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The Expert System Determines Children's Emotions with Learning Achievement Using The Web-based Damster Shafer Method

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Abstract

Psychology studies human behavior and mental processes is possible there involved the use of technology, but the use and utilization of technology in the field of psychology is felt still lacking. One method that is still widely used in psychology that is by making the Demster Shafer sheet. Demster Shafer method can be modified in the form of computer applications, where the application is using the knowledge of experts of psychology entered into the computer called expert systems applications. Application of expert system is designed to determine the child's learning style at primary school age. Application of expert systems is expected to overcome the problems of determining the child's learning style. In addition, it can be used as a support in the field of psychology and can be used for public purposes and individuals in general.

Keywords: *Expert System, Child Learning Styles, Rule, Application, Consultin*

1. Introduction

In the world of education, the development of technology and information has a positive impact, because with the development of information technology in the world of education, it shows significant changes in the process of learning, teaching and in children. From an early age even from birth, children will develop in many ways, namely in physical, cognitive, social and emotional fields. In determining the emotional reactions of children to the different feelings they experience in the world of education or the learning process in the future, it will have a great influence on the way children make decisions.

Problems for children arise from internal and external, all of which can interfere with the child's learning process. According to the journal Vol. 6 DikiArisan in the research entitled "Application of Expert Systems to Determine Learning Styles of Elementary School Age Children" where the results of this research are to show that this expert system uses knowledge from experts, which is the input of the search for characteristics carried out by the consulted party, the resulting output is child learner consultancy information and advice.

And contains that an expert system can be interpreted as a system that adopts human knowledge to computers, so that computers can solve problems as experts usually do. In the design of this application program, it asks for input in the form of various activities and subtests for children, then the output generated by the computer is the possibility of how much emotional the child is with the child's learning achievement. Based on the description above, the authors wish to conduct research with the title of the thesis "Expert System Determining Children's Emotional With Learning Achievement Using the Web-Based Demster Shafer Method".

2. Research methodology

2.1. Expert System

An expert system is a system that adopts human knowledge to computers, sothat computers can solve problems like experts do. The purpose of developing an expert system is actually a system designed to be able to imitate the expertise ofan expert in answering questions and solving a problem (T. Sutojo, et al 2011 p.13).

2.2. Demster Shafer Method

Damspter Shafer method is a technique that supports the decision-making process. This method uses the theory of bellief (bel) and plausibility (PI). Beliefwith x can be denoted by m(x) and plausibility can be denoted by m(θ).

M (Z)= $\frac{n\sum x \cap y=z \, m1(x).m2(y)x}{1-\sum x \cap y=\phi \, m1(x).m2(y)}$

Where :

x,y,z = Damage set

M_3(Z) = belief value from avidece (Z)

M_1(x) =belief value from avidece(x)

M_2(y) = belief value from avidece(y)

ϕ = empty set

3. Flowchart

A flowchart that describes the steps taken by experts in the design process.

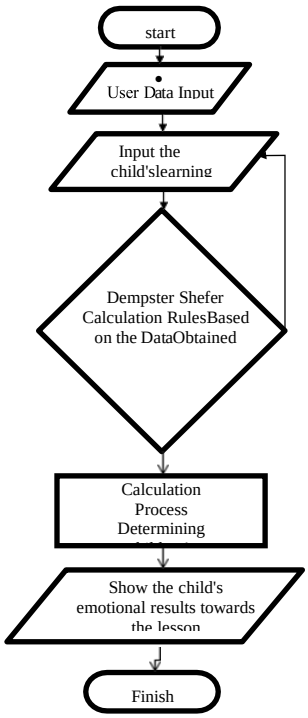

Fig. 1: Flowchart Dempster Shefer

Sample case : One of the children has an emotional about mathematics that is not yet known.
The visible features are:

1. Like to count = Certan = 1
2. Likes to solve puzzles= Certan = 1
3. Love detective ideals= not sure = 0
4. Ask a lot= not sure = 0
5. Math scores ae always good = certan = 1
6. Love science = not sure = 0
7. Likes to experimen = certan = 1
8. Critical thinking = certan = 1
9. Love to learn math = certan = 1

From the characteristics that have been described, the system will process according to the Dempster Shefer method. After the calculation is complete, the system will conclude the child's emotional about learning.

Table 1: Certainty table example case

No	Characteristic	MTK	BI	KS	IPA	BHI	PJ
1	Like to count	1	-	-	-	-	-
2	Likes to solve puzzles	-	1	-	-	-	-
3	Math scores are always good	-	1	1	1	1	1
4	Like experimenting	-	-	-	-	-	-

Factor-1: like to count

The first step is to calculate the value of belief and pleasibility of the numeracy factor (C1), which is a characteristic of children's emotionality towards mathematics (MTK) with the formulas (1) and (2):

m1(C1) =0,75

m1(θ) = 1- m1(C1)

= 1- 0,75 = 0,25

Factor-2: likes to solve puzzles

Then, if it is known that there are new facts, namely the puzzle-solving factor (C2), which is a characteristic of children's emotions towards Indonesian language lessons (BI) by referring to formulas (1) and (2), thenthe belief value is:

m2(C2) = 0,80

m2(θ) = 1- m2(C2)

= 1- 0,80 = 0,20

If illustrated premises table 2:

Table 2: illustration of the value of belif in two characteristics

		m2 {BI}0,20		m2(θ)0,25	
m1(MTK)	0,25	(θ)	0,05	(MTK)	0,625
m1(θ)	0,20	{BI}0,04		(θ)	0,05

Then calculate the confidence level (m) combined with the formula(5), then:

$$m3\{MTK\} = \frac{n0.625}{1-0,05} = 0,6578$$

The most happy confidence value is on mathematics (MTK) which is 0.6578 which is obtained from existing characteristics, namely (C1) and (C2).

Factor -3: always good math scores
Then, if it is known that there are new facts, namely the existence of a factor whose math scores are always good (C5), which is a child's emotional attitude towards learning Mathematics (MTK), Science (SS),Arts (KS) with .
M4(C5)= 0,80
m2(θ)= 1- m2(C2) = 1- 0,80 = 0,20

illustrated in table 3

Table 3: Ilustrion of the value of beif in there characteristic

		m4 {MTK,SS,KS}	0,80	m2(θ)	0,20
m4(MTK)0,6578		(θ)	0,5262	(MTK)0,1315	
m4(BI)	0,0421	{BI}	0,0336	(BI)	0,0084
m4(θ)	0,0526	{MTK,SS,KS}	0,0420	(θ)	0,0105

The most happy confidence value is for the m4(θ) lesson, which is 1.1110, which is obtained from the existing characteristics, namely (C1) , (C2) and(C5).

Factor -4 : likes to experiment
Then if it is known that there are new facts, namely the existence of the like-to-experiment factor (C7), which is a characteristic of natural science lessons (IPA) with formulas (1) and (2).
m6(C7) = 0,20
m6(θ) = 1- m2(C2) = 1- 0,20 = 0,80

If illustrated table 4 :

Table 4:Ilustration of confidence values in four tables

		m6 {IPA}	0,20	m6 {θ}	0,80
m6 {MTK}0,4738		{θ}	0.0947	{θ}	0.3790
m6 {BI}0,1596		{θ}	0.0319	{θ}	0.1276
m6 {BI,KS,KS,IPA}0,0886		{IPA}	0.0177	{IPA}	0.7088
m6 {θ}	1,1110	{IPA}	0.2222	{IPA}	0.1777

The most happy confidence value is the m7 lesson {BI, KS, BHI, IPA} which is 1.7249 which is obtained from the existing characteristics, namely (C1) , (C2) , (C5) and (C7).

4. Program Discussion

4.1. Main Page

This main page is the start page when the admin accesses the emotional expert system of children with learning achievements, on the initial page there is also a user menu, namely Subjects, Characteristics, Rules, Consultation Data, Profiles.

Fig. 2: Main Page

4.2. Subject Data

In the subject menu, in this menu the user

Fig. 3: Subject Data

4.3. Child characteristic

In the child's characteristics menu, in this menu users and admins can use itand can add the characteristics possessed by the child.

Fig. 4: Identification

4.4. Data rule determines children's emotions

In the rules for determining children's emotions with learning achievements, the user and admin can use them and can add rules for determining children's emotions.

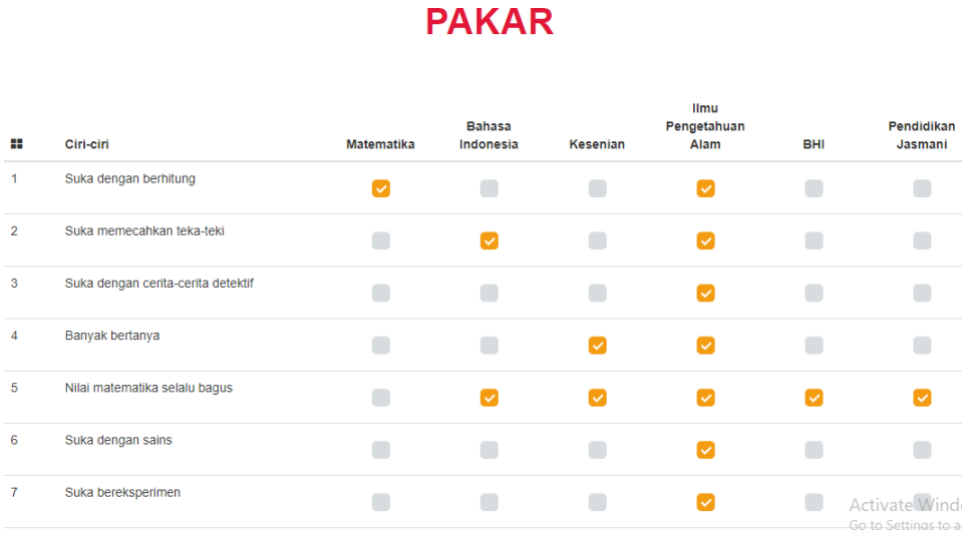

Fig. 5: Expert

4.5. Result menu identification

This form is the result of a calculation to determine the child's emotional that has been inputted by the user or admin, there are results from the Dempster Shaferdata inputted by the admin.

Fig. 6: Consultation

4.6. Child biodata menu

In this menu the admin can add the child's biodata in determining thechild's emotional with learning achievement.

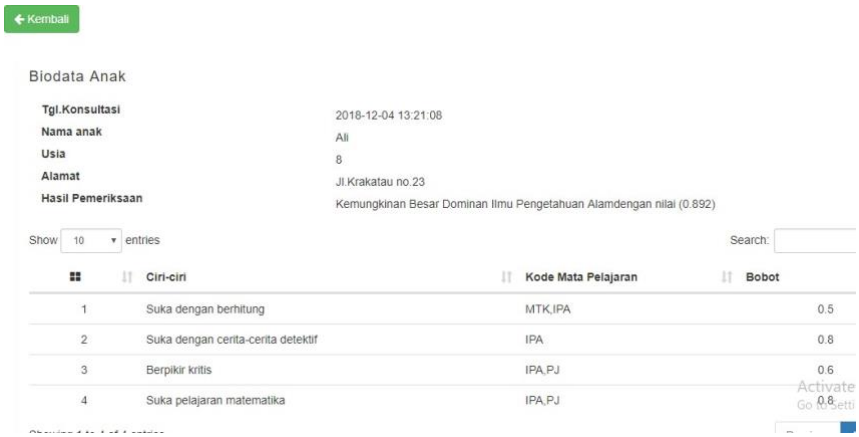

Fig. 7: Child Biodata menu

Fig. 8: Dempster Shafercalculation result

4.7. Admin login menu

In this form only the admin can access because in the menu after logging in the admin can input data features and add or delete new data.

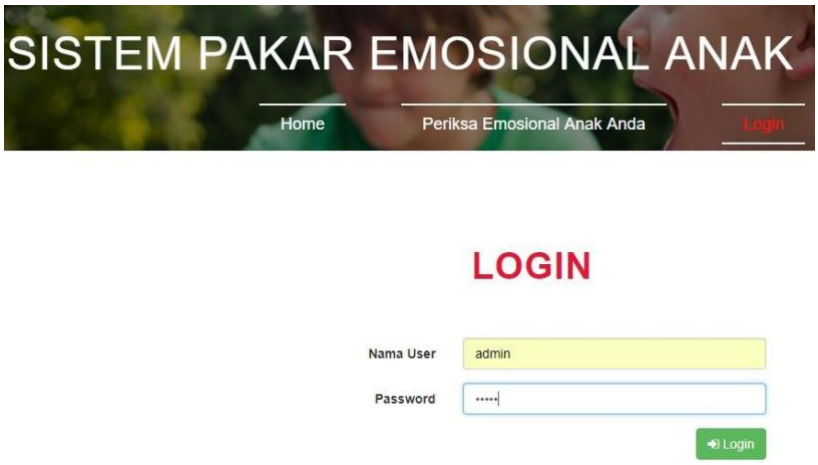

Fig. 9: Menu Login

5. Conclusion

With the results of the expert system application to determine the emotionality of children with learning achievements, the authors can draw several conclusions, namely as follows:

1. With the construction of this expert system, it can help children and parents to know children's emotions from an early age and can find out what the child likes, so that teachers and parents can be taken into consideration to provide more effective education and services to children.
2. The construction of this expert system as a tool in determining the emotionality of children with early learning achievement from seeing or identifying according to the emotional characteristics of children by using the Dempster Shafer method.

References

[1] Budi Sutedjo, Dharma Oetomo.2005. Planning and Development of Information Systems, Yogyakarta, Andi.
[2] Hartati, Sri and Iswanti, Sari. 2008, Expert System and Its Development.Yogyakarta : GrahaIlmu.
[3] Janner, Simarmata. 2010. Software Engineering. Yogyakarta, Andi. Jogiyanto. 2005. Analysis and Design of Information Systems. Yogyakarta, Andi. Raharjo, Budi. 2011. Creating a Database Using MySql. Bandung :Informatics.
[4] ST SugiartiYuni, M Kom. 2013, UML Design and Analysis, Yogyakarta, Andi.
[5] Sutojo, S.Si., M. Kom., EdyMulyanto, S.Si., M. Kom., Dr. Vincent Suhartono.2011, Artificial Intelligence, Yogyakarta, Andi/A. Karmakar, S. S. Roy, F. Vercauteren, and I. Verbauwhede, “Efficient finite field multiplication for isogeny based post quantum cryptography,” 2017, doi: 10.1007/978-3-319-55227-9_14.