

The Study of Early Diagnosis of Personality Disorder with Expert System Builder

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Abstrak

Gangguan kepribadian adalah gangguan psikologis kronis yang dapat memengaruhi pekerjaan, keluarga, dan kehidupan sosial seseorang. Dalam beberapa kasus, kemungkinan pasien tidak menyadari bahwa mereka memiliki gangguan kepribadian karena cara berpikir dan berperilaku tampak alami bagi pasien, dan pasien dapat menyalahkan orang lain. Untuk mendiagnosis gangguan kepribadian sejak dini, maka dibuatlah aplikasi menggunakan alat pembangun sistem pakar. Data dikumpulkan melalui wawancara dengan seorang pakar yang memahami masalah gangguan kepribadian. Dengan memanfaatkan konsep sistem pakar pada expert system builder tool (ESB) terjadi transfer pengetahuan dari ahli ke aplikasi yang akan dibuat. Aplikasi ini dibuat untuk berdasarkan basis pengetahuan, pohon keputusan dan tabel keputusan. Tahapan dari desain adalah merancang aturan pencarian identifikasi gangguan kepribadian, kemudian merancang tabel keputusan berdasarkan aturan dan merancang tabel keputusan berdasarkan pohon keputusan yang telah dibuat.

Kata Kunci: Diagnosis gangguan kepribadian, Sistem pakar, Expert system builder

Abstract

Personality disorders are chronic psychological disorders that can affect work, family and social life of a person. In some cases, the possibility of people do not realize that they have a personality disorder as a way of thinking and behaving seems natural to the patient, and the patient may blame others. To diagnose a personality disorder early, then made an application using expert system builder tools. Data collected through interviews with an expert who understands the problem of personality disorders. By utilizing the concept of expert system on expert system builder tool (ESB) there was a transfer of knowledge from experts to the application to be made. This application is made to follow the rules knowledge base, decision tree and decision table. Stages of the design is to design a search rule identification of personality disorder, then design decision table based on the rule-based and subsequently designed a decision tree based decision table that has been created.

Keywords: Personality disorders diagnosis, Expert system, Expert system builder

Introduction

Personality is often considered by two terms which are, character and temperament, although both words have the same meaning in daily use. Character refers to the characteristics obtained during our education and connotes according to normative social standards. Temperament, on the other hand, does not refer to the power of socialization but rather the style of one's behavior. One person can be said to be "good character" while others may have "sensitive temperament". Character represents so-

cial influence, and temperament represents the natural influence of nature [1].

According to the organization of Mental Health America, personality disorders are internal and external problems in humans who tend to be inflexible, rigid and unable to respond to changes and life demands. People with personality disorders tend to have a narrow view of the world and find it difficult to participate in social activities. The impact is even in the form of violence in habits of certain personality disorders [2].

Personality disorder is a chronic psychological disorder that greatly affects a person's life. Personality Disorder is a continuous pattern of experience and inner behavior that deviates significantly from cultural expectations. The disorder is united in humans and difficult to change. Narrow thinking starts at the age of seventeen, settles steadily on the sufferer and causes disorder or impairment. A negative personality disorder can affect one's work, family, and social life. Personality disorders can be continuous and mild or severe in terms of the extent to which a person features certain personality disorders. While most people can live a quite normal live with mild personality disorder (or more simply, personality traits), during times of increased stress or external tensions (work, family, new relationships, etc.) symptoms of personality disorder will get stronger and begin to seriously interfere with their emotional and psychological functions [3].

In some cases, it is possible that people with personality disorder are unaware of their condition because they believe that their way of thinking and behaving are natural, and they may blame others for the situation. Many people underestimate this condition and do not want to consult the experts, in this case a psychologist, with consideration of cost and fear or embarrassment of being known to surrounding communities [4].

The next development of expert systems is to provide complex problem solutions centered on human knowledge as practiced by an expert. Expert system development does not follow conventional system development procedures. Because the focus of expert systems is knowledge, the important thing that must be considered to develop a good expert system is the need for knowledge acquisition from an expert in more detail. [5] Technology development especially in the field of expert systems has offered new ways and ideas to share and distribute existing knowledge from an expert, especially in the health or medical fields. However, the lack of web-based expert system research is the focus of development. The study conducted is expected to develop an expert system for diagnosing personality disorders that can be accessed by the general public not only by certain people. To help early diagnose a person's personality disorders, then an application using expert system builder tools is created.

The challenge in developing expert systems for clinical decision making requires defining the knowledge acquisition from experts; determination of experts, willingness from experts, techniques for collecting data from experts, and ensuring that knowledge obtained from experts is reliable, valid, and complete. Because the focus of an expert system is knowledge, the input variable of expert knowledge determines the accuracy of a system to be developed [6].

This application is expected to solve the aforementioned problems by building a computer-based system that can accommodate the knowledge of a psychologist. Detection at the earliest stages is crucial to the prevention of this personality disorder because treatment in appropriate time is the key to a higher recovery rate.

Research Methods

Personality Disorder/ Abnormal Behaviors

To define abnormal behavior precisely is a challenge because it is difficult to find an ideal or perfect human model and in many cases there is no strict limitation between normal and abnormal behavior. Sometimes people who are generally considered as normal (healthy), may perform acts that are classified as abnormal, which may be out of consciousness. Some abnormal behavior terms as follows [7]:

1. Abnormal behavior is sometimes used to indicate the inner aspects of personality, the behavioral aspects that can be observed, or both.
2. Maladaptive behavior, referring to all forms of behavior that have adverse impacts on individuals / communities.
3. Mental disorder, showing all forms of abnormal behavior from the mild ones to those that severely interfere with one's life.
4. Psychopathology is a study of abnormal behavior or mental disorders, but is often used as another term for both terms.
5. Mental illness, including disorders involving the pathology of the brain or a severe disorganization of personality.

6. Behavioral disorders, referring to disturbances caused by inappropriate learning process.
7. Mental illness is a legal term to indicate that an individual is considered to be insane and mentally incapable of accounting for his or her actions.

Fundamental of Expert System

The expert system is one of the artificial intelligence branches that has evolved since the mid-1960s. The basic idea and focus behind expert systems is expertise that is then transferred from a human expert to a computer. Knowledge from these experts is stored on a computer where at any time the user can use the computer to obtain suggestions, advice, explanations, even the logic behind these suggestions regarding problems faced by users. Rule based on an expert system is defined as information obtained from one or several experts who can represent the required information into IF-Then rule. The generated rule based can be used as inference data to reach the conclusions needed.

There are several applications of expert systems in the health or medical field which until now have been used among them in terms of psychiatric treatment [8]. Knowledge based system is human centered. Four components of KBS are knowledge base, an inference engine, a knowledge engineering tool, and a specific user interface.

An expert system is a computer program that contains knowledge of one or more human experts on a specific field. According to Ephraim Turban, the basic concept of expert systems contains knowledge base, rule, and inference [9]. There are 2 ways to do inference, namely:

1. Forward reasoning. It is a group of multiple inferences that searches solution for a problem. Reasoning starts from the goal or hypothesis, then matches the initial situation or facts. Use it if the number of initial conditions is smaller than the goal and event which is a new fact.
2. Backward reasoning uses a goal-driven approach, starting from the desired expectation (hypothesis), and then looking for supporting (or contradictory) evidence of

that expectation. Reasoning starts from the goal or hypothesis, then matches the initial situation or facts; if the number of initial conditions is more than the goal and if the event is a query.

Expert system is used because it allows knowledge of various experts to be combined and utilized by everyone without the presence of the said experts.

Knowledge Representation

Knowledge Representation is a method used to encode knowledge in an expert system, which is intended to capture the important characteristics of the problem and make that information accessible to problem solving procedures. Knowledge is classified into 3, which are:

1. Procedural Knowledge is knowledge related to procedures or ways to do things, for example, how to boil water in a pan
2. Declarative Knowledge is knowledge to be able to determine the right and wrong values of things, for example, do not dip your hands in boiling water.
3. Tacit Knowledge is sometimes referred to as "unconscious knowledge", because knowledge cannot be expressed or defined by language, for example, how to move a hand.

Knowledge can be presented in a simple or complex form, depending on the problem. (Sch-nupp, 1989). There are several models or forms of knowledge representation that have been developed, such as Production rule.

Generating Production Rules From Decision Trees

Decision trees are one of the most popular classification methods as they are easily interpreted by humans. Decision trees are prediction models using tree structures or hierarchical structures. The concept of decision trees is to convert data into decision trees and decision rules. The main benefit of using decision trees is their ability to break down complex decision making processes to be simpler so that decision makers will better interpret the solution to the problem. Decision Trees are also useful for

exploring data, finding hidden relationships between a number of prospective input variables with a target variable. Decision trees combine data exploration and modeling, so it is very good as a first step in the modeling process even when used as the final model of several other techniques. Bargaining often occurs between the accuracy of the model and the transparency of the model. In some applications, the accuracy of a classification or prediction is the only thing highlighted, for example a direct mail company makes an accurate model to predict which members have the potential to respond to requests, regardless of how or why the model works.

The tree in the analysis of decision-making for problem solving is mapping about alternative problem solving that can be taken from the problem. The tree also shows the probability factors that will influence the alternative decisions, along with the estimated final results that will be obtained if we take the alternative decisions.

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Results

Analysis of Personality Disorders and Clinical Symptoms

In this study, there were 30 diagnoses of personality disorder along with clinical symptoms of each diagnosis. The personality disorders are: paranoid, schizoid, histrionic, schizotypal, narcissistic, antisocial, borderline, avoidant, dependent, obsessive-compulsive, psychopathy, homosexual, self-harm/self-injures, multiple identity disorder, anorexia nervosa, schizoaffectif, bipolar disorder, schizophrenia, lesbian, dissociative identity/multiple personality, dissociative amnesia, dissociative fugue, depersonalization, hypochondria, somatization, somnambulism, phobia, hysteria, and organic psychosis.

The study employed certainty factor method, knowledge base used from a psychologist to get accurate data about personality disorder.

Knowledge Base Rules Analysis

Knowledge Representation is a method used to encode knowledge in an expert system, which is intended to capture the important characteristics of the problem and make that information accessible to problem solving procedures. (Knowledge is the main thing in expert systems.)

Knowledge base is the core of expert system programs. It is a representation of the knowledge of an expert. According to Panpan, knowledge base can be represented in various forms; one of them is in the form of a rule-based system. Knowledge base is composed of facts in the form of information about objects and rules which are information of how to generate new facts from known facts [8].

The production rule is the type of knowledge representation that is most commonly used as it has more advantages compared to its disadvantages. Knowledge representation which is in the form of rules are:

- Antecedent > expressing situation/premise (beginning with if)
- Consequent > declaring certain actions if the premise is correct (beginning with THEN)

Table 1: Knowledge Base Rules of Early Diagnosis of Personality Disorder



Expert System – Personality Disorders by Cynthia Hayat

1	IF suspicion AND and being rude AND and have difficulty socializing AND and do not trust close friends THEN the Personality Disorder is <u>Paranoid</u> .
2	IF have little interest in close relationship AND and have little interest in having sex AND and being ignorant of praise or criticism from others AND and experience only little pleasure THEN the Personality Disorder is <u>Schizoid</u> .
3	IF excessive emotional expression AND and is very easy to be persuaded or suggested AND and have chronic feeling of emptiness AND and have difficulty to control anger THEN the Personality Disorder is <u>Histrionic</u> .
4	IF strange speech pattern AND and only have a few friends AND and excessive emotional expression THEN the Personality Disorder is <u>Schizotipal</u> .
5	IF extreme needs to be praised AND and being envious to others AND and have tendency to exploit others AND and focus on sucsessed AND and intelligence and beauty AND and strong feeling that they deserve something THEN the Personality Disorder is <u>Narcisstic</u> .
6	IF unstable emotion and behavior AND and have difficulty to control anger AND and impulsive behavior AND and being spendthrift and show inappropriate sexual behavior

	THEN the Personality Disorder is <u>Borderline</u> .
7	IF feeling of being inferior AND and constraint themselves in intimate relationship for fear of being humiliated or mocked AND and reluctant to involve in a relationship unless they are certain that they will be liked THEN the Personality Disorder is <u>Avoidant</u> .
8	IF have difficulty to make decision without advices from others AND and have difficulty to do anything because of inconfidence AND and always need other people THEN the Personality Disorder is <u>Dependent</u> .
9	IF good at creating perfect lies AND and have ability to master and even manipulate others' emotions AND and have difficulty to control emotion AND and hold grudge for a long time, waiting for an opportunity to take revenge AND and smart, and good at manipulating expressions AND and have no empathy (response) for pain or grief of others AND an high selfishness THEN the Personality Disorder is <u>Psychopathy</u> .
10	IF have excessive feeling to same-sex AND and show abnormal inappropriate behavior AND and very sensitive AND and have difficulty in breaking away from trauma of the past AND and difficulty in controlling emotions and sexual desire AND and feel erotic impression to the same sex THEN the Personality Disorder is <u>Homosexual</u> .
11	IF always run away from trouble AND and have difficulty to control emotion AND and cannot take care of themselves AND and cannot think logically AND and do not like themselves

	AND and do not like change AND and hypersensitive to rejection AND and aggressive AND and experience depression and deep stress AND and often experience irritability THEN the Personality Disorder is <u>Self harm/Self injures</u> .		
12	IF easy to get angry AND and feel guilty or shame, blaming themselves AND and drug abuse AND and feeling of distrust and betrayal AND and despression and despair AND and suicidal AND and feel alienated and lonely AND and experience physical pain THEN the Personality Disorder is <u>Post Traumatic Stress</u> .	17	IF look ver masculine or very feminine AND and look cold/rigid AND and always dependent on partner AND and show attention and romantic behavior to fellow women AND and not independent AND and often worried AND and very susceptible to abusing drug THEN the Personality Disorder is <u>Lesbian</u> .
13	IF do not want to maintain normal body weight AND and feel intense fear of gaining weight AND and inappropriate evaluatio'n of their own body weight and shape AND and amenorrhea AND and experience health/metabolism problems, malnutrition THEN the Personality Disorder is <u>Anorexia nervosa</u> .	18	IF at least two different personalities exist in a person AND and two or more of those personalities repeatedly take full control over the individual's behavior AND and failure to recall important personal information AND and the disorder does not occur due to the effects of psychoactive substances or general medical conditions AND and headache and suicidal desire THEN the Personality Disorder is <u>Dissociative Identity or Multiple Personalities</u> .
14	IF mood disorder AND and hallucination, hearing voices, delusion AND and most dangerous and more potential to commit suicide THEN the Personality Disorder is <u>Schizoaffective</u> .	19	IF suffer from memory loss without any reason AND and unable to recall important personal information AND and memory often appears suddenly and spontaneously AND and tend to keep habits, preferences and skills THEN the Personality Disorder is <u>Then Dissociative Amnesia</u>
15	IF joy or sadness AND and is extreme (changes very fast) and persisted (stay for a long time) AND and experience comples mood/multiple emotions THEN the Personality Disorder is <u>Bipolar Disorder</u> .	20	IF confused of own identity AND and seems to be normal and does not show ant other signs of mental disorder AND and imagine wrong past THEN the Personality Disorder is <u>Then Fugue Dissociative</u> .
16	IF hallucinations AND and abnormal behavior AND and delusion, believing that a person is experiencing somethingimaginary AND and chaotic communication AND and like to be alone and cannot be controlled THEN the Personality Disorder is <u>Schizophrenia</u> .	21	IF temporary loss or change of feeling AND and the individual is able to retain reality testing AND and depersonalization experience cause significant stress on one or more important function area AND and depersonalization experience cannot be included

	into other disorder THEN the Personality Disorder is Depersonalization .		AND always tend to escape from problems and difficulties THEN the Personality Disorder is Hysteria.
22	IF think with fear AND and the main thing is not the intensity of delusion but the emotions that are under the stress AND and present for six months or more AND and hypochondrial indications that occur exclusively from other signs of disorder THEN the Personality Disorder is <u>Hipochondria</u> .	27	IF disruption of the function of brain tissues AND and unable to take responsibility AND and fail in adjusting to reality AND and blood vessel narrowing due to old age lead to frequent anger THEN the Personality Disorder is <u>Organic Psychosis</u> .
23	IF preoccupied by thoughts of defects in appearance AND and the preoccupation leads to clinically significant suffering, social functions or other important functions AND and cannot be explained by other mental disorder (shape and body size dissatisfaction in anorexia nervosa) THEN the Personality Disorder is <u>Somatization</u> .	28	IF repetitive, intense, and occurs for at least 6 months AND and act based on impulse THEN the Personality Disorder is <u>Exhibitionist</u> .
24	IF sit on bed with eyes opened AND and wistful or teary eye AND and roam around the house, probably opening and closing the door AND and perform routine activities, such as get dressed or make a snack AND and talk or move awkwardly AND and scream, especially when having nightmares AND and difficult to wake up when sleepwalking occurs THEN the Personality Disorder is <u>Somnabulism</u> .	29	IF easily changed emotion and feeling AND and overjoy and excessive sadness THEN the Personality Disorder is <u>Affective Personality Disorders</u> .
25	IF experience anxiety in certain conditions AND and complain of excessive and irrational worry AND and sudden panic attack which frighten many people AND and anxiety of being noticed, assessed or in a public space THEN the Personality Disorder is <u>Phobia</u> .	30	IF show certain traits which are different from daily behavior such as anger outburst AND and aggressiveness THEN the Personality Disorder is <u>Explosive personality disorder</u> .
26	IF extremely selfish AND and always feel unhappy, suggestible and sensitive AND and very strong emotions, judgments are based on strong feeling of dislike	31	IF the need of dependency AND and obstructionism AND and like to procrastinate AND and do not accept request for optimal performance AND and not willing to apologize AND and tend to look for faults in others even in people who they depend on AND and stubborn AND and inefficient THEN the Personality Disorder is <u>Passive-Agressive Personality Disorders</u> .
		32	IF have strong interest in amputation AND and excitement when seeing amputated human body THEN the Personality Disorder is <u>Acrotomophilia</u> .
		33	IF various forms of sadistic behavior AND and are interested at death AND and love to talk about torture

	AND and look at other people as sexual objects that must be conquered AND and burning and abnormal sex desire AND and desire to kill someone to get the corpse, use it as sexual partner and then destroy it THEN the Personality Disorder is <u>Necrophilia</u> .
34	IF feel aroused when thinking about bathing AND and take long time to take a bath AND and like to bath in warm water THEN the Personality Disorder is <u>Ablutophilia</u> .
35	IF is a situational molester AND is a preference molester AND raping children as a result from sexual desire AND a is very generous, but also rude and threatening AND and people who are afraid of failing in a normal relationship THEN the Personality Disorder is <u>Pedophilia</u> .
36	IF like to peek women AND and is most happy with objects that touch directly AND and like to look at women panties for a long time THEN the Personality Disorder is <u>Clot</u> .
37	IF repeatedly steal unnecessary things AND and increased impulse before stealing AND and feel pleasure after stealing AND and the stealing is not motivated by anger AND and the behavior is not caused by conduct disorder, manic episode in bipolar disorder AND and feel stressed AND and generally, they can afford to buy things they steal. AND and feel tense AND and take the things spontaneously AND and they do not feel guilty after stealing AND and have a great urgent desire to steal things that are not needed

	AND and feel relieved and satisfied when stealing AND and although after stealing they feel fear and regret, the desire to steal will arise again spontaneously AND and they steal not for personal advantages or revenge AND and inadequacy AND and insecurity AND and lack of self-confidence AND and little self-understanding AND and lack of satisfaction insocial relationship AND and emotional immaturity AND and disturbed personality AND and have pathology in the nervous system THEN the Personality Disorder is <u>Kleptomania</u> .
38	IF is not flexible about morality AND and stingy AND and excessive devotion to work AND and stubborn THEN the Personality Disorder is <u>Obsessive-compulsive</u> .
39	IF high curiosity in teenagers AND and for men, usually they like to try enter their genitals THEN the Personality Disorder is <u>Autopedderasty</u> .
40	IF irritable and aggressive AND and little feeling of regret AND and do not care about the safety of self and others THEN the Personality Disorder is <u>Antisocial</u> .

Decision Table Analysis

According to Panpan, a decision table is needed to show the reciprocal relationships between the values on the intermediate-phase outcomes or the final recommendation of a knowledge based system (KBS). Decision making table can be seen in table 2 [8].

Table 2: Decision Table

Decision Table		
Conclu sion	Do you feel or experience these things?	and

Paranoid	Many suspicions against others	na
Schizoid	Less interest or less like to close relationship	Being ignorant of the praise or criticism of others
Histronic	Excessive emotional expression	Feeling empty and chronic
Schizotypal	Strange speech pattern	Excessive emotional expression
Narcissistic	The extreme need to be praised	The tendency to exploit others
Borderline	Unstable emotions and behavior	Very difficult to control anger
Avoidant	Feel inferior	Limiting themselves to intimate relationship for fear of humiliation
Dependent	Difficult in decision-making without advice or excessive support from others	It is hard to do everything alone because of lack of confidence
Psychopathic	Good at creating the perfect lies	Have the ability to master the emotion of others and even manipulate it
Homosexual	Have the excessive feeling to the same-sex	Has an abnormality in inappropriate behavior of his nature

Self harm / self injuries	Always avoid trouble	Difficult to control emotion
Post Traumatic Stress	Easy to angry	Feeling guilty, shame or blame him/herself
Anorexia Nervosa	He / she does not want to maintain weight at normal level	The intense fear that the weight will increase
schizoaffective	Mood disorder	hallucinations, hearing whispers, delusions, communal chaos
Bipolar Disorder	excitement or depression	extreme (the change is very fast) and settled
Schizophrenia	the appearance of hallucinations either by visual hearing or projection	Abnormal behavior
Lesbian	Looks very masculine or very feminism	cold / stiff impressed
dissociative identity or dual personality	at least two different personalities exist within a person	two or more of these personalities repeatedly take
Then Amnesia Dissociative	suffered loss of memory for no detectable organic cause	unable to recall important personal information
Then Fugue Dissociative	Confused about identity then usually suddenly leave	Impressed normal and showed no sign of any other disturbance

Depersonalization	Loss or temporary change in ordinary feelings	Such individuals are able to maintain a reality test
Hypochondria	He thinks with fear	He thinks with fear that he has severe illness
Somatization	Preoccupation with defect shadows in appearance	Preoccupation causes clinically significant suffering
Somnambulism	Sitting on the bed and opening his eyes	Has a wistful and glassy eye expression
Phobia	Experience anxiety in a certain condition only	Complaining of excessive and irrational feelings of worry
Hysteria	Selfish and arbitrary	Always feeling unhappy, very suggestive, and very sensitive
Organic psychosis	Disruption to the function of brain tissue, so that the patients experience	Unable to take responsibility
Exhibitionist	Repetitive, intense, and occur over a period of at least 6 months	The person concerned acts in impulse
Affective Personality Disorders	The state of his/her emotions and feelings that change between depression	Excessive happiness and sadness

Explosive personality disorder	Showing certain other traits and day-to-day behavior	Aggressiveness
Passive-Aggressive Personality Disorder	Feel that the need for dependence was never met	Obstructionism (happy to obstruct)
Necrophilia	Various forms of sadistic behavior	Interested and look at all forms of death
Acrotomophilia	Crazy about amputations	Excited at seeing an amputated human body
Pedophilia	Situational disturbing (situational molester) that has	The preference molester is
Clot	Penchant for peeking woman	Very happy with the object that are in direct contact with
Kleptomania	Repetition steals objects that are not needed by the individual	Increased impulse continuously before stealing
Obsessive-compulsive	Inflexible about moral	miserly
Auto pederasty	Very high curiosity in adolescents	For men, they usually like to try to put their genital in
Anti social	Irritable and aggressive	Less regretful

Application View

The application developed displays a type of personality disorder and also a conclusion note of the type of personality disorder in the expert system rule (If-Then).

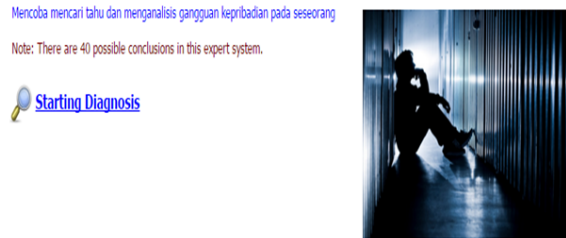


Figure 1: Application home view

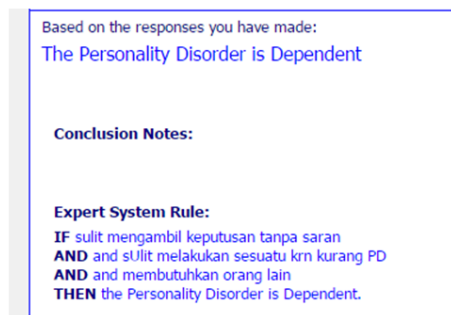


Figure 2: Application Output View

Conclusion

Based on the results and discussion of "Application for Early Diagnosis of Personality Disorders", it can be concluded that

1. This application can help the user in diagnosing personality disorder by providing quite complete symptoms. There are about 30 types of personality disorders in the application.
2. For further research, it can be developed using mobile-based applications so that users can easily access them.

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