

Expert System Delayed Walking in the Toddler

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Abstract

Delayed walking is a disorder of walking delay in the toddler aged 9-18 months. There are several indicators that cause delays in walking on children including motor, genetic and temperament. These factors are rarely understood by parents. And sometimes the delays seem to be left unchecked and that can cause its own failure. The lack of time to consult with a child specialist has resulted in such cases seeming to be left unchecked. Expert systems are built to provide knowledge to the public about the phenomena of walking delays that occur in children and the causes and solutions that will be obtained by parents. This system was built using a forward chaining method whose data reading was traced to the daily activities of toddlers. This system is designed to adapt information directly from child experts or child specialists who understand firsthand the condition of the child and delayed walking.

Keywords: Expert System, Forward Chaining, Delayed Walking, Toddler

1. Introduction

Child development is a psychophysical change resulting from the process of maturing the psychological and physical functions of children which are supported by environmental factors and learning processes in a certain period of time towards maturity. Child development consists of: motor development, language, speech, and social development. Motor development consists of gross motor and fine motor development. Gross motor development is related to movements that are influenced by the skills of large muscles such as sitting, standing and walking while fine motor skills are associated with movements that are affected by the skills of fine nerves such as holding objects with index and thumb. The ability develops along with the age and maturity of the child as well as the nerves and muscles[1]

The hope of some parents in the toddlers generally is to want the toddler to walk quickly. Motor development, especially the ability to walk normal age varies from the age of 9 months to 18 months [2]

Parents begin to worry when their children cannot walk until reached 18 months. Indeed, being able to walk at the age of 15-18 months is still within normal limits, but usually these children have gross motor disorders and mild balance disorders that will be better given intervention and stimulation early. In general, children walk late with other gross motor movement delays and balance disorders. Often parents or some doctors consider children not confident or traumatized when walking.

it is should be discussed with child experts to find out the indications that cause is it, to make it easier their must be communicate with experts in children and toddlers, so a system was created that aims to help parents find solutions to late walking in children using expert systems. this system is built using the forward chaning method.

MakalahharusberisiLatarBelakang, pernyataan, Rasional.

2. Theoretical Basis

Expert system is a system that adapts one's expertise to a system based on knowlegebase [3]. The expert system consists of two main parts, namely: development environment and consultation environment. it is used as an expert system builder both in terms of building components and knowledge bases. The consultation environment is used by someone who is not an expert to consult [4]

3. Research Method

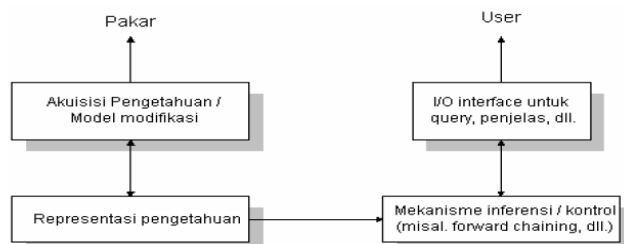


Figure 1. Structure Of expert system

Knowledge-based computer expert systems are computer programs that have knowledge originating from knowledgeable people (experts) in a particular domain, where knowledge here is human knowledge which is very minimal in its spread, expensive and difficult to obtain.

Although it is can solve problems in a limited domain based on the knowledge entered into it, but the expert system cannot solve that cannot be solved by humans. Therefore the reliability of the expert system lies in the knowledge entered into it.

The Conditions of expert systems can help humans solve their problems, including:

1. The need for many experts (experts), but the available experts are very limited in number.
2. Excessive use of experts in making decisions, even in a routine task.
3. Critical considerations must be taken in a short time to avoid undesirable things.
4. Optimal results, such as in digestion or configuration.
5. A large amount of data that experts must examine continuously

An inference engine is the brain of an expert system, this part contains the mechanism of function thinking and patterns of system reasoning used by an expert. This mechanism will analyze a particular problem and then find the best answer or conclusion. From the facts obtained during the question and answer process with the user, as well as the rules stored in the knowledge base, the inference engine can draw a conclusion and provide recommendations or suggestions expected by the user. Some approaches in compiling the inference engine are as follows:

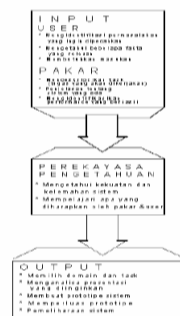


Figure 2. Knowledge Engineering with IO Expert Systems

a. Forward Chaining

3.2 Forward Chaining

it is called: data-driven because the inference engine uses information that is determined by the user to move to all networks from the logic "AND" and "OR" until a terminal is specified as an object. If the inference engine cannot determine the object, it will ask for other information. The rule (Rule) where specifies an object, forming the path (path) that points to the object. Therefore, only one way to reach an object is to fulfill all the rules.

If it is conditioned on 10 activities from expert systems that use the forward chaining method are as follows:

- R1 : if A and B then C
- R2 : if C then D
- R3 : if A and E then F
- R4 : if A then G
- R5 : if F and G then D
- R6 : if G and E then H
- R7 : if C and H then I

R8 : if I and A then J
 R9 : if G then J
 R10 : if J then K

The initial facts given are only A and E, wanting to prove whether K is true. it is reasoning process is shown in the picture below:

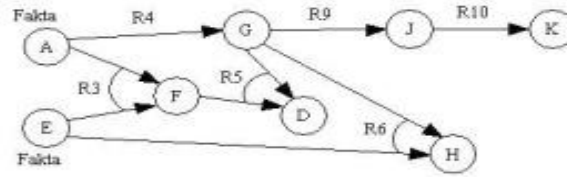


Figure 3. Forward Chaining

The design of system integration model rule begins with designing a knowledge base. Designing a knowledge base uses production rules to present knowledge of recommendations, directions or strategies. Production rules are written in the form of if-then statements. The principle of if-then connects (antecedent) with the consequences that result. In it of this expert system knowledge base the premise is a symptoms found in digestion are a type of digestive disorder, so the form of the statement is (if-then). It is part of rules in the production rules can have more than one proposition, which means that in this expert system in one rule can have more than one symptom. The symptoms are connected using the IF-THEN logic operator. Table 1 shows some forms of if-then statements.

Table 1. Examples of Symptoms with IFTHEN Logic

Kode	Logika dengan Gejala If Then
R1	If it's 8 months old BB 9kg TB 70.25cm Balanced Muscles Slow Leg Nerves The condition of the child crawling Then Motoric
R2	If Usia 12 Bulan BB 15Kg TB 70cm Otot tidak Seimbang Syaraf Kaki Lambat Kondisi Anak Gamang Berjalan Then Vertibularis

The success of an expert system application is a method of designing knowledge and how to process that knowledge so that conclusions can be drawn. Knowledge from interviews and analysis into table of digestive disorders and symptoms to facilitate the process of finding solutions. Table 2 shows several types of digestive disorders obtained from the results of the study.

Table 2 Causes of Late Walking

Kode	Gangguan Keterlambatan
P1	Motorik
P2	Vertibularis
P3	Sensor Raba
P4	Psikologis
P5	Genetik

Database design is done to describe the data used and correlated in the application of expert systems. There are several parts of the connected table, namely admin tables, consultation tables, disease tables, symptom tables, and rule tables. This design shows the existence of users, experts, patients, diseases that are connected by a consultation table. While the symptom table or facts found against the possibility that resulted in the existence of digestive disease disorders in table 3.

Table 3. Symptoms of Delayed Walking Disorders

Kode	Kondisi Pada Anak
G001	Usia 8-12 Bulan
G002	Usia 12-15 Bulan
G003	Usia 15-18 Bulan
G004	Usia 18-24 Bulan
G005	Usia 24-32 Bulan
G006	Usia Diatas 32 Bulan
G007	BMI Normal
G008	BMI Kurang
G009	BMI Gemuk
G010	BMI Obesitas
G011	Otot Seimbang
G012	Tidak Seimbang
G013	Saraf kaki lambat
G014	Saraf kaki sedang
G015	Saraf kaki tidak mampu bergerak sama sekali

4. Result

The conclusion of the diagnosis, there may be more than one syndrome with delayed walking. This happens if the question and answer process between users and visitors are obtained. CONDITIONS that meet several HYPOTHESES are obtained. Results and discussion.

It starts using the system, the user will be faced with the first login display, login here to find out the system user. If the user has not been registered in the system, the information that will be provided is that the user must register first, as in Figure 5 below:

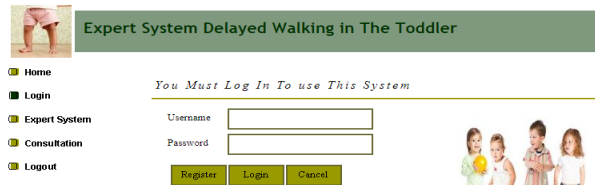


Figure 5. Form Login

After that the user is directed to an expert system activity that provides knowledge about expert systems. After that the user will be directed to consultation activities where parents will explain about the condition of the toddler at that time as in the following picture:

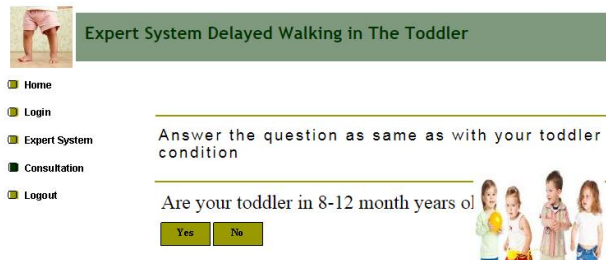


Figure 6. Form Login

By the explanation obtained from parents of toddlers and based on the rules that have been created, the expert will provide solutions in the form of knowledge to the user as follows:

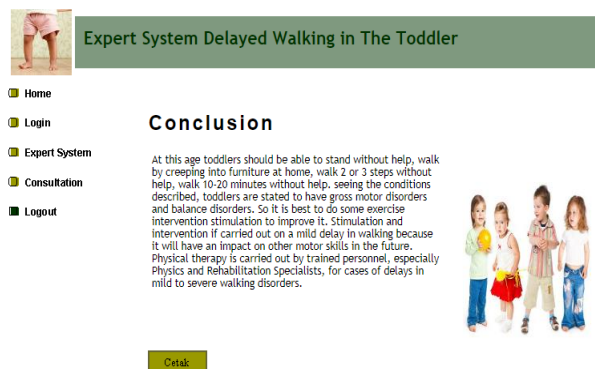


Figure 7. Form Login

This knowledge can be printed and used as a reference for complaints to pediatricians. testing system is used to find out whether the system has been running according to what was planned. The tests conducted focus on the functional requirements of the software. This test allows the expert to obtain a collection of input conditions that will work on all the functional requirements of the program. This test aims to show the function of software about how to operate it.

The black box model testing is done by doing a text case by partitioning the input domain by providing in-depth testing coverage. In the testing involved the system users and experts including doctors, paramedics, clinical officers, IT practitioners, and information system students

5. Conclusion

The conclusions that can be drawn from the discussion of this study are , his system provides optimal time in providing information, anytime and anywhere. This system is able to provide information to parents in consultation. This expert system produces the expected conclusion by using the forward chaining method.

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