is no confidence whatsoever in choosing the hypothesis, then the value: m{Ø}=1.0

and it is known that X is *a subset* of, with m1 as the density function, and Y is also a *subset* of with m2 as the density function, then we can form the combined function m1 and m2 as m3, namely as equation 2:

$$m1 \oplus m2(Z) = \frac{\sum_{X \cap Y = Z} m1(X)m2(Y)}{1 - \sum_{x \cap Y = \emptyset} m1(X)m2(Y)}$$

Description :

m1 , m2(Z) = Mass function of evidence (Z)

m1(X) = Mass function of evidence (X)

m2(Y) = Mass function of evidence (Y)

k = Number of evidential conflicts.

Calculations with Dempster Shafer.

A therapist wants to know the point of cupping in a patient with symptoms that have been chosen by a therapist according to what the patient feels as follows :

Symptom Code	Symptom	Weight	Chosen
G01	High fever.	0.9	YES
G02	The phases are pale.	0.8	YES
G03	Dark urine.	0.8	YES
G04	Abdominal pain.	0.7	YES
G05	Joint pain	0.7	YES
G06	Eyes and skin turning yellow or jaundiced.	0.9	YES

Table 1. Consultation Data by Trapists Using the Dempster Shafer Method

Information :

The operator selects six symptoms which are:

G01 with a weight of 0.9

G02 with a weight of 0.8

G03 with a weight of 0.8

G04 with a weight of 0.7

G05 with a weight of 0.7

G06 with a weight of 0.9

Based on the relationship between the symptoms and the disease, the symptoms chosen by the trapper are symptoms of

Hepatitis. Then the rule to be executed is rule 1, namely:

R1 = IF G01 and G02 then K1

G01 (Yes = 0.9)

Then: M1 {K1} = 0.9

M1{θ} = 1- 0.9 = 0.1

G02 (YES = 0.9)

Then: M2 {K1} = 0.8

M2 {θ} = 1- 0.8 = 0.2

Next, a new density value will be calculated for the M3 combination as calculated below:

	M2 {K1}{0.8}	M2 { θ)}{0.2}
M1 {K1} 0.9	{K1} 0.72	{K1} 0.8
M1 (θ) 0.1	{K1} 0.08	{K1} 0.02

Table 2. Calculation of Dempster Shafer 1

M3{K1} = (0.72+0.08+0.8)/(1-0)=0.98

M3 (θ) = 0.02/(1-0)=0.02

M3 {K1} = 0.98

M3 {θ} = 1- 0.98 = 0.02

G03 (YES = 0.8)

Then = M4 {K1} = 0.8

M4 {θ} = 1 – 0.8 = 0.2

Next, a new density value will be calculated for the M5 combination as calculated below:

	M4 {K1}{0.8}	M4 { θ)}{0.2}
M3 {K1} 0.98	{K1} 0.784	{K1} 0.196
M3 (θ) 0.1	{K1} 0.016	{K1} 0.004

Table 3 : Calculation of Dempster Shafer 2

M5{K1} = (0.784+0.016+0.196)/(1-0)=0.996

M5 (θ) = 0.004/(1-0)=0.004

M5 {K1} = 0.996

M5 {θ} = 1- 0.996 = 0.004

G04 (YES = 0.7)

Then = M6 {K1} = 0.7

M6 {θ} = 1 – 0.7 = 0.3

Next, a new density value will be calculated for the M7 combination as calculated below:

	M6 {K1}{0.7}	M6 { θ)}{0.3}
M5{K1} 0.996	{K1} 0.6972	{K1} 0.2988
M5 (θ) 0.004	{K1} 0.0028	{K1} 0.0012

Table 4 : Calculation of Dempster Shafer 3

M7{K1} = (0.6972+0.0028+0.2988)/(1-0)=0.9988

M7 (θ) = 0.0012/(1-0)=0.0012

M7 {K1} = 0.9988

M7 {θ} = 1- 0.9988 = 0.0012

G05 (YES = 0.7)

Then = M8 {K1} = 0.7

M8 {θ} = 1 – 0.7 = 0.3

Next, a new density value will be calculated for the M9 combination as calculated below:

	M8 {K1}{0.7}	M8 { θ)}{0.3}
M7{K1} 0.9988	{K1} 0.69916	{K1} 0.29964
M7 (θ) 0.0012	{K1} 0.00084	{K1} 0.00036

Table 5 : Calculation of Dempster Shafer 4

M9{K1} = (0.69916+0.00084+0.29964)/(1-0)=0.99964

M9 (θ) = 0.00036/(1-0)=0.00036

M9 {K1} = 0.99964

M9 {θ} = 1- 0.99964 = 0.00036

G06 (YES = 0.9)

Then = M10 {K1} = 0.9

M10 {θ} = 1 – 0.9 = 0.1

Next, a new density value will be calculated for the M11 combination as calculated below:

	M10 {K1}{0.9}	M10 { θ)}{0.1}
M9{K1} 0.99964	{K1} 0.899676	{K1} 0.099964

M9(θ) 0.00036	{K1} 0.000324	{K1} 0.000036

Table 6 : Calculation of Dempster Shafer 5

$M11\{K1\} = (0.899676+0.000324+0.099964)/(1-0)=0.999964$

$M11 (\theta) = 0.000036/(1-0)=0.000036$

From the results of the calculations that have been carried out, the density value of hepatitis in patients is 0.99 or 99%.

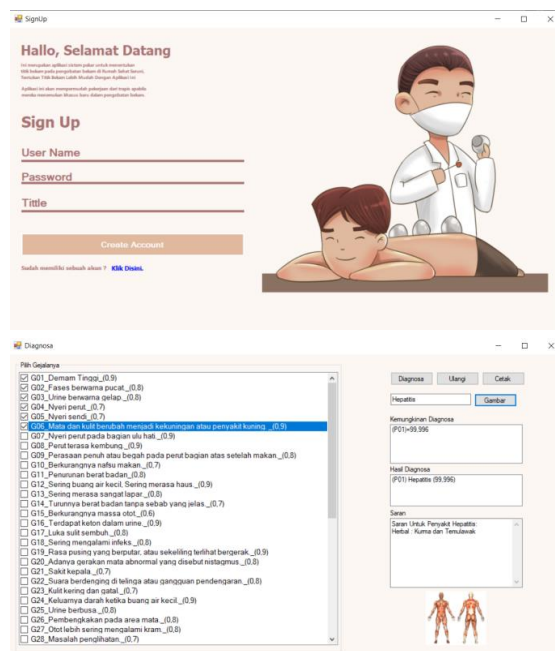Figure 1. Display Of Application Demoster Shafer

CONCLUSION

Based on the results of all stages of the research that the author conducted, starting from data collection to testing the system designed by the author, several conclusions can be drawn from these results, namely:
1. The application of the Expert System for Cupping Treatment with the Dempster Shafer Method can help therapists work in determining cupping points for patients who consult the Seruni Healthy House quickly and of course efficiently.
2. The application of the Cupping Treatment Expert System with the Dempster Shafer Method can provide accurate and fast patient consultation results according to the patient's symptoms. With accuracy in providing solutions to determine cupping points, so that the actions taken by trappers can be carried out with certainty.
3. From the design of the Expert System Application for Cupping Treatment with the Dempster Shafer Method, the trapist benefits, namely that it can facilitate the therapist's work in providing cupping treatment to patients because after the therapist enters the patient's symptoms, the therapist will immediately get a cupping point that is appropriate to the patient's disease.

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