iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 2 **Issue:** VI **Month of publication:** June 2014

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

ISSN: 2321-9653

INTERNATIONAL JOURNAL FOR RESEARCH IN APPLIED SCIENCE AND ENGINEERING TECHNOLOGY (IJRASET)

Neurological Disorder Diagnosis System

Atul Krishan Sharma[1] , Stuti Gupta[2]

Department of CSE, Maharishi Dayanand University, Rohtak, India

Abstract: ***In this paper we have presented Neurological Disorder Diagnosis System. This paper present an account of Rule-Based Expert System (RBES) for Neurological Disorders, i.e., Alzheimer, Parkinson, Tetanus disease, Cerebral Palsy, Meningitis, Epilepsy, Multiple Sclerosis, Stroke, Cluster headache, Migraine, Meningitis. Neurological disorders are mainly concerned with the malfunctioning of nervous system. Detection and monitoring of neurological disorders at early stage is essential for quality life and facilitate necessary diagnosis and treatment of the diagnosed disease. The focus of this paper is the development of Neurological Disorder Diagnosis System (NDDS) which can act as home agent to detect the disorder with accuracy to that of an expert. The proposed model provides health professionals with a decision-making tool which works through a session of query and answer with the patient. The proposed system is a rule based expert system which allows non expert to detect the nervous system disorders at an early stage. The system consists of a knowledge base with some facts. On the basis of these facts the medical practitioner will fed symptoms as input. The system by applying inference procedures will return the output as results. More than10 types of neurological diseases can be diagnosed and treated by our system.***

Keywords: Artificial Intelligence, Rule Based system, Expert System, Backward Chaining, Neurological Disorders.

1. INTRODUCTION

Neurological Disorder Diagnosis System (NDSS) is an expert system which will be used to diagnose neurological disorder at an early stage[1][2]. Early detection will lead to proper treatment of the disorder and maintain the health of the person. Expert System is a branch of Artificial Intelligence developed in 1960's. Since then the concept is widely used to deploy AI Technique to solve real life problems that are only solvable by the human expertise. An expert system can be defined as an Intelligent System which uses knowledge base to solve the problem.

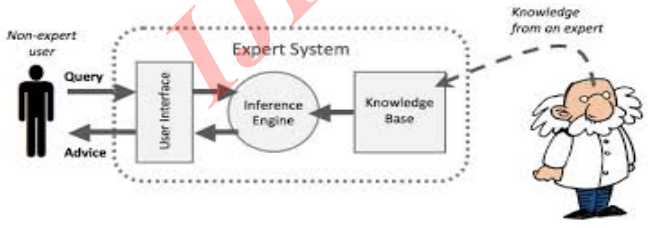


Fig 1: Architecture of Expert System

Knowledge base is an artificial intelligence technique used to store complex information regarding a problem. A knowledge base system mainly has four main components: A knowledge base to store problem information, an inference engine to apply inference procedure on knowledge, knowledge representation tool to represent the processed knowledge[6]. The proposed system is a rule based expert system which uses knowledge base for determining the neurological disorder[2].

A rule based system uses chaining rules to apply inference procedures on knowledge. Mainly forward chaining and backward chaining rules are implemented for expert system. The proposed system uses backward chaining procedure to diagnose the disease. Backward chaining procedure works by applying rules and reach to a particular goal specified. In the proposed system that particular goal is the disorder. MYCIN is a previously designed rule based expert system to solve a particular type of problem. CDSS is another such type of system which is used to act as a home doctor for nurses and medical practitioners. The proposed system will use external DBMS and AI Technique, Knowledge base to for its implementation. In section 2 we have explained proposed system and its objectives,

IJRASET: ISSN: 2321-9653

in section 3 we have design the system in which knowledge Acquisition, processing of the knowledge and how that knowledge will be used to get the result, in section 4 implementation part, in sec 5 we have analyze the various cases to get the result and in section 6 that is the last section where we conclude the paper

2. PROPOSED SYSTEM

The proposed system Neurological Disorder Diagnosis System (NDDS) is a system developed mainly to help medical practitioners to detect neurological disorder at an early stage. This is performed by using simple Query and Answer Session. The system will query for the symptoms and on the basis of algorithm will apply inference procedure on answers of queries result the output as a possible disease with accuracy. The proposed system is able to diagnose neurological disorders like Dementia, Epilepsy, Headache Disorders, Multiple Sclerosis, Neuro infections, malnutritional disorders, parkinson's disease. About 10 types of disorders can be diagnosed by the proposed system. The proposed System has four main components: User interface, Inference Engine, Working memory, Knowledge base.

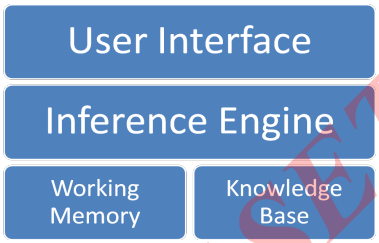


Fig 2. Architecture of proposed system

User Interface : User interface acts as a interface between the user and the system. It is a GUI which is easily understandable by the naïve user.
Inference Engine : Inference Engine applies inference procedure on the input given and gives the result back to the user.
Working Memory : Working memory consists of facts and rules.
Knowledge Base : It acts as repository for the user to find its result.
OBJECTIVES OF THE PROPOSED SYSTEM

1. To implement the IT in real world problems.
2. To assist Medical students.
3. To develop an interactive rule- based expert system to help the neurology diagnosis process.
4. To produce relevant data and information for consultations and with the results obtained at this stage, produce possible diagnoses and suggest treatments.
5. To review Artificial Intelligence literature in an expert systems and estimate the expert system model that fits in the domain of neurology.
6. To help general practice doctors, nurses, nursing students etc .
7. To assist Neurologists for various diseases associated with symptoms, i.e. to be a home assistant for doctors.
8. To create a medical record for a patient's health history.
9. To provide useful information that will help the doctor make some critical decision concerning a patient's health.
10. To provide researchers up-to-date repository of information regarding various neurologial diseases.

3. SYSTEM DESIGN

In this paper, Neurological Disorder Diagnosis System (NDDS) has been developed which by applying a question answer session with the patient detect the neurological disorder of the patient. The approach used for this system is rule based approach which uses backward chaining procedure for its implementation. The system can diagnose about 10 type of neurological disorder with this approach with accuracy equivalent to that of an expert. There are various stages in the development of the system.

a) Knowledge Acquisition

Knowledge acquisition is done by searching for the content on World Wide Web (WWW). Knowledge acquisition is another term for knowledge gathering. Reading reports of World Health Organization and other medical reports a knowledge base is maintained for 10 types of neurological disorders.

IJRASET: ISSN: 2321-9653

Table1: An example table showing symptoms

ID	SYMPTOM
S1	Primary headache
S2	Migraine
S3	Having Difficulty Walking
S4	Not know the time of day or the day of week
S5	Difficulty in swallowing

The above table demonstrates the way symptoms are arranged according to their ID. These symptoms will be matched against the inputs given by the user and by applying inference rules goal will be achieved.

b) Knowledge Processing

Knowledge processing is achieved by applying inference rules on facts and the solution is achieved by applying the same procedure over and over. In the proposed system backward chaining rules will be applied. Thus rule applied will be,

if<condition> then <condition> else <condition>

For example: if < S1,S9, S10, S20 > then <meningitis> else < no record found>

The above example provides a sample of working of the proposed system. The example states that if a person shows symptoms s1, s9, s10, s20 then the probability is the person has meningitis. By applying these rules under an algorithmic procedure knowledge processing will be done.

c) Knowledge representation

In the proposed system, Knowledge representation is achieved using MATLAB. It provides a graphical view of how the system is performing and how a goal is achieved using inference rules. Apart from graphical view, MATLAB also allow to see with what accuracy the system is able to achieve the defined goal.

d) Scope of System

The system is able to diagnose about 10 types of neurological disorders. A timely updation to the fact base is requires to diagnose latest symptoms and disorders. The system acts as a huge information repository for researchers researching in the field of medical diagnosis. System can also be modified to deal with uncertainity in the near future using fuzzy reasoning.

4. IMPLEMENTATION

The proposed system is implemented by integrating various software and modules. The interface is designed using IDE like SWI Prolog. SWI-Prolog is an open source implementation of the programming language Prolog, commonly used for teaching and semantic web applications. It has a rich set of libraries for constraint logic programming, multithreading, unit testing, GUI, interfacing to Java, ODBC and others. Prolog interpreter is used to apply inference rules. Prolog is used because it achieves goal by applying backward chaining rules. Prolog best exploits if, then, else rules. It is easily available and easy to learn and work. To create a fact base RDBMS is used. The file is designed which contains various symptoms along with their ID's, the file is then imported in the prolog program for matching the inputs with facts. An external database is used to store the patient's information. MATLAB is used to display the flow graphs regarding the program flow and to calculate the accuracy the system is achieving in reaching to a particular goal.

5. EXPERIMENTAL ANALYSIS

a) Analogy Of Diagnosing Disease

The symptoms fed are the observed symptoms in the patient. The presence of these symptoms provides the evidence for the presence of that particular disorder. Each and every Fact in Knowledge Base is matched against the observed symptom. On successful matching of facts and symptoms a goal is achieved which is the likely presence of the disorder in the patient.

IJRASET: ISSN: 2321-9653

However, these symptoms are also affected by the age, gender and other medical conditions of the patient.

b) Logical Analysis

The above table describes the possible symptoms which can be observed in the patient having some neurological disorder. By applying inference rules on the above given symptoms and observed symptoms, the system can deduce the type of disorder the patient has.

For example:

If (Age>0, gender=M/F) has symptoms(s24, s30, s31,s32,s44,s45)

Then disease (Manengitis).

The above example represents the working of the system. By investigating the age, gender and symptoms observed the system concluded that the patient has Manengitis.

IJRASET: ISSN: 2321-9653

Symptoms

Symptom_No	Symptom_Name
S1	Excessive
S10	Crucify neck muscles
S11	Varying degrees of coma
S12	Delays in securing the kinetic skills
S13	Emergence of abNormal movement patterns
S14	Muscle stiffness
S15	Movement is weak
S16	Has desiccated back
S17	Lack of attention to what is happening around him
S18	High temperature and fever
S19	Neck stiffness
S2	Refrain from food or breast
S20	Pain in the joints
S21	Excessive
S22	Hard headache
S23	Sleepiness with coma
S24	Headache
S25	Feel it (headache)
S26	Excessive, rapid anger, painted face, nausea
S27	Emergence reefs bright, stars, zigzag lines
S28	Feeling nausea or vomit
S29	Phobia light, sound
S3	Sleep much
S30	The headache starts Sudden
S31	Collection of the headache happen one or two in the year and continue time two month or three month
S32	Come in half head but may change to another side
S33	Feel the pain in
S34	Headache sharp and suddenly
S35	Continue for the duration 45 minutes
S36	Teariness eye,Conjunctivitis congestion, clogging Nose,congestion face on the pain
S37	Feel the patient strain
S38	Have migraine
S39	Have Brain tumor
S4	Quickirritability, anger
S40	Have Distortions arteries and veins
S41	Have Head injury in the past
S42	Happen in certain day from week
S43	Feel weakness in your body

Record: 1 of 73 No Filter Search

Table 2: Symptoms Database [2]

IJRASET: ISSN: 2321-9653

6. CONCLUSION AND FUTURE WORK

In this paper, Neurological Disorder Diagnosis System (NDDS) a rule based expert system is developed which helps in diagnosing a nervous system disorder by analyzing the observed symptoms. The developed system treats the computer as an intelligent machine and allow it to give results like an expert. The developed system stores the patients information separately for future use. This expert system is developed to be used as a consultation system for neurologists and researchers in order to

reach a decision. The system developed is different from previously developed systems is in the manner of accuracy. The system is developed to be near possible as accurate as a human expert.

The system can be mae advanced to deal with uncertainity using Fuzzy Based Reasoning Techniques. Fuzzy logic provides high accuracy for problems based on uncertainity. The system can also be developed as touch screen systems which can act as pocket systems to detect neurological disorders.

7. REFERENCES

[1] Bryan S. T, "An introduction to expert systems", Oxford University Computing Laboratory, ISBN 0-902928-73-2.

[2] Ahmad A, "Rule-Based Expert System for Diagnosis and Symptom of Neurological Disorders", Journal of Emerging Trends in Computing and Information Sciences, Vol. 4, No. 3 Mar 2013.

[3] Ruiz M., Duboy V and Cruz P.D.L., "Development of a Knowledge Base for smart screening of language disorders in primary care", 13th IEEE International Conference on BioInformatics and BioEngineering, pp. 121-126, 2012.

[4] "World Health Organization Report", http://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf

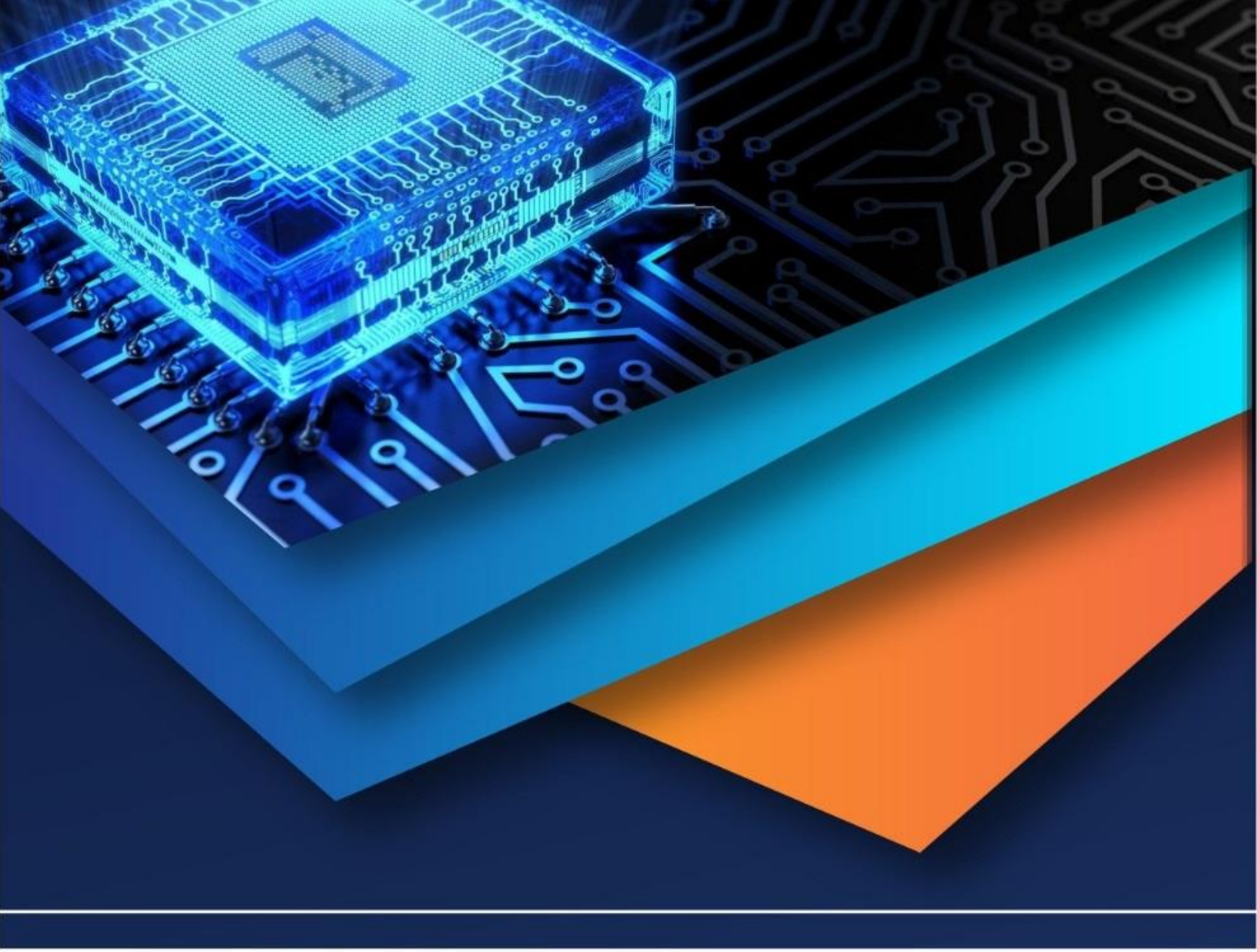
[5] Biswas D., Bairagi S., Panse N. & Shinde N., "Disease Diagnosis System", May 2013.

[6] Lanzola G, Stefanelli M, "A Specialized Framework for Medical Diagnostic Knowledge Based Systems", Pavia, Italy, November 2013.

[7] Patra S.K. and Sahu D. P., "An Expert System for Diagnosis of Human Diseases", International Journal of Computer Applications (0975 – 8887), Volume 1, No. 13, May 2010.

[8] Singla J., Grover D. and Bhandari A., "Medical Expert Systems for Diagnosis of Various Diseases", International Journal of Computer Applications (0975 – 8887), Volume 93, No.7, May 2014.

IJRASET: ISSN: 2321-9653



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)