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Osteoporosis Diagnosis Aplication

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Abstract

The background of this research is that there are only few orthopedists at the General Hospital of Bengkulu province Indonesia, so that many patients with osteoporosis can not be treated immediately. The researcher uses orthopedist's knowledge as expert. The purpose of this research is to design application and develop Forward Chaining method by combining unity, rules and conclusion fact. Furthermore, the researcher examines the information's truth that can be used as conclusion of patient diagnosis. To make the application the researcher uses Java Net beans IDE 7.0 and MySQL as the data base. One of the results of this research is Osteoporosis Diagnosis Application that can be used by patient without directly consulting with doctor. The appeared information can also be used as initial information to consult with orthopedist if needed; patient also gets knowledge about osteoporosis.

Key Words: Osteoporosis, Forward Chaining, NetBeans IDE 7.0, MySQL

INTRODUCTION:

Today, there are only few orthopedists in Bengkulu province. Bone disease is a health problem with unseen syndromes, for example, osteoporosis shows almost no signs outside the body. This bone-mass-decreasing process can be figured out with *Radiology* or *Densitometry*. This disease is affected by many factors such as age, race, weight, nutrition, life style, certain drugs, certain disease, hormone and gene. But it is mostly by aging, especially in women. Up to now, examination with high accuracy result is done with *Bone Densitometry* such as DEXA. However, this device can only be found in certain places. Besides, it is high cost. Based on the existing problem, the researcher with his computer science background tries to create Osteoporosis Diagnosis Application. In designing and creating the application the researcher uses the knowledge of orthopedist as the basis. The researcher also uses doctor's knowledge as osteoporosis expert. In creating the application the researcher uses Java NetBeans 7.0. Programming language. The application made from this research can be operated with windows operating system and android. This system can later be used by patient to do initial diagnosis without directly meeting orthopedist; patient will also get all initial information about bone health problem.

1. MATERIAL AND METHODS

A. Expert System: Expert system is one field of development of *Artificial Intelligence* (AI) that combines knowledge and data search to solve problem normally needs human expertise. The goal of expert system development is not to replace human role, but to substitute human knowledge in the form of system so that it can be used by many people. [1] There are two important parts of expert system. The first is the development environment that is used by the maker of expert system to build component and introduce knowledge into knowledge basis. The second is consultation environment that is used by user to consult so that user gets knowledge and advice from the expert system like consulting with an expert.

Expert system architecture has main components namely *user interface, expert system data base, knowledge acquisition facility,* and *inference mechanism.* Besides, there is one component that only exists in some expert systems namely *explanation facility. User interface* is sofware that provides communication media between user and system. The data base of expert system contains knowledge at a level of expert on certain subjet. It contains knowledge that is needed to understand, design and solve problem. Inferene technique of

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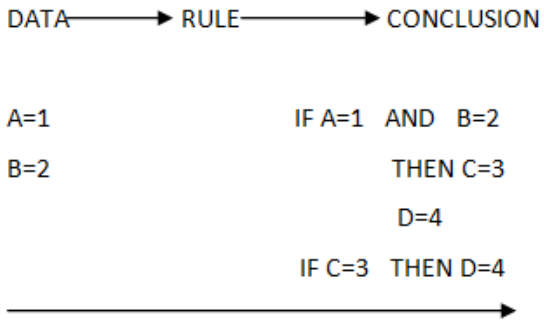
Forward chaining uses unity of condition-action. In this method, data are used to determine which rule is going to be applied, than the rule is applied. The next step is to attach data to the working memory. Processes are repetaed until a result is found. [2]



Picture 1: Forward Chaining

Forward Chaining method is suitable to use to overcome problem of controlling and prediction (prognosis). One example of inference using forward chaining is, If a patient suffers from *Epilepsy Idiopatic* with CF between 0.4 to 0.6 Then give *Carbamazepine*.

B. Diagnosis: Diagnosis is identifiation on objet or thing [3]. Scientifically, osteoporosis is weakness of bone signed with lost of bone density so that bone is easily fractured and does not endure light impact [4]. Osteoporosis is a condition of obvious bone-mass decrease results in low bone density. Osteoporosis is unpredicable. When a bone has been fragile, sudden fracture immediately becomes the syndrome. Often, people do not realize that they suffer from osteoporosis until their bones are really fragile, and sudden body stretching, colide or fall cause fracture. It is why the disease is called *the silent disease* [5].

C. Computer and Java NetBeans: Computer is a device to process information based on determined proedures. Initially the word meaning of computer was refered to people who do arithmetic calculating, whether with helping device or not, but later it changes, it refers to the machine itself [6]. Computer system can be used to process data. Computer system consists of basic elements in the form of hardware, sofware and human (brainware)[7]. Java programming language is created by James Gosling and Patrick Naughton in a project of Sun Microsystem. At the beginning, they wanted to name it OAK,refered to a tree in James Gosling's office. But, OAK already existed in Sun Mycro sytem, so it was named Java (the inspiration was from drinking coffee).

The first browser that can read Java is Hot Java. Since Netscape browser from Netscape Navigator company and Internet Explorer from Microsoft Inc. could read Java script, Java language has increased its popularity. Other vendors such as IBM, Oracle, Symantec, Inprice (It was Borland Inc), and mobile phones companies such as Nokia, Siemens, Sony Ericsson, Motorola and Samsung also adopt Java technology [8].

NetBeans IDE 7.0 is a development environment, a tool to be used by programmer to write, compile, find out mistake and distribute program. IDE NetBeans is written in Java, but also support other proramming languages. There are many moduls to expand IDE NetBeans. IDE NetBeans is a non-limited product. NetBeans refers to two things, platform for developing JAVA desktop, and an Integrated Development Environment (IDE) that is built using NetBeans platform. NetBeans platform enables application to be built from a group of modular software componenets called modul. A modul is a Java archieve, which makes JAVA classes to interact with NetBeans Open API and manifestation file, which identifies it as modul. Application that is built with moduls can be developed by adding new moduls. Because modul can be developed independently, the application based on NetBeans can be developed by third party easily and powerfully.

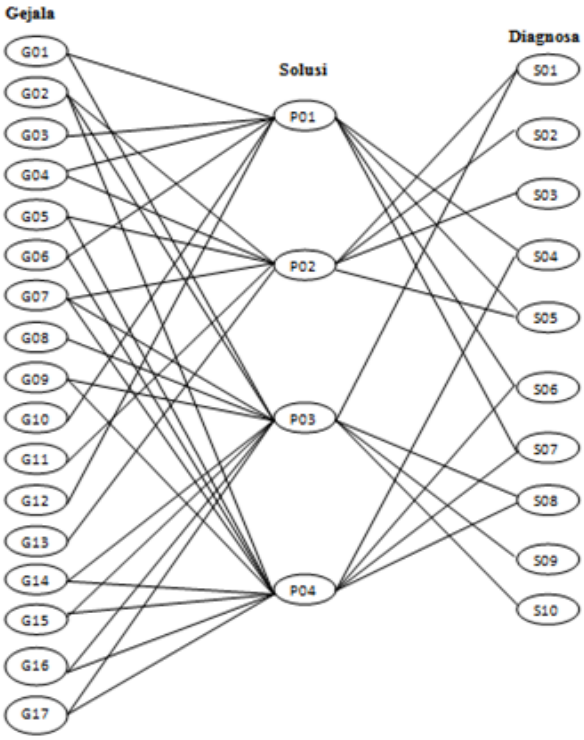
D. Methodology: The method used to create and to design the result of this research is Data Flow Diagram. Data Flow Diagram (DFD) is a network that illustrates an automatic/a computerized system, manualization or compound of both, which is illustrated in the form of group of interconnected system components based on rule[9].The advantage of using DFD is the posibility to illustrate system from a lower level (decomposition). The disadvantage of using DFD is that it does not show repetition process (looping), decision process and calculation process. DFD is a diagram that shows system activity completed with components that shows explicitly file used, source or purpose of data, also the data flow from a process to another [10].

Entity Relationship Diagram (ERD) is a network model that illustrates data structure stored in a system abstractly. So, it is clear that ERD is different from DFD, which is a data network model emphasizes on structures and data relationship. According to data base is used to store structured data . The structure

for the data can be designed using varied technical versions; one of them is called Entity Relationship Modelling or ERM [11].

ERM model was firstly acknowledged by Peter in 1976 as a way to unify network and illustrate the real situation of entity and relationship. Database design is integrated unity of logic data element that is interconneted; data base consolidates many records, which formerly are in separated file. Data base is also a unity of data, which connected logically with the description of the data, that is designed to provide information that is needed by an organization. It means that data base is a huge place to store data, which can be used by many users. In term of item data base does not belong to a department but it becomes company's resource that can be used together [12].

3. DESIGN OF APPLICATION SEMANTIC DIAGRAM



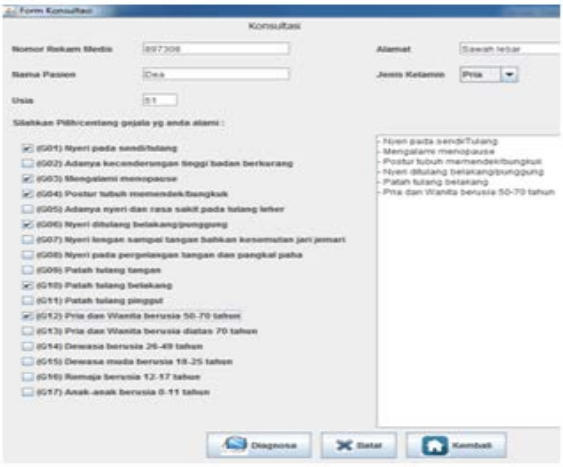
Picture 2: Semantic Diagram

4. RESULT AND DISCUSSION

A. Consultation Menu: The consultation menu in the Osteoporosis Diagnosis Application can be used by patient with bone diseases by choosing consultation menu and patient can directly consult through the application without having to meet directly with orthopedist. It can be seen in picture 3.

Picture3. User's menu

B. Consultation Result: There are four fields in the consultation menu: input of patient's name, input of address, input of age, and input of sex. The menu also has two buttons, diagnosis and back. It can be seen in picture4 below:



Picture 4: Result Menu

5. SYSTEM TESTING RESULT

Black Box Testing is used here. The final result is expected that each rule fits the determined purpose. Therefore, the system in this program is tested by inserting each rule into the program system. If the system has not been able to run each rule, the program will do remodification. Besides, the system testing stage will determine which platform to be used so that the system runs maximally, and how far the system can run rules without having bug or error [13]. Black Box Testing is done to minimize bug and determine which operating system to be used so that the system can run well. And the most important, after the program considered to be complete, its main function will not come out from the determined function.

Table 1: System Testing Result

No	Testing Scenario	Expected Result	Conclusion
01	Username and password left empty, then click login button (form of login admin)	System will reject the login access and shows message " Login gagal (login fail)"	valid
02	Username correct and password wrong , then click login button (form of login admin)	System will reject login access and shows message "Login gagal (login fail)"	valid
03	Username and password inserted correctly, then click login button (form login admin)	System accepts the login access and shows message "Login berhasil (login success)"	Valid
04	In the form of syndrome input click button, then without filling in the syndrome code immediately click save button	System will reject to save data and shows message "Data Tidak Boleh Kosong (Don't leave the data empty)"	valid
05	In the form of syndrome input click button then fill in the syndrome code and immediately click save button	System will save data and shows message "Data Berhasil Disimpan (Data successfully saved)"	Valid
06	In the form of syndrome input click edit button and change the syndrome then click save button	System will save data that have been changed and shows message "Data Berhasil Dirubah (Data successfully changed)"	Valid
07	In the form of syndrome input choose data in the table and click erase	Will come a message "Apakah anda ingin menghapus data ini? (Do you want to erase the data?) Yes/no" click Yes and data will be erased and there will be message "Data berhasil dihapus (Data successfully erased)"', click No and the data will not be erased	Valid

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