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Diagnosis of Victims of Bullying Behaviour Using Bayes Method

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Abstract

Victims of bullying behaviour in the first high school students are still going on and unresolved. Victims of bullying behaviour that is not easily visible to the naked eye and the lack of knowledge about bullying is a problem in resolving the problem. This research is to create an expert system that can diagnose victims of bullying behaviour based on the symptoms suffered by the victims of bullying to address the problems faced during this time. The Bayes method describes the relationship between the probability of A with event B has occurred and the probability of event B on the condition of event A has occurred and the occurrence of an event based on the influence gained from the observation result, Like bullying symptoms that occur in victims of bullying behavior, the Bayes method will calculate the probability and generated types of bullying experienced by students based on the knowledge that is in the can of an expert and made into an application.

Keywords: *Expert System, Bayes Methods, Bullying, Students*

1. Introduction

Bullying happens in almost every life, family, school, and community. Bullying is primarily in school, has become a global problem. It is still happening and never ceases and is even forwarded to new students [1]. Bullying is a negative impact on students developmental levels as Learners [2]. To diagnose victims who are physical Bullying behavior, verbal and psychological is not easy because this cannot be seen. The eyes and victims who suffer Bullying behaviour will not necessarily tell Bullying happened [3]. so it takes a knowledge and special skills to know a psychologist. It is therefore necessary computational method for. Diagnosing the type of Bullying on victims and providing solutions from Bullying by implementing the knowledge and expertise of a psychologist into an expert system. [4]. The expert system can make it easier for the work that can be done manually with tools such as expert systems and more energy saving [5]. The expert system is a computer program that comes from experts to solve computer problems, as is usually done by an expert [6]. In expert systems There are several methods that can be used for one of the Bayes methods. The Bayes method was discovered by a British Presbyterian priest named Thomas Bayes in 1763. Calculate the probability of an event occurring based on the effects gained from the observation results [7].

2. Research Methodology

a) Data Collection method

The techniques for collecting data on this research are as follows:

1) Observation

Data collection method through direct observation of the object being researched. To get real and convincing data, direct observation is done at school. In observation data collection can be done in several methods such as interviews and questionnaires.

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2) Library Studies
To obtain theoretical data, data is collected by reading and studying books, journals, or other references related to this research, which is about Bullying behaviour in both the library and the Internet and so on.

b) System Design

The stage in system design is the basis for making a reliable and robust system requiring a process. The stages of the application of Bayes method on expert systems to diagnose victims of Bullying behaviour to students

1) The input needs analysis
From the application of Bayes method on the expert system in diagnosing victims of bullying behaviour in this student is a symptom data of each type of bullying.

2) Output Requirements
To analyze the needs of the output, students will get a result of the type of bullying that has been given by the experts from the symptoms that have been chosen. These types of bullying result from calculations with the largest Bayes method for one or several types of bullying that are influenced by selected symptoms, as well as producing solutions of the type of bullying experienced.

3. Results and Discussion

The probability of Bullying type is derived from the calculation of symptoms that are owned by each type of bullying. The value of the symptoms gained from the experience and knowledge of an expert. [8].

Table 1. Weight Value Bayes

Weight Range	Num	Value
0 s/d 0.3	Uncertain	0 s/d 0.25
>0.3 s/d 0.6	Less Definite	>0.25 s/d 0.50
>0.5 s/d 0.6	Definitely	>0.50 s/d 0.75
>0.6	Very Definite	1

The symptoms and probability values can be seen in table 2:[9]

Table 2. Symptom Data

No	Code	Symptoms	Value Probability
1.	G1	There are wounds hidden	0.65
2.	G2	Messy clothes/Ripped	0.4
3.	G3	Somatic complaints arise like headaches and upset stomach	0.62
4.	G4	Lazy to come to school	0.7
5.	G5	Often cry	0.49
6,	G6	Difficult to communicate	0.6
7.	G7	Not taking normal road routes to school	0.45
8.	G8	Easy panic and depression	0.58
9.	G9	Often feel scared/worried	0.65
10.	G10	Not comfortable to enjoy the rest of the time	0.57
11.	G11	Easy to despair	0.62
12.	G12	Sudden decline in interest in school	0.7
13.	G13	Spend more time with your class siblings	0.42
14.	G14	Low self-esteem	0.67

No	Code	Symptoms	Value Probability
15.	G15	Unwilling to engage in social activities	0.68
16.	G16	Often moody	0.7
17.	G17	Ownership items damaged/torn	0.52
18.	G18	Frequent loss of his own possessions	0.5
19.	G19	Outs	0.7
20.	G20	Hard to make friends with new friend	0.7
21.	G21	Being aggressive and emotional	0.52
22.	G22	Self destructing	0.62
23.	G23	Loss of appetite	0.6
24.	G24	Frequent nightmares	0.41

Based on the symptom data above to diagnose this type of bullying then in stacking rule in table 2.

Table 3. Knowledge Base Rules

No.	Rules
1.	IF G1 AND G2 AND G3 AND G4 AND G5 AND G6 AND G7 AND G8 AND G9 AND G10 THEN J1
2.	IF G4 AND G5 AND G6 AND G11 AND G12 AND G13 AND G14 AND G15 AND G16 THEN J2
3.	IF G4 AND G8 AND G9 AND G10 AND G16 AND G18 AND G19 AND G20 AND G21 AND G22 AND G23 AND G24 THEN J3

Here is the Bayes method formula:

$$P(H|E) = \frac{P(E|H) \times P(H)}{P(E)} \quad (1)$$

P(H|E) = A probability H hypothesis occurs if Evidence E happened
P(E|H) = Probability of the emergence of evidence E, If the H hypothesis occurred
P(H) = Probability of hypothesis H without regard to any evidence
P(E) = Probability of evidence E without regard to any evidence

Here's to look for the universe values by summing all hypotheses:

$$\sum_{i=0}^{n} P(E|Hk) = G1+G2+ G3+ G4+G5+G6 +G7+G8+G9+ G10 \quad (2)$$
$$= 0.65+0.4+0.62+0.7+0.49+0.6+ 0.45+0.58+0.65+0.57 = 5.71$$

$$P(H|1) = \frac{G1}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.65}{5.71} = 0.1138$$
$$P(H|2) = \frac{G2}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.4}{5.71} = 0.0700$$
$$P(H|3) = \frac{G3}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.62}{5.71} = 0.1085$$
$$P(H|4) = \frac{G4}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.7}{5.71} = 0.1225$$
$$P(H|5) = \frac{G5}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.49}{5.71} = 0.0858$$
$$P(H|6) = \frac{G6}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.6}{5.71} = 0.1050$$
$$P(H|7) = \frac{G7}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.45}{5.71} = 0.0788$$

$$P(H|8) = \frac{G8}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.58}{5.71} = 0.1015$$
$$P(H|9) = \frac{G9}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.65}{5.71} = 0.1138$$
$$P(H|10) = \frac{G10}{\sum_{i=0}^{n} P(E|Hk)} = \frac{0.57}{5.71} = 0.0998$$

$$\sum_{i=0}^{n} P(Hi) * P(E|Hi - \text{n}) \quad (3)$$

$$= P(H1) * P(E|H1)+P(H2) * P(E|H2)+P(H3) * P(E|H3)+P(H4) * P(E|H4) + P(H5) * P(E|H5) + P(H6) * P(E|H6)+P(H7) * P(E|H7)+P(H8) * P(E|H8) +P(H9) * P(E|H9) + P(H10) * P(E|H10)$$
$$= (0.1138*0.65)+ (0.0700*0.4)+ (0.1085*0.62)+ (0.1225*0.7)+ (0.0858*0.49)+ (0.1050*0.6)+ (0.0788*0.45)+ (0.1015*0.58)+ (0.1138*0.65)+ (0.0998*0.57)$$
$$= 0.585218$$

The next step will be to contribute P (Hi | E) or the probability of the correct Hi hypothesis if it is given evidence E is as follows:

$$P(Hi) = \frac{P(E|Hi) \times P(Hi)}{\sum_{i=0}^{n} P(E|Hk) \times P(Hk)} \quad (4)$$

$$P(H1|E) = \frac{0.65*0.1138}{0.585218} = 0.1263$$
$$P(H2|E) = \frac{0.4*0.0700}{0.585218} = 0.0478$$
$$P(H3|E) = \frac{0.62*0.1085}{0.585218} = 0.1149$$
$$P(H4|E) = \frac{0.7*0.1225}{0.585218} = 0.1465$$
$$P(H5|E) = \frac{0.49*0.0858}{0.585218} = 0.0718$$
$$P(H6|E) = \frac{0.6*0.1050}{0.585218} = 0.1076$$
$$P(H7|E) = \frac{0.45*0.0788}{0.585218} = 0.0605$$
$$P(H8|E) = \frac{0.58*0.1015}{0.585218} = 0.1005$$
$$P(H9|E) = \frac{0.65*0.1138}{0.585218} = 0.1263$$
$$P(H10|E) = \frac{0.57*0.0998}{0.585218} = 0.0972$$

After the whole value P (Hi | E) is known, then next sum the whole value of the Bayesnya with formula as follows:

$$\sum_{i=0}^{n} Bayes = Bayes1 + Bayes2 + Bayes3 + Bayes4 + Bayes5 + Bayes6 + Bayes7 + Bayes8 + Bayes9 + Bayes10$$
$$= (0.65*0.1263)+(0.4*0.0478)+(0.62*0.1149)+(0.7*0.1465)+(0.49*0.0718)+(0.6* 0.1076) (0.45*0.0605) +(0.58*0.1005)+ (0.65* 0.1263)+ (0.57*0.0972)$$
$$= 0.5977 = 59.77\ \%$$

From the above calculations that students are diagnosed with a type of physical bullying with a probability value of 0.5977-> 59.77%. In the image below, Lia performs the test by selecting symptoms 1-10

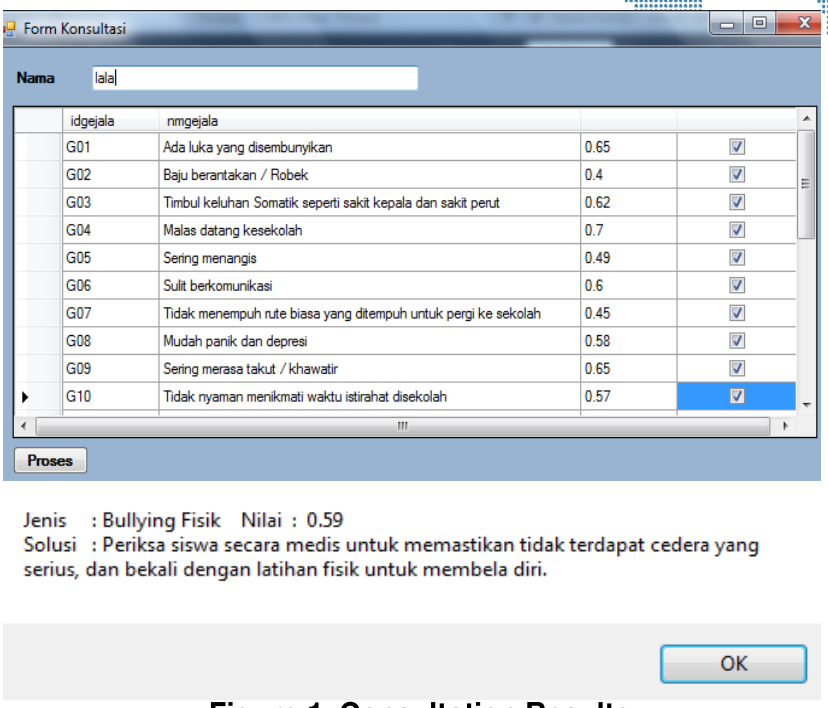

Figure 1. Consultation Results

In the results of symptoms that have been selected, Lia diagnosed the type of physical bullying with a value of 0.5977%.

4. Conclusion

In this research system was built with an expert system that is based on the knowledge and experience of an expert that is applied to the computer so that it can solve problems such as an expert/experts and apply the Bayes method to overcome the uncertainty of data, by combining information from. Samples and other information that has existed before and is attached with Bayes formula. This study was obtained 24 symptoms of bullying selected based on symptoms that occur in students who allegedly get bullying treatment or as a victim of bullying and have 3 types of bullying as well as solutions used to diagnose the existence of bullying that happens to students.

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